ORANGE COUNTY WATER DISTRICT
18700 Ward Street
Fountain Valley, California 92708

ADDENDUM NO. 2
TO
CONTRACT DOCUMENTS
FOR
CITY OF GARDEN GROVE WELLS 22, 26, AND 27
PFAS WATER TREATMENT PLANTS PROJECT
CONTRACT NO. GG-2025-1
5/27/2025

This addendum serves as written notice of the following corrections, clarifications, additions and/or deletions to any and all copies of the Request for Bids for City of Garden Grove Wells 22, 26, and 27 PFAS Water Treatment Plants Project, Contract No. GG-2025-1, for OCWD.

THE BIDDER SHALL EXECUTE THE CERTIFICATION AT THE END OF THIS ADDENDUM AND SHALL ATTACH IT TO THE BID SUBMITTED.

BID FORMS

1. DELETE Bid Schedule and REPLACE in its entirety with revised Bid Schedule (Attachment "A" of this Addendum).

GENERAL PROVISIONS - None

SPECIAL PROVISIONS - None

TECHNICAL SPECIFICATIONS

2. Within Section 01 14 00, 1.05 ("B"), DELETE the following:

   Item 4 in its entirety and renumber item 5 to 4 and 6 to 5.

3. Within Section 40 06 20, PIPE SCHEDULE – WELL 22, DELETE the following:

   RW, Raw Water, Working Pressure 100 psi

   PTW, Pump to Waste, Working Pressure 100 psi

   TW, Treated Water, Buried Piping, Type of Joint RESTRAINED MJ

   REPLACE with the following:

   RW, Raw Water, Working Pressure 150 psi,

   PTW, Pump to Waste, Working Pressure 150 psi

TW, Treated Water, Buried Piping, Type of Joint RESTRAINED FLANGE ADAPTER / RESTRAINED MJ

4. Within Section 40 06 20, PIPE SCHEDULE – WELL 26, DELETE the following:

   TW, Treated Water, Buried Piping, Material DUCTILE IRON

   TW, Treated Water, Buried Piping, Type of Joint RESTRAINED MJ

   TW, Treated Water, Buried Piping, Class/Design SECTION 40 05 19

   REPLACE with the following:

   TW, Treated Water, Buried Piping, Material C900 PVC

   TW, Treated Water, Buried Piping, Type of Joint BELL AND SPIGOT

   TW, Treated Water, Buried Piping, Class/Design SECTION 40 05 31/40 06 20

5. Within Section 46 05 24.23, 2.01 (“B”), DELETE the following:

   All steel pipes shall be supplied by American Spiralweld Pipe Company or Northwest Pipe Company.

   REPLACE with the following:

   All steel pipes shall be supplied by American Spiralweld Pipe Company or Northwest Pipe Company or Equal.

6. Within Section 46 60 00, 2.01 (“E.11”), DELETE the following:

   Provide restrained flanged couplings at the influent pipe connection from the valve manifold to the IX vessels per the drawings. Expansion joints connecting the manifold piping to vessels piping shall not be provided.

   REPLACE with the following:

   Provide restrained flanged couplings or restrained expansion joint at the influent pipe connection from the valve manifold to the IX vessel piping per the drawings.

7. Within Section 46 60 00, 2.03 (“A”), DELETE the following:

   Provide 4-inch stainless steel pipe.

   REPLACE with the following:

   Provide 4-inch lined carbon steel pipe. Lining material must be certified as NSF61.

8. ADD Section 03 40 00 – Precast Concrete (Attachment “B” of this Addendum)

9. DELETE Appendix A.2 WELL 26 GEOTECHNICAL EVALUATION in its entirety and REPLACE with (Attachment “C” of this Addendum)

10. ADD Appendix B - Traffic Control Plans (Attachment “D” of this Addendum)

PLAN SHEETS

11. List of revised plan sheets to DELETE and REPLACE (Attachment “E” of this Addendum)
    - *G004 – GENERAL NOTES*
    - *C011 – WELL 22 CIVIL SITE DEMOLITION PLAN – SHEET 1*
    - *C012 – WELL 22 CIVIL SITE DEMOLITION PLAN – SHEET 2*
    - *C013 – WELL 22 CIVIL SITE PLAN AND HORIZONTAL CONTROL – SHEET 1*
    - *C014 – WELL 22 CIVIL SITE PLAN AND HORIZONTAL CONTROL – SHEET 2*
    - *C016 – WELL 22 CIVIL SITE YARD PIPING PLAN – SHEET 2*
    - *C016A – WELL 22 CIVIL YARD PIPING PROFILES*
    - *C018 – WELL 22 CIVIL SITE GRADING, PAVING, AND DRAINAGE PLAN – SHEET 2*
    - *C059 – WELL 26 CIVIL SITE GRADING, PAVING, AND DRAINAGE PLAN – SHEET 3*
    - *C064 – WELL 26 CIVIL RAW WATER PLAN AND PROFILE STA 21+25 – END*
    - *M013 – WELL 22 MECHANICAL TREATMENT AREA PLAN*
    - *M015 – WELL 22 MECHANICAL PIPING CONNECTION PLAN AND ISOMETRIC*
    - *M015 – WELL 26 MECHANICAL WELL PLAN*

QUESTION & ANSWER TABLE

12. Clarifications and Responses to Questions are hereby incorporated into the Contract Documents for Contract GG-2025-1 (Attachment “F” of this Addendum).

REFERENCE DOCUMENTS

13. The following are provided as reference documents for clarification purposes and are available on the OCWD Planroom, “Addenda/Other” tab:
    a. Well 22, CPT-6 Data (in Excel format) as referenced in Technical Specifications, Appendix A.1
    b. Well 26, CPT-7 Data (in Excel format) as referenced in Technical Specifications, Appendix A.2
    c. Well 27, CPT-5 Data (in Excel format) as referenced in Technical Specifications, Appendix A.3

ATTACHMENT A

BID SCHEDULE

No.	Base Bid Items	Est. Quantity	Unit of Measure	Unit Price	Total
1	Mobilization, Demobilization & Clean-Up	1	LS		
2	O&M Manuals	1	LS		
3	Worker Protection and Safety, Sheeting, Shoring, and Bracing	1	LS		
4	Builder's All Risk Insurance	1	LS		
5	Well 22 – Demolition	1	LS		
6	Well 22 – IX System	1	LS		
7	Well 22 – Cartridge Filters	1	LS		
8	Well 22 – Above Grade Piping	1	LS		
9	Well 22 – Below Grade Piping	1	LS		
10	Well 22 – Chlorine Dosing	1	LS		
11	Well 22 – Storm Drain	1	LS		
12	Well 22 – Site Improvements	1	LS		
13	Well 22 – Site Fencing	1	LS		
14	Well 22 – Site Lighting	1	LS		
15	Well 22 – Electrical & I&C	1	LS		
16	Well 22 – Startup, Testing, and Training	1	LS		
17	Well 26 and Well 26 PFAS Water Treatment Plant - Demolition	1	LS		
18	Well 26 PFAS Water Treatment Plant – IX System	1	LS		
19	Well 26 PFAS Water Treatment Plant – Cartridge Filters	1	LS		
20	Well 26 – Sand Separator	1	LS		
21	Well 26 PFAS Water Treatment Plant – Above Grade Piping	1	LS		

No.	Base Bid Items	Est. Quantity	Unit of Measure	Unit Price	Total
22	Well 26 PFAS Water Treatment Plant – Below Grade Piping	1	LS		
23	Well 26 and Well 26 PFAS Water Treatment Plant – Off-Site Below Grade Piping, Raw Water Pipeline	1,519	LF		
24	Well 26 and Well 26 PFAS Water Treatment Plant – Off-Site Below Grade Piping, Raw Water Pipeline via Microtunneling	1	LS		
25	Well 26 PFAS Water Treatment Plant – Off-Site Below Grade Piping, Treated Water Pipeline	261	LF		
26	Well 26 PFAS Water Treatment Plant – Off-Site Below Grade Piping, Filter to Waste Pipeline	1,194	LF		
27	Well 26 PFAS Water Treatment Plant – Off-Site Below Grade Piping, Filter to Waste Pipeline Storm Drain Connection	1	LS		
28	Well 26 PFAS Water Treatment Plant – Ground Improvements	1	LS		
29	Well 26 PFAS Water Treatment Plant – Chemical and Electrical Building	1	LS		
30	Well 26 PFAS Water Treatment Plant – Chlorine Storage	1	LS		
31	Well 26 PFAS Water Treatment Plant – Chlorine Dosing	1	LS		
32	Well 26 PFAS Water Treatment Plant – Site Improvements	1	LS		
33	Well 26 PFAS Water Treatment Plant – Site Fencing	1	LS		
34	Well 26 PFAS Water Treatment Plant – Site Lighting	1	LS		
35	Well 26 PFAS Water Treatment Plant – Electrical Equipment, Panels, and Appurtenances	1	LS		
36	Well 26 PFAS Water Treatment Plant – Electrical & I&C	1	LS		
37	Well 26 – Well Pump	1	LS		

No.	Base Bid Items	Est. Quantity	Unit of Measure	Unit Price	Total
38	Well 26 – VFD	1	LS		
39	Well 26 – Above-Grade Piping	1	LS		
40	Well 26 – Site Improvements	1	LS		
41	Well 26 – Electrical Equipment, Panels, and Appurtenances	1	LS		
42	Well 26 – PLC	1	LS		
43	Well 26 – HVAC	1	LS		
44	Well 26 – Building Improvements	1	LS		
45	Well 26 – Electrical and I&C	1	LS		
46	Well 26 and Well 26 PFAS Water Treatment Plant – Startup, Testing, and Training	1	LS		
47	Well 26 and Well 26 PFAS Water Treatment Plant – Traffic Control	1	LS		
48	Well 27 – Demolition	1	LS		
49	Well 27 – IX System	1	LS		
50	Well 27 – Cartridge Filters	1	LS		
51	Well 27 – Sand Separator	1	LS		
52	Well 27 – Above Grade Piping	1	LS		
53	Well 27 – Below Grade Piping	1	LS		
54	Well 27 – Storm Drain	1	LS		
55	Well 27 – Site Improvements	1	LS		
56	Well 27 – Site Fencing	1	LS		
57	Well 27 – Building Improvements	1	LS		
58	Well 27 – Site Lighting	1	LS		

No.	Base Bid Items	Est. Quantity	Unit of Measure	Unit Price	Total
59	Well 27 – Electrical and I&C	1	LS		
60	Well 27 – Startup, Testing and Training	1	LS		
61	Additional Work as Directed by Engineer*	-	Force Amount	-	$800,000
TOTAL BASE CONTRACT BID PRICE ***The sum of all base bid items listed above, performed in the manner consistent with the Contract***					
(Amount in Words)				**(Amount in Numbers)**	

*Allowance is identified in Special Provisions Section 800. Allowance is to be used as compensation for items as set forth in Special Provisions Section 800. The allowance amount is to be included in the total project bid.

Each individual bid item shall be determined from visiting the work site, reviewing the Plans and Specifications, and all other portions of the Contract Documents, and shall include all items necessary to complete the Work, including the assumption of all obligations, duties, and responsibilities necessary to the successful completion of the Contract, and the furnishing of all materials and equipment required to be incorporated in and form a permanent part of the Work: tools, equipment, supplies, transportation, facilities, labor, superintendence, and services required to perform and complete the Work; site and home office overhead and bonds, insurance and submittals; all as per the requirements of the Contract Documents, whether or not expressly listed or designated.

ATTACHMENT B

SECTION 03 40 00
PRECAST CONCRETE

PART 1 – GENERAL

1.01 REQUIREMENTS

A. The Contractor shall construct all precast concrete items as required in the Contract Documents, including all appurtenances necessary to make a complete installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 21 00 – Reinforcing Steel

B. Section 03 23 00 – Stressing Tendons

C. Section 03 30 00 – Cast-in-Place Concrete

D. Section 03 35 00 – Concrete Finishes

E. Section 03 39 00 – Concrete Curing

F. Section 03 60 00 – Grout

G. Section 05 05 13 – Galvanizing

H. Section 05 05 23 – Metal Fastening

I. Section 05 10 00 – Metal Materials

J. Section 33 05 61 – Utility Structures

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of the Bid.

1. California Building Code

2. ACI 301 – Structural Concrete for Buildings

3. ACI 318 – Building Code Requirements for Structural Concrete

4. ASTM D2240 – Standard Test for Rubber Property – Durometer Hardness

07282025

5. PCI Standard MNL-116 – Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products

6. PCI Standard MNL-120 - Design Handbook Precast and Prestressed Concrete

7. PCI Standard MNL-123 – Manual on Design of Connections for Precast Prestressed Concrete

8. PCI Standard MNL-124 – PCI Design for Fire Resistance of Precast Prestressed Concrete

1.04 SUBMITTALS

A. The Contractor shall submit the following for review in accordance with Section 01 33 00 – Submittal Procedures.

1. Shop Drawings for all precast members including layout and dimensions, unit locations, unit identification marks, reinforcement connection details, support items, dimensions, openings, temporary supports, and relationship to adjacent materials. Indicate design loads, deflections, cambers, bearing requirements, and special conditions. The submittal shall be sealed by a Professional Engineer currently registered in the State or Commonwealth in which the project is located.

2. A list of the design criteria used by the manufacturer for all manufactured, precast items.

3. Design calculations, showing at least the design loads and stresses on the item and assumptions, shall be submitted. Calculations shall be sealed by a Professional Engineer currently registered in the in the State or Commonwealth in which the project is located.

4. Certified reports for all lifting inserts, indicating allowable design loads.

5. Information on lifting and erection procedures.

1.05 QUALITY ASSURANCE

A. All manufactured precast concrete units shall be produced by an experienced manufacturer regularly engaged in the production of such items. All manufactured precast concrete and site-cast units shall be free of defects, spalls, and cracks. Care shall be taken in the mixing of materials, casting, curing, and shipping to avoid any of the above. The Engineer may elect to examine the units at the casting yard or upon arrival of the same at the site. The Engineer shall have the option of rejecting any or all the precast work if it does not meet with the requirements specified herein or on the Drawings. All rejected work shall be replaced at no additional cost to the Owner.

B. Manufacturer Qualifications: The precast concrete manufacturing plant shall be certified by the Prestressed Concrete Institute, Plant Certification Program, prior to the start of production. Certification is required for plants providing prestressed structural members such as hollow core planks, double-T members, etc.

C. Plant production and engineering must be under direct supervision and control of an Engineer who possesses a minimum of five years' experience in precast concrete work.

D. Erector of precast and prestressed items shall be a company specializing in erecting members specified with a minimum of three years documented experience and specifically approved by the fabricator of precast and prestressed members specified.

PART 2 – PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Precast and prestressed members shall be designed to support superimposed loads indicated on the Drawings and as required by current Building Code of the State or Commonwealth in which the project is located. Design shall also consider loads and stresses due to handling, transporting, and erecting of units.

B. Maximum live load deflections for members shall be L/240 for roof members and L/360 for floor members.

C. Members shall be designed to accommodate construction tolerances, and clearances of intended openings.

D. Design shall be performed by a qualified professional engineer registered in the State or Commonwealth in which the project is located.

E. Fire Rating shall be established in accordance with PCI MNL 124 to achieve the fire ratings required on the Drawings for floor, wall, and roof assemblies.

2.02 CONCRETE

A. Concrete materials including Portland cement, aggregates, water, and admixtures shall conform to Section 03 30 00 – Cast-in-Place Concrete. Precast concrete manufacturer has option of using Type III cement for prestressed concrete members to expedite release of prestressing and erection.

B. For prestressed concrete items, minimum compressive strength of concrete at 28 days shall be 5,000 psi unless otherwise specified. Minimum compressive strength of concrete at transfer of prestressing force shall be 3,500 psi unless otherwise specified.

C. For non-prestressed concrete items, minimum compressive strength of concrete at 28 days shall be 4,500 psi for fluid containing and other environmental concrete structures and 4,000 for other structural concrete structures, unless otherwise specified.

2.03 GROUT

A. Grout for joints between members shall be a cement grout in conformance with Section 03 60 00 – Grout.

B. Minimum compressive strength of grout at 7 days shall be 3,000 psi.

2.04 REINFORCING STEEL

A. Reinforcing steel used for precast concrete construction shall conform to Section 03 21 00 – Reinforcing Steel.

2.05 PRESTRESSING STRANDS

A. Prestressing strands shall be 7-wire, stress-relieved, high-strength strands Grade 250K or 270K in conformance with Section 03 23 00 – Stressing Tendons.

2.06 STEEL INSERTS

A. Steel inserts shall be in accordance with Section 05 10 00 – Metal Materials.

B. All steel inserts protruding from or occurring at the surface of precast units shall be galvanized in accordance with Section 05 05 13 – Galvanizing.

2.07 WELDING

A. Welding shall conform to Section 05 05 23 – Metal Fastening.

2.08 BEARING PADS

A. Neoprene bearing pads shall conform to the requirements of A4-F3-T.063-B2, Grade 2, Method B, in accordance with the RMA Rubber Handbook. Pads shall be nonlaminated pads having a nominal Shore A durometer hardness of 70 in accordance with ASTM D2240. Adhesive for use with neoprene pads shall be an epoxy-resin compound compatible with the neoprene having a sufficient shear strength to prevent slippage between pads and adjacent bearing surfaces. Adhesive shall be 20+F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by IGI Adhesives, Sikadur 31, Hi-Mod Gel by Sika Corporation, or DP-605 NS Urethane Adhesive by 3M Adhesive Systems.

B. Plastic bearing pads shall be multi-monomer plastic strips which are non-leaching and support construction loads with no visible overall expansion, manufactured specifically for the purpose of bearing precast concrete.

PART 3 – EXECUTION

3.01 FABRICATION AND CASTING

A. All precast members shall be fabricated and cast to the shapes, dimensions and lengths shown on the Drawings and in compliance with PCI MNL-116. Precast members shall be straight, true, and free from dimensional distortions, except for camber and tolerances permitted later in this clause. All integral appurtenances, reinforcing, openings, etc., shall be accurately located and secured in position. Form materials shall be steel and the systems free from leakage during the casting operation.

B. Manufacturer shall maintain plant records and quality control program during production of precast members.

C. Ensure reinforcing steel anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.

D. Openings with a 10-inch minimum dimension in either direction shall be cast in place. Smaller openings shall be considered in the design and arrangement of reinforcement and strands. These openings may be field cut, but only in the size and location approved by the precast manufacturer.

E. All cover of reinforcing shall be the same as detailed on the Drawings.

F. Because of the critical nature of the bond development length in prestressed concrete panel construction, if the transfer of stress is by burning of the fully tensioned strands at the ends of the member, each strand shall first be burned at the ends of the bed and then at each end of each member before proceeding to the next strand in the burning pattern.

G. The Contractor shall coordinate the communication of all necessary information concerning openings, sleeves, or inserts to the manufacturer of the precast members.

H. Concrete shall be finished in accordance with Section 03 35 00 – Concrete Finishes. Grout all recesses due to cut tendons which will not otherwise be grouted during erection.

I. Curing of precast members shall be in accordance with Section 03 39 00 – Concrete Curing. Use of a membrane curing compound will not be allowed.

J. The manufacturer shall provide lifting inserts or other approved means of lifting members.

3.02 HANDLING, TRANSPORTING AND STORING

A. Precast members shall not be transported away from the casting yard until the concrete has reached the minimum required 28-day compressive strength and a period of at least 5 days has elapsed since casting.

B. No precast member shall be transported from the plant to the job site prior to approval of that member by the plant inspector. This approval will be stamped on the member by the plant inspector.

C. During handling, transporting, and storing, precast concrete members shall be lifted and supported only at the lifting or supporting points as indicated on the shop drawings.

D. All precast members shall be stored on solid, unyielding, storage blocks in a manner to prevent torsion, objectionable bending, and contact with the ground.

E. Precast concrete members shall not be used as storage areas for other materials or equipment.

F. Precast members damaged while being handled or transported will be rejected or shall be repaired in a manner approved by the Engineer.

3.03 ERECTION

A. Erection shall be carried out by the manufacturer or under the manufacturer's supervision using labor, equipment, tools, and materials required for proper execution of the work.

B. Contractor shall prepare all bearing surfaces to a true and level line prior to erection. All supports of the precast members shall be accurately located and of required size and bearing materials.

C. Installation of the precast members shall be made by leveling the top surface of the assembled units keeping the units tight and at right angles to the bearing surface.

D. Connections which require welding shall be properly made in accordance with Section 05 05 23 – Metal Fastening.

E. Grouting between adjacent precast members and along the edges of the assembled precast members shall be accomplished as indicated on the drawings, care being taken to solidly pack such spaces and to prevent leakage or droppings of grout through the assembled precast members. Any grout which seeps through the precast members shall be removed before it hardens.

F. In no case shall concentrated construction loads, or construction loads exceeding the design loads, be placed on the precast members. In no case shall loads be placed on

the precast members prior to the welding operations associated with erection, and prior to placing of topping (if required).

G. No Contractor, Subcontractor or any of their employees shall arbitrarily cut, drill, punch or otherwise tamper with the precast members.

H. Precast members damaged while being erected will be rejected or shall be repaired in a manner approved by the Engineer.

END OF SECTION

ATTACHMENT C

Updated Geotechnical Evaluation
Well 26 PFAS Treatment System
Orange County Water District
12132 Trask Avenue
Garden Grove, California

Hazen and Sawyer

7700 Irvine Center Drive, Suite 200 | Irvine, California 92618

May 26, 2026 | Project No. 213012001

Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore

A SOCOTEC COMPANY

Ninyo & Moore
A SOCOTEC COMPANY

Updated Geotechnical Evaluation
Well 26 PFAS Treatment System
Orange County Water District
12132 Trask Avenue
Garden Grove, California

Mr. Stephen Diamond
Hazen and Sawyer
7700 Irvine Center Drive, Suite 200 | Irvine, California 92618

May 26, 2026 | Project No. 213012001

Michael L. Putt, PG, CEG
Principal Geologist

JCR/MLP/SG/co

Soumitra Guha, PhD, PE, GE
Principal Engineer

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

In accordance with your request and authorization, we have performed a geotechnical evaluation for the Orange County Water District (OCWD) Well 26 Per- and Poly-Fluoroalkyl Substances (PFAS) Treatment System. The project consists of a new PFAS treatment system and a new 16-inch raw water pipeline on Trask Avenue. The new PFAS treatment system will be located at the Orange County Fire Authority (OCFA) Station 83 at 12132 Trask Avenue in Garden Grove, California. The new 16-inch pipeline along Trask Avenue will convey raw water from the existing Well 26 site located at 12351 Trask Avenue to the new PFAS treatment system (Figure 1). Furthermore, due to existing subsurface structures along Trask Avenue, the new raw water pipeline will have a 290-foot-long segment which will need to be constructed using micro-tunneling that will require launching and receiving shafts. The purpose of our study was to evaluate the soil and geologic conditions at the site in order to provide geotechnical recommendations for the design and construction of the proposed improvements. An earlier version of this report (Ninyo & Moore, 2025) was previously prepared for the project. Due to the planned micro-tunneling for the new pipeline in Trask Avenue, additional laboratory testing and geotechnical analysis were performed to develop trenchless construction design recommendations for the project. This updated report presents our geotechnical findings, conclusions, and recommendations regarding the project improvements including the micro-tunneling component.

2 SCOPE OF SERVICES

Our scope of services included the following:

- Project coordination, planning, and scheduling of the subsurface exploration.
- Review of readily available background material, including topographic maps, published geologic maps and literature, fault and seismic hazards maps, groundwater data, and historic aerial photographs.
- Geotechnical site reconnaissance to observe the general site conditions, mark the proposed boring locations, and coordinate with Underground Service Alert for utility clearance.
- Preparation of site-specific traffic control plans.
- Permit Acquisition from the Orange County Health Care Agency for performing borings and a cone penetration test (CPT) sounding deeper than 50 feet and/or borings that will penetrate the water table.
- Permit Acquisition from the City of Garden Grove for performing borings within the City right of way.

- Subsurface exploration consisting of the drilling, logging, and sampling of six hollow-stem auger exploratory borings to depths ranging from approximately 11.5 to 71.5 feet below the ground surface and the advancement of one CPT sounding to a depth of approximately 100.2 feet below the ground surface. The borings were logged by a representative of our firm and bulk and relatively undisturbed soil samples were collected at selected depths for laboratory testing.

- Laboratory testing on selected soil samples, including evaluation of in-situ moisture content and dry density, percentage of soil particles finer than the No. 200 sieve, Atterberg Limits, direct shear strength, R-Value, and corrosivity.

- Geotechnical engineering analysis of data from our background review, subsurface exploration, and laboratory testing.

- Preparation of this report presenting our findings, conclusions, and recommendations pertaining to the geotechnical aspects of the design and construction of the proposed improvements.

3 SITE DESCRIPTION AND PROPOSED CONSTRUCTION

The new PFAS treatment system will be located at the existing OCFA Station 83 at 12132 Trask Avenue in Garden Grove, California (Figure 1). The station is bounded by Trask Avenue to the north, a mobile home development to the east and south, and a healthcare center to the west. The new PFAS treatment system will be located along the southern boundary of the fire station property that is currently acting as a parking area and is surfaced with asphalt concrete (AC). The fire station is located approximately 0.2 miles west of the existing Well 26 site. The Well 26 site is bordered by Trask Avenue to the south, a residential neighborhood to the east, and the East Garden Grove Wintersburg Channel to the west and northwest. The well 26 site has an existing one-story well building. The ground surface around the well building is surfaced with a combination of asphalt concrete and Portland cement concrete pavement and is enclosed with wrought iron fencing with an access gate on the south boundary of the site. The East Garden Grove Wintersburg Channel adjacent to the well site is estimated to be approximately 10 feet high with an inclination of approximately 1.5:1 (horizontal to vertical) and is concrete lined. The topography of the site is relatively flat with a ground surface ranging from 95 to 100 feet above the mean sea level (United States Geological Survey [USGS], 2022).

The purpose of this project is to design a Dual Media Pressure Vessel System to treat well water impacted by PFAS. Based on our review of the preliminary construction drawings (Hazen & Sawyer, 2026) that we were provided, raw water from the existing well pump at Well 26 will be distributed to the new treatment system located at the OCFA Station 83 via approximately 1,500 feet of a new 16-inch pipeline located along Trask Avenue. Waste water from the treatment system will then be pumped into a new 16-inch pipeline along Trask Avenue and discharged into a new

3-foot by 3-foot by 9-foot-deep catch basin located at the Well 26 site. The treated water will be conveyed by a third approximately 260-foot-long 16-inch pipeline from the treatment plant to the existing water main on Trask Avenue. We understand that the proposed raw water, waste water, and treated water pipelines will generally range from approximately 2.5 to 6.5 feet deep; however, an approximately 290-foot-long segment of the 16-inch raw water pipeline will be constructed at approximately 15 to 20 feet below the ground surface where the pipeline crosses beneath existing pipelines and the East Garden Grove Wintersburg Channel on Trask Avenue. This pipeline segment is anticipated to be installed using the jack and bore method to cross beneath the existing channel and adjacent transecting utility lines. The new pipeline will be installed in a single 30- to 36-inch-diameter steel casing. The bottom of the casing will be approximately 16 to 17 feet deep in order to pass beneath the channel. The launching pit will be approximately 12 feet by 30 feet and the receiving pit will be approximately 10 feet by 12 feet. The new treatment system at the OCFA Station 83 will include four new ion exchange vessels, three new cartridge filters, a chemical building, concrete drainage swale, and associated piping (Figure 2). We understand that the new equipment will be supported by mat foundations or spread footings.

4 SUBSURFACE EVALUATION AND LABORATORY TESTING

Our subsurface exploration was performed on May 15, June 10, and November 13, 2025, and consisted of drilling, logging, and sampling of six hollow-stem auger borings to depths ranging from approximately 11.5 to 71.5 feet below the ground surface and the advancement of one CPT sounding to approximately 100.2 feet below the ground surface. Borings B-1 and B-2 were drilled, and CPT-7 was advanced, at the proposed PFAS treatment system site at the existing fire station. Boring B-3 was drilled at the existing Well 26 site and Borings B-4, B-5 and B-6 were drilled on Trask Avenue. The borings were drilled using a truck-mounted drill rig with 8-inch-diameter augers. The borings were logged by a representative from our firm, and bulk and relatively undisturbed soil samples were obtained at selected depths for laboratory testing. The CPT sounding was performed using a 30-ton CPT rig. A continuous soil profile, including cone tip resistance and sleeve friction, was recorded during the CPT sounding. A representative of Ninyo & Moore was on site to observe the CPT sounding. Logs of the exploratory borings are provided in Appendix A and logs of the CPT sounding are provided in Appendix B. The approximate locations of the exploratory borings and CPT sounding are presented on Figure 2.

Laboratory testing was performed on representative samples to evaluate in-situ moisture content and dry density, percentage of soil particles finer than the No. 200 sieve, Atterberg Limits, direct shear strength, R-Value, and corrosivity. The results of the in-situ moisture content and dry density

tests are presented on the boring logs in Appendix A. The remaining laboratory testing results are presented in Appendix C.

5 GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Regional Geology

The subject site is located within the southerly portion of the Los Angeles Basin, which is situated near the northern end of the Peninsular Ranges Geomorphic Province. The Los Angeles Basin has been divided into four structural blocks, which are generally bounded by prominent fault systems: The Northwestern Block, the Southwestern Block, the Central Bock, and the Northeastern Block (Norris and Webb, 1990). The subject site is located within the Central Block, which is bordered on the west by the Newport-Inglewood fault, on the east by the Whittier-Elsinore fault, on the north by the Malibu Coast-Santa Monica-Raymond fault, and on the south by the San Joaquin Hills. The Central Block is characterized by thick sequences of alluvium overlying predominantly sedimentary rock of Cretaceous through Pleistocene age. The depths to crystalline basement rocks are known from petroleum well logs and geophysical data. The total thickness of sedimentary section is roughly 4,000 meters (i.e., about 13,000 feet) near the southern end of the Los Angeles Basin, and exceeds 9,000 meters (i.e., about 30,000 feet in the deepest portion of the block) (Norris and Webb, 1990).

Regional geologic mapping (Morton & Miller, 2006) indicates that the project site is underlain by Holocene and late Pleistocene-age young alluvial-fan deposits consisting of unconsolidated to moderately consolidated silt, sand, and pebbly cobbly sand (Figure 3). Our review of the geologic literature and stereoscopic aerial photographs did not indicate the presence of known active faults underlying the project site.

5.2 Site Geology

Materials encountered during our subsurface exploration generally consisted of structural pavement consisting of asphalt concrete underlain by aggregate base (AB), undocumented fill and alluvium. Structural pavement sections consisting of approximately 4 to 9.5 inches of AC underlain by approximately 2 to 6 inches of AB was encountered in all exploratory borings. The AB generally consisted of moist, dense, silty sand with gravel and silty gravel with sand. Undocumented fill was encountered beneath the structural pavements in all borings to depths of up to approximately 4 feet below ground surface. The fill generally consisted of moist, medium dense silty sand with varying amounts of debris and gravel. Alluvium was encountered beneath the fill in all borings to the explored depths of up to approximately 71.5 feet. The alluvium consisted

of moist to wet, loose to very dense sandy silt, clayey sand, silty sand, poorly graded sand, and poorly graded sand with silt, and wet, stiff to very stiff lean clay and silty clay. More detailed descriptions of the subsurface materials encountered during our exploration are presented on the boring logs in Appendix A.

5.3 Groundwater

Groundwater was encountered in borings B-1, B-2 and B-3 at depths ranging from approximately 19 to 20 feet below the ground surface during drilling. Groundwater was measured at a depth of approximately 16.0 feet below the ground surface utilizing a porewater pressure dissipation test in the CPT sounding. The historic high groundwater depth for the project area is reported to range from approximately 5 to 10 feet below the ground surface (California Department of Conservation, Division of Mines and Geology, State of California [CDMG], 1997). Fluctuations in groundwater levels will occur due to variations in precipitation, ground surface topography, subsurface stratification, irrigation, groundwater pumping, and other factors that may not have been evident at the time of our field evaluation.

6 FAULTING AND SEISMICITY

The subject site is not located within a State of California Earthquake Fault Zone (EFZ), formerly known as the Alquist-Priolo Special Studies Zone (California Geological Survey [CGS], 2018). However, the site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered to be significant during the design life of the proposed project. Figure 4 shows the approximate site location relative to the major faults in the region.

The principal seismic hazards evaluated at the subject site are surface fault rupture, ground motion, liquefaction, dynamic settlement, and lateral spreading. A brief description of these hazards and the potential for their occurrences on site are presented in the following sections.

6.1 Surface Fault Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the project site. Therefore, the probability of damage from surface fault rupture is considered to be low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

6.2 Ground Motion

Considering the proximity of the site to active faults capable of producing a maximum moment magnitude of 6.0 or more, the project area has a high potential for experiencing strong ground motion. The California Building Code (CBC) specifies that the risk-targeted maximum considered earthquake (MCE_R) ground motion response accelerations be used to evaluate seismic loads for design of buildings and other structures. Based on the measurements collected from CPT-7, the average shear wave velocity in the upper 30 meters (100 feet) of the subsurface profile (V_{S30}) is estimated to be approximately 234 meters per second (768 feet per second). In accordance with Chapter 20 of the American Society of Civil Engineers (ASCE) Publication 7-22 (2022) for the Minimum Design Loads and Associated Criteria for Building and Other Structures, the site classification is Site Class D (medium dense sand or stiff clay).

In accordance with ASCE 7-22, the multi-period MCE_R ground motion response accelerations were determined using the USGS Seismic Design Geodatabase accessed through the ASCE 7 Hazard Tool (2025). The multi-period MCE_R ground motion response accelerations are based on the spectral response accelerations in the direction of maximum horizontal response represented by a 5 percent damped acceleration response spectrum that is expected to achieve a 1 percent probability of collapse within a 50-year period with deterministic limits (Figure 5). Spectral response acceleration parameters, consistent with ASCE 7-22 are provided in Section 8.6 for the evaluation of seismic loads on buildings and other structures.

ASCE 7-22 specifies that the potential for liquefaction and soil strength loss be evaluated, where applicable, for the mapped maximum considered earthquake geometric mean (MCE_G) peak ground acceleration adjusted for site effects (PGA_M). The MCE_G PGA_M is based on the geometric mean peak ground acceleration with a 2 percent probability of exceedance in 50 years. The PGA_M for the site was calculated as 0.670g using the ASCE 7 Hazard Tool (2025).

6.3 Liquefaction Evaluation

Liquefaction is the phenomenon in which loosely deposited granular soils and non-plastic silts located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid rise in porewater pressure, and causes the soil to behave as a fluid for a short period of time. Liquefaction is known generally to occur in saturated or near-saturated cohesionless soils at depths shallower than 50 feet below the ground surface. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain

size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking.

Based on our review of the State of California Seismic Hazard Zones Map (CDMG, 1998) the project site is located in an area mapped as being potentially susceptible to liquefaction (Figure 6). Accordingly, the liquefaction potential of the subsurface soils was evaluated using the data from our CPT sounding. The liquefaction analysis was based on the CPT-Based Liquefaction Triggering Procedure (Boulanger and Idriss, 2014) using the computer program CLiq (Geologismiki, 2023). It is our opinion that utilizing the data from the CPT sounding will provide a better estimate of liquefaction compared to the borings since continuous profiles of the soil layers were measured in the CPT sounding. A groundwater depth of 5 feet was used in our analysis based on the reported historic high groundwater depth (CDMG, 1997). A PGA_M of 0.670g was used in our analysis for a design earthquake magnitude of 7.6. Our liquefaction analysis indicates that the loose to medium dense granular soil layers below the historic high groundwater table are susceptible to liquefaction during the design seismic event. The results of our liquefaction analysis are presented in Appendix D.

6.4 Dynamic Settlement

As a result of liquefaction, the proposed improvements may be subject to liquefaction-induced settlement. In order to estimate the amount of post-earthquake settlement, the method proposed by Zhang, et al. (2002) was used in which the seismically induced cyclic stress ratios and correlations from the CPT sounding are related to the volumetric strain of the soil. The amount of soil settlement during a strong seismic event depends on the thickness of the liquefiable layers and the density and/or consistency of the soils.

Under the current conditions, we estimate that liquefaction-induced dynamic settlements of up to approximately 5.5 inches may occur at the project site. Assuming relatively uniform subsurface stratigraphy across the site, we estimate that dynamic differential settlement of up to approximately 2.8 inches may occur over a horizontal distance of about 55 feet.

6.5 Lateral Spreading

Lateral spreading of ground surface during an earthquake usually takes place along weak shear zones that have formed within a liquefiable soil layer. Lateral spread has generally been observed to take place in the direction of a free-face but has also been observed to a lesser extent on ground surfaces with very gentle slopes. An empirical model developed by Youd and Bartlett (2002) is typically used to predict the amount of horizontal ground displacement within a site. For

a site located in proximity to a free-face, the amount of lateral ground displacement is strongly correlated with the distance of the site form the free-face. Other factors such as earthquake magnitude, distance from the earthquake epicenter, thickness of the liquefiable layers, and the fines content and particle sizes of the liquefiable layers also affect the amount of lateral ground displacement.

The East Garden Grove Wintersburg Channel (adjacent to the existing Well 26 site and approximately 280 feet south of the proposed new treatment facility site) is approximately 10 feet lower in elevation compared to the ground surface elevations at the new treatment facility site. Accordingly, our analysis indicates that liquefaction-induced lateral spread of up to approximately 6 inches may occur at the new treatment facility site during the design seismic event.

7 CONCLUSIONS

Based on the results of our evaluation, it is our opinion that the project is feasible from a geotechnical standpoint provided that the following recommendations are incorporated into the design and construction of the proposed improvements. The primary geotechnical concern at the proposed new treatment facility site is the potential for liquefaction-induced dynamic settlement and lateral spread during a seismic event. As described above, our analysis estimates that up to approximately 5.5 inches of total dynamic settlement, 2.8 inches of differential dynamic settlement, and 6 inches of lateral spread towards the East Garden Grove Wintersburg Channel may occur following a significant seismic event. Accordingly, mitigation of liquefaction hazards should be performed for the proposed structures at the treatment facility site. Soil liquefaction and lateral spread during a significant earthquake event could result in damage to pipelines. Mitigation for liquefaction induced settlement is not typically performed for small diameter pipelines; however, measures to reduce damage to pipelines from liquefaction can be considered for the project and could include flexible pipeline material, such as earthquake resistant ductile iron pipe, and using flexible joints, particularly at the connections to the structures that will be mitigated for the liquefaction hazard. Details regarding liquefaction mitigation for the proposed treatment plant site are presented in the Recommendations section of this report.

Additionally, the following conclusions were made:

- Based on our exploratory borings, the site is underlain by fill and young alluvial fan deposits. Fill soils were encountered to depths of up to approximately 4 feet and generally consisted of moist, medium dense, silty sand with varying amounts of debris and gravel. Alluvium was encountered beneath the fill to the explored depths of up to approximately 71.5 feet. The alluvium consisted of moist to wet, loose to very dense sandy silt, silty sand, poorly graded sand, and poorly graded sand with silt, and wet, stiff to very stiff lean clay and silty clay.

- The near-surface granular soils encountered at the site have little cohesion and may be subject to caving. These soils should be considered to be Type C soils in accordance with the Occupational Safety and Health Administration (OSHA) guidelines. Appropriate shoring systems for these types of soils should be considered during planning if site constraints do not allow for sloped excavations.

- The on-site soils should be generally suitable for use as compacted fill provided that those are free of trash, debris, roots, vegetation, deleterious materials, and cobbles or hard lumps of material in excess of 4 inches in diameter.

- For the trenchless construction area, the soils anticipated to be encountered during tunneling include loose to medium dense silty sand, clayey sand, and poorly graded sand, and lesser amounts of sandy silt. The bottom of the pipeline and access pits will be near the groundwater elevation. The soils are expected to exhibit cohesive running to running behavior above groundwater and flowing behavior below groundwater. Trenchless construction should anticipate encountering transitions between sandy and silty soils.

- Groundwater was encountered in borings B-1, B-2 and B-3 at depths ranging from approximately 19 to 20 feet below the ground surface. Groundwater was measured utilizing a porewater pressure dissipation test in CPT-7 at approximately 16 feet below the ground surface. Historic high groundwater levels are mapped between 5 and 10 feet below the ground surface. Fluctuations in groundwater levels will occur due to variations in precipitation, ground surface topography, subsurface stratification, irrigation, groundwater pumping, and other factors which may not have been evident at the time of our field evaluation. Groundwater should be accounted for with potential construction dewatering activities for deeper trench excavations.

- Existing utilities and structures are present along the project alignment that will require protecting in-place during construction. Temporary shoring should be designed to reduce the potential movement of exposed cuts and damage to the nearby structures and utilities.

- The subject site is located in a State of California Seismic Hazard Zone for liquefaction. Based on our subsurface evaluation, the soils below groundwater are susceptible to liquefaction during the design seismic event. Our analysis indicates that liquefaction-induced dynamic settlement of up to approximately 5.5 inches may occur at the site. The anticipated dynamic differential settlement is approximately 2.8 inches over a horizontal distance of 55 feet. Mitigation measures to reduce damage to pipelines from liquefaction may include flexible pipeline material or flexible joints.

- The subject site is not located within a State of California EFZ (CGS, 2018), and based on our review of published geologic maps, there are no known active faults underlying the site. Therefore, the potential for surface fault rupture at the site is considered to be low.

- Our laboratory test results indicate that the near-surface site soils can be classified as non-corrosive based on the California Department of Transportation (Caltrans, 2021) corrosion guidelines.

8 RECOMMENDATIONS

The recommendations presented in the following sections provide geotechnical criteria regarding the design and construction of the proposed treatment facility and new pipelines. The

recommendations are based on the results of our subsurface evaluation, geotechnical analysis, and project understanding. The proposed work should be performed in conformance with the recommendations presented in this report, project specifications, and requirements of the applicable governing agencies.

The following earthwork and foundation recommendations are based on the assumption that ground improvement techniques will be implemented for the proposed structures at the new treatment facility site.

8.1 Ground Improvement

Our analysis indicates that up to approximately 5.5 inches of total dynamic settlement and 6 inches of liquefaction-induced lateral spread may occur during the design seismic event at the new treatment facility site. The differential dynamic settlement is estimated to be on the order of 2.8 inches over a horizontal distance of 55 feet. Mitigation of the liquefaction hazards may be achieved by in-situ ground improvement to densify or cement the liquefiable soils. In order to limit the total static and dynamic settlement to approximately 3 inches or less below the shallow foundations, ground improvement should be designed to extend to approximately 25 feet below the existing ground surface. The lateral limits of the ground improvement zone should extend approximately 10 feet beyond the structure footprints.

A project-specific ground improvement plan should be designed by a specialty contractor. The ground improvement plan should be designed to mitigate the settlement and lateral displacement hazard on site and protect existing improvements. Detailed design of the ground improvement, including construction procedures, equipment, and the size and spacing of the improvement points should be prepared by a specialty contractor to meet the project objectives. In general, we anticipate that ground improvement by stone columns, deep soil mixing (DSM), or compaction grouting may be appropriate for the site. The details of the ground improvement methodology will impact the site earthwork and foundation design and the ground improvement design should be developed in consultation with Ninyo & Moore. Subgrade preparation following ground improvement work will be involved to prepare the structure pads for both the treatment equipment and the new building. A brief description of the ground improvement methods is presented below. We recommend that a pilot test program be performed at the time of construction to evaluate the effectiveness of the proposed ground improvement method within the zone to be treated. After the ground improvement has been performed, subsurface testing by CPT soundings or borings with standard penetration testing (SPT) should be performed to evaluate if sufficient improvement

in the in-situ soil properties has occurred to mitigate potential liquefaction-induced dynamic settlement.

8.1.1 Stone Columns

The construction of stone columns involves the insertion of crushed stone in a grid pattern with a vibratory probe. The strength of the soil mass is increased due to the reinforcement of crushed stone and densification of surrounding soils. In addition, the potential for liquefaction of the subsurface soils is reduced and the rate of consolidation is increased with the improved drainage provided by these stone columns. We recommend that a specialty contractor be retained to design the actual size, spacing, depth, and layout of the stone columns. Typically, stone columns range from approximately 2 to 3 feet in diameter and are spaced approximately 5 to 8 feet apart, center to center. The vibration associated with stone columns may cause settlement to adjacent improvements and may also result in complaints from people in the vicinity of the site. Vibration impacts should be evaluated during the design of the ground improvement.

8.1.2 Deep Soil Mixing (DSM)

Deep Soil Mixing (DSM) is the mechanical mixing of the in-situ soil with grout slurry using a rotary mixing tool. Soil-mixing rigs may have a single auger (about 2 to 12 feet in diameter) or several small-diameter augers (usually two to eight augers). As the augers are advanced into the soil, grout is pumped through the stems and injected into the soil at the tips. After the design depth has been reached, the augers are withdrawn while the mixing process continues. The soil-mixing process results in a soil-cement column. The intent of a DSM program is to achieve increased shear strength and reduced compressibility of the soil. The DSM solidifies “columns” of soil in the treated area and the resulting soil-cement matrix helps to redistribute the shear stresses in the soil, thus, reducing the settlement of the ground surface due to compression and liquefaction of the remaining untreated soil.

8.1.3 Compaction Grouting

Compaction grouting involved the injection of a low-slump, mortar-like grout under high pressure to compact and displace the adjacent soils. The grout is injected at selected target zones in the subsurface through small diameter steel grout pipes. The grout is injected in stages at incremental depth intervals to treat the problem soil zone. Typically, a grid pattern is designed to treat the lateral limits of the area of concern. The grout may include a blend of fine aggregate such as sand, silt, clay, and cement to achieve a pumpable, viscous grout with

a low slump (generally less than 2.0 inches) that remains intact after injection. During treatment grout pressure, grout flow rate, and volume of grout are monitored to evaluate the grouting process. Monitoring of ground surface heave, structures, and other improvements is also performed. Compaction grouting is not as effective in high plasticity, stiff to hard clay soils and would rely on a high proportion of grout to form a structural matrix.

8.2 Earthwork

Earthwork at the site is anticipated to consist of site clearing, one of the ground improvement methods described above, relatively shallow remedial grading for foundation support, trenching for new pipelines, excavation of launching and receiving pits, micro-tunneling, backfilling of trenches and trenchless access pits, and foundation excavation. Based on the plans provided, we anticipate open cut trench excavations up to approximately 10 feet deep and launching/receiving pits and tunneling operation about 17 feet deep. The deeper excavations may encounter wet or soft soil conditions. In addition, abandoned, buried utilities and/or structures may be present. Work within the public right-of-way for trenched excavations should comply with the requirements of the “Greenbook” Standard Specifications for Public Works Construction (Public Works Standard, Inc., 2024). Earthwork operations should be performed in accordance with the requirements of applicable governing agencies and the recommendations presented in the following sections of this report.

8.2.1 Construction Plan Review and Pre-Construction Conference

We recommend that the construction plans be submitted to Ninyo & Moore for review to evaluate conformance to the geotechnical recommendations provided in this report. We further recommend that a pre-construction conference be held. The owner and/or their representative, the governing agencies’ representatives, the civil engineer, Ninyo & Moore, and the contractor should attend to discuss the work plan, project schedule, and earthwork requirements.

8.2.2 Clearing and Site Preparation

Prior to performing excavations or other earthwork, the area should be cleared of existing improvements, including concrete, rubble and debris, abandoned utilities, surface obstructions, and other deleterious materials. Existing utilities within the project limits should be re-routed or protected from damage by construction activities. Materials generated from the clearing operations should be removed from the project site and disposed of at a legal dumpsite.

8.2.3 Treatment of Near-Surface Soils

Preparation of the structure subgrades at the proposed new treatment facility site should be performed in accordance with the methods outlined in the Ground Improvement section of this report. The treatment of the subgrade materials under the new structures should be based on the design of the ground improvement method selected and developed in conjunction with the specialty contractor. Typically, stone columns, DSM, and compaction grout columns are terminated at depths of about 4 to 6 feet below the ground surface. The upper up to 6 feet of soils may be disturbed during the ground improvement installation process. Following the completion of ground improvement efforts, the fill and alluvial soils above the improved zone (i.e., up to approximately 6 feet thick) should be moisture-conditioned to generally above the laboratory optimum moisture content and compacted to a relative compaction of 90 percent as evaluated by ASTM International (ASTM) test method D 1557.

The subgrades for vehicular pavements should be prepared by scarifying the upper approximately 12 inches of the exposed subgrade, moisture-conditioning to slightly above the optimum moisture content, and compacting to a relative compaction of 90 percent as evaluated by ASTM D 1557.

8.2.4 Temporary Excavations and Shoring

We anticipate that excavations within the alluvial soils at the site will be accomplished with backhoes, excavators, loaders, or other earthmoving equipment in good condition. We anticipate that the subsurface materials that will be encountered during construction will consist of predominantly sand and silt. The on-site materials will involve moisture-conditioning to bring the materials near the laboratory optimum moisture content prior to placement and compaction.

Temporary near-vertical excavations not exceeding a depth of approximately 4 feet should be feasible where existing structures that may surcharge the excavations are not present. However, excavations that expose friable sand with low cohesion may be subject to caving. In particular, bedding materials for existing pipelines, if encountered may be prone to caving, which could undermine the existing pipelines. Excavations that are unstable or deeper than 4 feet should be laid back to slope inclinations of approximately 1.5:1 (horizontal to vertical) or flatter. Where excavations cannot be laid back, shoring may be appropriate. Excavations should be performed in accordance with the OSHA regulations. On-site soils should be considered as Type C soils in accordance with the OSHA guidelines.

If shoring systems are to be used for site excavations, those should be designed for the anticipated soil conditions using the lateral earth pressure values presented on Figures 7 and 8 for cantilevered and braced shoring systems, respectively. The recommended design earth pressures are based on the assumption that the shoring system will be constructed without raising the ground surface elevation behind the shored sidewalls of the excavation, that there will be no surcharge loads, such as soil stockpiles and construction materials, and that no loads will act above a 1:1 (horizontal to vertical) plane ascending from the base of the shoring system. For a shoring system subjected to the above-mentioned surcharge loads, the contractor should include the effect of these loads on the lateral earth pressures acting on the shored walls.

We anticipate that settlement of the ground surface will occur behind the shored excavation. The amount of settlement depends heavily on the type of shoring system, the contractor's workmanship, and soil conditions. To reduce the potential for distress to adjacent improvements, we recommend that the shoring system be designed to limit the ground settlement behind the shoring system to 0.5 inch or less. Possible causes of settlement that should be addressed include settlement during installation of the shoring elements, excavation for structure construction, construction vibrations, and removal of the support system. We recommend that shoring installation be evaluated carefully by the contractor prior to construction and that ground vibration and settlement monitoring be performed during construction.

The contractor should retain a qualified and experienced engineer to design the shoring system. The shoring parameters presented in this report are minimum requirements, and the contractor should evaluate the adequacy of these parameters and make the appropriate modifications for their design. We recommend that the contractor take appropriate measures to protect workers. OSHA requirements pertaining to worker safety should be observed.

8.2.5 Construction Dewatering

Regional maps indicate that the historic high groundwater levels in the vicinity of the projects are as shallow as approximately 5 to 10 feet below the ground surface. Groundwater was encountered during our subsurface exploration at depths of approximately 19 to 20 feet below the ground surface in our borings and approximately 16 feet in the CPT sounding. Fluctuations in groundwater depth will occur and shallower groundwater should be anticipated. The planned excavations for the micro-tunneling (approximately 17 feet deep) may encounter seepage and/or groundwater during construction.

If groundwater is encountered during construction of deeper portions of the proposed pipelines, dewatering will be involved in order to perform work in a dry condition. The dewatering system design should be performed by a specialty dewatering contractor. The dewatering scheme may include pumping of groundwater from well points within or outside of the shoring. Drawing down the water level within the excavation may affect the water level outside of the excavation. This will result in an increase in effective stresses and may induce settlement of the soils underlying adjacent improvements. Design of the groundwater withdrawal system is the responsibility of the contractor.

The soils at the project site generally comprised of sands, silts, and clays. Excavating around the existing utility may involve especially high groundwater flow rates where drainage from sand or gravel bedding/backfill zones occurs. Special measures to seal these zones may be involved.

Depending on the permeability of soil between the bottom of the excavation and the bottom of the shoring system, as well as the effectiveness of water tightening between shored panels, drawing down of the water level within the excavation defined by the “cofferdam” may affect the water level outside of the excavation. We recommend that the dewatering be performed from inside the shoring system and the groundwater level be lowered no more than 3 feet below the excavation. Monitoring wells should be installed outside the excavation to monitor groundwater levels. Depending on the type of shoring and dewatering systems, the contractor may consider pump testing or an independent evaluation of the potential for groundwater inflow and/or resulting settlement. Additional measures, such as grouting and groundwater recharging may be implemented in the design to reduce the potential for groundwater inflow and resulting settlement. Disposal of groundwater should be performed in accordance with the guidelines of the Regional Water Quality Control Board.

8.2.6 Excavation Bottom Stability

Excavations close to or below the groundwater (before or after dewatering) will encounter wet and loose or soft ground conditions. Wet soils may be subject to pumping under heavy equipment loads. In general, unstable bottom conditions may be mitigated by overexcavating the excavation bottom to approximately 2 feet and replacing with gravel wrapped by geo-fabric (Mirafi 140N or equivalent). The purpose of the geofabric is to reduce the potential for migration of clayey materials into the gravel and thereby reducing the potential for creating voids due to soil migration.

8.2.7 Fill Material

In general, the on-site soils should be suitable for re-use as fill. Fill should be free of trash, debris, roots, vegetation, or other deleterious materials. Fill should generally be free of rocks or lumps of material in excess of 4 inches in diameter. Oversize cobbles or hard lumps larger than 4 inches in diameter should be broken into smaller pieces (less than 4 inches in diameter) or removed from the site. Wet soils should be processed to bring the moisture content to a level that is slightly above the laboratory optimum moisture content and suitable for compaction. Fill material used as structure backfill should meet the “Greenbook” Standard Specifications for Public Works Construction criteria (Public Works Standard, Inc., 2024) for structure backfill.

On-site soils used for fill may involve moisture-conditioning to achieve appropriate moisture content for compaction. Wet soils should be allowed to dry to a near-optimum moisture content prior to their placement as trench backfill. Due to time or site constraints, wet on-site soils may not be able to be allowed to dry enough for use as fill. Where this is the case, a controlled low-strength material such as two-sack cement slurry or imported granular material may be used.

Imported materials should consist of clean, non-expansive, granular material, which conforms to the Greenbook for structure backfill. “Non-expansive” can be defined as soil having an expansion index of 20 or less in accordance with ASTM D 4829. The imported materials should also meet the Caltrans (2021) criteria for non-corrosive soils (i.e., soils having a chloride concentration of 500 parts per million [ppm] or less, a soluble sulfate content of approximately 0.15 percent (1,500 ppm) or less, a pH value of 5.5 or higher and a minimum resistivity of 1,500 ohm-centimeters [ohm-cm] or higher). Imported materials for use as fill should be evaluated by the geotechnical consultant prior to importing. The contractor should be responsible for the uniformity of imported materials brought to the site.

8.2.8 Fill Placement and Compaction

Fill placed for support of the improvements and as trench backfill should be compacted in horizontal lifts to a relative compaction of 90 percent or more as evaluated by ASTM D 1557. Fill soils should be moisture-conditioned to slightly above the optimum moisture content. The optimum lift thickness of fill will depend on the type of compaction equipment used but generally should not exceed 8 inches in loose thickness. Special care should be taken to avoid pipe damage when compacting trench backfill above pipes. Placement and compaction of the fill soils should be in general accordance with appropriate governing agency standards and good construction practice.

8.3 Underground Utilities

We anticipate that the new pipelines will be supported on alluvial deposits. The depths of pipelines are not known; however, we anticipate that the new pipeline invert depths and new electrical conduits will be on the order of 15 feet deep or less. Trenches should not be excavated parallel to structure footings. If needed, trenches can be excavated adjacent to a continuous footing, provided that the bottom of the trench is located above a 1:1 (horizontal to vertical) plane projected downward from a point 6 inches above the bottom of the adjacent footing. Utility lines that cross beneath footings should be encased in concrete below the footing.

8.3.1 Pipe Bedding

We recommend that pipelines be supported on 6 inches or more of granular bedding material such as sand with a sand equivalent (SE) value of 30 or more. Bedding material should be placed and compacted around the pipe, and 12 inches or more above the top of the pipe in accordance with the Greenbook standard. Special care should be taken not to allow voids beneath and around the pipe. Bedding material and compaction requirements should be in accordance with the recommendations of this report, the project specifications, and applicable requirements of the appropriate agencies.

8.3.2 Modulus of Soil Reaction

The modulus of soil reaction is used to characterize the stiffness of soil backfill placed on the sides of buried flexible pipelines for the purpose of evaluating lateral deflection caused by the weight of the backfill above the pipe. We recommend that a modulus of soil reaction of 1,000 pounds per square inch (psi) be used for design, provided that granular bedding material is placed adjacent to the pipe, as recommended in this report.

8.4 Trenchless Construction

It is our understanding that jack and bore trenchless construction will be utilized to install the 290-foot segment of the raw water pipeline that crosses beneath the existing East Garden Grove Wintersburg Channel and adjacent utility-dense area to the west of the channel. The pipeline in this area is anticipated to have an invert depth of approximately 15 to 17 feet below the ground surface. In general, we anticipate that the tunneling operations will encounter materials similar to those encountered in our exploratory borings including loose to medium dense silty sand, clayey sand, and poorly graded sand, and lesser amounts of sandy silt.

The granular soil is expected to exhibit cohesive running to running behavior above the groundwater and flowing behavior below the groundwater. The tunneling contractor should take appropriate precautions to avoid piping or loss of material into the tunnel excavation. Casing should be advanced ahead of the excavation. Open face tunnel conditions should be avoided.

Ground surface settlement may occur from the tunneling, mainly as a result of loss of ground during drilling. The actual magnitudes of these losses are largely dependent on the type and strength of the ground, groundwater or seepage conditions, size and depth of the pipe, equipment capabilities, and the skill of the contractor. We anticipate that the tunnel excavation will advance with a carrier casing. After the carrier pipe is in place, the annular space between the pipelines and tunnel should be grouted to reduce settlement. Due to the depth to the pipeline below the ground surface, it is our opinion that drilling induced ground settlement of negligible magnitude can be achieved by the contractor utilizing appropriate construction techniques for the anticipated subsurface conditions. However, the amount of induced settlement at the ground surface by the tunneling operations can be controlled by the contractor's means and methods. We recommend that an experienced specialty contractor be used for the tunneling operations.

In order to evaluate the load factors on the proposed pipeline, the loading presented in Tables 1 and 2 should be used for the 30-inch diameter and 36-inch diameter casing section, respectively.

Table 1 – Loading on 30-Inch Diameter Trenchless Segment

Approximate Depth from Existing Ground Surface to Top of Pipeline (feet)	Load on Pipeline (pounds/lineal foot of pipe)
14	2,875
16	3,000

Notes:
Based on McCarthy, David F., 2002, Essentials of Soil Mechanics and Foundations: Basic Geotechnics, Prentice Hall, 6th Edition.
Linear interpolation may be used to obtain loading between the depths shown.
Loading assumes 30-inch diameter sleeve. Loading may need to be modified for different sleeve sizes.

Table 2 – Loading on 36-Inch Diameter Trenchless Segment

Approximate Depth from Existing Ground Surface to Top of Pipeline (feet)	Load on Pipeline (pounds/lineal foot of pipe)
14	3,860
16	4,065

Notes:
Based on McCarthy, David F., 2002, Essentials of Soil Mechanics and Foundations: Basic Geotechnics, Prentice Hall, 6th Edition.
Linear interpolation may be used to obtain loading between the depths shown.
Loading assumes 36-inch diameter sleeve. Loading may need to be modified for different sleeve sizes.

Ground surface settlement may occur from directional drilling operations, mainly as a result of loss of ground during drilling. The actual magnitudes of these losses are largely dependent on the type and strength of the ground, groundwater conditions, size and depth of the pipe, equipment capabilities, fluid pressures and pullback rate, and the skill of the contractor. Ground heave and/or inadvertent releases of drilling fluids could also occur as a result of hydraulic fracturing. A Survey Grid Line per Caltrans (2018) and monitoring program could be implemented by the contractor prior to, during, and upon completion of the micro-tunneling for detecting frac-out. Additionally, a contingency plan should be in place prior to drilling in the event that ground settlement, ground heave, and/or frac-out occurs during drilling and casing installation, including controls for potential inadvertent fluid releases to the ground surface.

8.5 Lateral Pressures for Thrust Blocks

Thrust restraint for buried pipelines and lateral pressures for jacking may be achieved by transferring the thrust force to the soil outside the pipe through a thrust block. Thrust blocks may be designed using the passive lateral earth pressures presented on Figure 9. Excavations for construction of thrust blocks should be backfilled with granular backfill material and compacted following the recommendations presented in this report.

8.6 Seismic Design Considerations

Design of the proposed improvements should be performed in accordance with the requirements of the governing jurisdictions and applicable building codes. Table 3 presents the multi-period spectral response acceleration parameters in accordance with the CBC (2025) for the evaluation of seismic loads on buildings and other structures.

Table 3 – 2025 California Building Code Seismic Design Criteria

Site Coefficients and Spectral Response Acceleration Parameters	Values
Site Class	D
MCE_R Spectral Response Acceleration at 0.2-Second Period for Site Class BC, S_s	1.54g
MCE_R Spectral Response Acceleration at 1.0-Second Period for Site Class BC, S_1	0.59g
MCE_R Spectral Response Acceleration at Short Periods Adjusted for Site Class, S_{MS}	1.78g
MCE_R Spectral Response Acceleration at 1.0-Second Period Adjusted for Site Class, S_{M1}	1.28g
Design Spectral Response Acceleration at Short Periods, S_{DS}	1.19g
Design Spectral Response Acceleration at 1.0-Second Period, S_{D1}	0.85g
Maximum Considered Earthquake Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.67g

8.7 Foundations

After ground improvement is performed to mitigate liquefaction hazards, the proposed treatment facility structures may be supported by shallow spread footings or mat foundations. The subgrade

should be prepared in accordance with the recommendations presented in the Earthwork section of this report. Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

8.7.1 Mat Foundations

The mat foundation should be embedded to a depth of 12 inches or more below the lowest adjacent ground surface. The mat foundations may be designed using a net allowable bearing capacity of 1,500 pounds per square foot (psf). The allowable bearing capacity may be increased by one-third when considering loads of short duration such as wind or seismic forces. The total and differential static settlements corresponding to this allowable bearing load are estimated to be less than approximately 1 inch and 0.5 inch over a horizontal span of 40 feet, respectively.

Mat foundations bearing on compacted fill may be designed using a coefficient of friction of 0.35, where the total frictional resistance equals the coefficient of friction times the dead load. Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils directly underlying the mat. The appropriate contact pressure(s) beneath the mat foundations will vary with their size, shape, and other factors. A design modulus of subgrade reaction (K_v) of 100 pci may be used for the compacted subgrade soils in evaluating such deflections. This value is based on a unit square foot area and should be adjusted for the planned mat size. The coefficient of subgrade reaction, K_b, for a mat of a specific width may be evaluated using the following equation:

$$\mathbf{K_b = K_v[(b+1)/2b]^2}$$

Where, **b** is the width of the mat in feet.

8.7.2 Spread Footings

Conventional spread footings should extend 18 inches deep below the lowest adjacent finished grade and bear on compacted fil. Spread footings should have a width of 2 feet or more, and be reinforced and detailed in accordance with the recommendations of the structural engineer.

Spread footings, as described above and bearing on compacted fill may be designed using a net allowable bearing capacity of 2,000 psf. The net allowable bearing capacity may be increased by 250 psf for every additional foot of width and depth up to a value of 3,000 psf.

Total and differential static settlements for footings designed in accordance with the above recommendations are estimated to be on the order of 1 inch and 0.5 inch over a horizontal span of 40 feet, respectively.

Spread footings bearing in compacted fill may be designed using a coefficient of friction of 0.35, where the total frictional resistance equals the coefficient of friction times the dead load. The footings may be designed using a passive resistance value of 260 psf per foot of depth up to a value of 2,600 psf. The allowable lateral resistance can be taken as the sum of the frictional resistance and passive resistance provided that the passive resistance does not exceed one-half of the total allowable resistance. The net allowable bearing capacity and passive resistance may be increased by one-third when considering loads of short duration such as wind or seismic forces.

8.8 Preliminary Pavement Design

We anticipate that future new pavement for the well site and new treatment facility may include new flexible asphalt concrete (AC) or rigid Portland cement concrete (PCC) pavement for the anticipated traffic including chemical trucks. Traffic loading information was not available for our design at the time of preparation of this report. For planning purposes, we have assumed traffic index (TI) values of 5.0, 6.0 and 7.0 for the preliminary design of pavement sections. A design R-value of 60 was utilized for the subgrade soil in the design of the preliminary pavement sections.

Our AC pavement analysis utilized the methodology outlined in the Highway Design Manual (Caltrans, 2020b) and the computer software CalME (Caltrans, 2020c). For design of PCC pavements, we used the methodology presented in the Navy Pavement Design Manual (1979) assuming a 28-day compressive strength of 2,500 psi for the concrete. We evaluated new pavement structural sections for a design life of approximately 20 years. The preliminary pavement section recommendations are summarized in Table 4.

Table 4 – Preliminary Pavement Structural Sections

Traffic Index	AC over CAB or CMB (inches)	Full Depth AC (inches)	PCC (inches)
5.0	3.0/4.5	4.0	5.5
6.0	4.0/4.5	5.0	6.0
7.0	4.5/4.5	6.0	8.5

Notes:
AC – Asphalt Concrete
PCC – Portland Cement Concrete, based on 28-day compressive strength of 2,500 psi.
CAB – Crushed Aggregate Base
CMB – Crushed Miscellaneous Base

Prior to placement of the new structural pavement sections presented above, the subgrade soils should be prepared in accordance with the recommendations provided in the Earthwork section of this report. Aggregate base material should conform to the specifications provided in Section 200-2.2 of Greenbook for crushed aggregate base (CAB) or Section 200-2.4 of Greenbook for crushed miscellaneous base (CMB) and should be compacted to a relative compaction of 95 percent in accordance with ASTM D 1557. Placement of AC should conform to Section 203-6 of the Greenbook and should be compacted to a relative compaction of 95 percent in accordance with ASTM D 1560 or California Test (CT) method 304. We recommend that 4 inches of CAB or CMB be placed underneath the PCC.

Pavement section should be selected based on actual anticipated traffic loading conditions and evaluation of the subgrade materials, including R-value testing, at the time of construction. We recommend that the paving operations be observed and tested by Ninyo & Moore. We further recommend that the mix design for various pavements be made by an engineering company specialized in this type of work.

8.9 Pavement Reconstruction

Trenching within the street right-of-way will result in the replacement of pavement for the project. In general, pavement repair should conform to the material and compaction requirements of the adjacent pavement sections. AB material should conform to the specifications provided in Section 200-2.2 for crushed AB or Section 200-2.4 for crushed miscellaneous base in Greenbook and should be compacted to a relative compaction of 95 percent in accordance with ASTM D 1557. AC should conform to Section 203-6 of the Greenbook and should be compacted to a relative compaction of 95 percent in accordance with ASTM D 1560 or CT 304. Actual pavement reconstruction should conform to the requirements of the appropriate governing agency.

8.10 Corrosivity

Laboratory testing was performed on representative samples of near-surface soils to evaluate pH, electrical resistivity, water-soluble chloride content, and water-soluble sulfate content. The soil pH and electrical resistivity tests were performed in general accordance with CT 643. Chloride content test was performed in general accordance with CT 422. Sulfate testing was performed in general accordance with CT 417. The laboratory test results are presented in Appendix C.

The soil pH ranged from approximately 7.4 to 8.1 and the electrical resistivity ranged from approximately 6,598 to 12,588 ohm-cm. The chloride content of the samples ranged from approximately 10 to 25 ppm. The sulfate content of the tested samples was approximately 0.001

percent (i.e., 10 ppm). Based on the laboratory test results and Caltrans criteria, the project site can be classified as a non-corrosive site, which is defined as having earth materials with less than 500 ppm chloride content, less than 0.15 percent sulfates, a pH of 5.5 or more, and an electrical resistivity of more than 1,500 ohm-cm. If corrosion susceptible improvements are planned on site, we recommend that a corrosion engineer be consulted for further evaluation and recommendations.

8.11 Concrete

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates can be subject to premature chemical and/or physical deterioration. Based on the American Concrete Institute (ACI) criteria (2025), the potential for sulfate attack is negligible for water-soluble sulfate contents in soil ranging from 0.00 to 0.10 percent by weight and moderate for water-soluble sulfate contents ranging from 0.10 to 0.20 percent by weight. The potential for sulfate attack is severe for water-soluble sulfate contents ranging from 0.20 to 2.00 percent by weight and very severe for water-soluble sulfate contents over 2.00 percent by weight. The soil sample tested for this evaluation, using CT 417, indicates a water-soluble sulfate content of 0.001 percent by weight (i.e., 10 ppm). Accordingly, the on-site soils are considered to have a negligible potential for sulfate attack. Per ACI (2025), Type II/V cement is appropriate for the site improvements.

In order to reduce the potential for shrinkage cracks in the concrete during curing, we recommend that the concrete for the proposed structures be placed with a slump of 4 inches based on ASTM C 143. The slump should be checked periodically at the site prior to concrete placement. We further recommend that concrete cover over reinforcing steel for foundations be provided in accordance with CBC (2025). The structural engineer should be consulted for additional concrete specifications.

8.12 Drainage

Positive surface drainage is imperative for satisfactory site performance. Positive drainage should be provided and maintained to transport surface water away from foundations and other site improvements. Positive drainage is defined as a slope of 2 percent or more over a distance of 5 feet or more away from the foundations. Surface water should not be allowed to pond adjacent to the tank footings.

9 CONSTRUCTION MONITORING PROGRAM

An appropriate construction monitoring program should be implemented for both ground improvement and trenchless construction activities to monitor the ground vibrations, ground surface settlement, and lateral movement of shoring support systems. The construction monitoring program during ground improvement operation should be based on the ground improvement method that is selected for the project. We recommend that a program of documentation and instrumentation be implemented to evaluate design assumptions and existing conditions, and to monitor vibrations and possible ground settlement during construction of stone columns are selected. The monitoring programs may include the use of seismographs and an array of surface control points. If compaction grouting is selected, an array of surface control points to monitor for possible ground heave would be appropriate. The resulting data should be reviewed and evaluated by Ninyo & Moore. These programs should be in-place or conducted prior to the start of construction.

9.1 Documentation of Existing Conditions

We recommend that a pre-construction survey of the existing conditions of the nearby structures be performed before the construction on-site. The pre-construction survey should consist of photographic documentation of the improvements, including distress features such as cracks and/or separations that may be present. The purpose of the pre-construction survey is to develop documentation of existing conditions prior to construction that may serve as a basis for evaluating potential damage claims

9.2 Construction Vibrations

People can perceive vibrations from construction activities at significantly lower levels than might cause cosmetic damage to structures. The Transportation and Construction Vibration Guidance Manual (Caltrans, 2020a) indicates that transient vibrations, such as from pile driving or construction activities, may be noticeable at peak particle velocities as low as 0.02 to 0.06 inches per second (ips). The vibrations from the construction activities may be disturbing and result in complaints and/or damage claims at peak particle velocities as low as 0.2 to 0.4 ips. However, these vibration levels are well below the level considered to cause cosmetic damage to residential construction.

There is also the possibility of settlement of the soil during construction activities due to vibrations. This settlement may result in damage to structures. If the construction vibrations can be

maintained below a peak particle velocity of 0.2 ips, the settlement can likely be limited to acceptable levels based on past projects in similar conditions.

For the above stated reasons, we recommend that seismographs be used in the early stages of construction to monitor the vibrations if stone columns are selected as the ground improvement method. Seismographs should be located near structures and improvements next to the construction activities. Additional seismographs should be located at various structures and improvements farther from the construction activities to monitor vibrations as a function of distance from the sites. Periodic vibration monitoring is recommended during other construction activities. After review of the data obtained, the number of seismographs may be reduced at the discretion of the client and the geotechnical consultant.

9.3 Ground Surface Settlement/Heave

We recommend that arrays of ground surface settlement points be installed around the proposed excavations and next to existing structures and improvements. The contractor should submit a monitoring plan showing the proposed locations of monitoring points for review and approval by the project engineer. We recommend that the contractor be responsible for maintaining total settlement/heave at any survey point to less than 0.5 inch. If the settlement/heave reaches this limit, we recommend that a further review of construction methodologies be performed and appropriate changes be made. We recommend that ground surface monitoring points be installed at distances of approximately 10 and 20 feet beyond the perimeter of the treatment zone.

9.4 Survey Grid for Trenchless Construction

A survey grid to monitor ground settlement during installation of the trenchless pipeline section should be implemented in general accordance with the guidelines presented in Caltrans Guidelines and Specifications for Trenchless Technology Project (Caltrans, 2018) and Design Bulletin No. 83-05 (Caltrans, 2023). According to the bulletin, subsurface monitoring points should be installed to depths of approximately 5 and 10 feet above the crown of the proposed pipeline, above utilities, and on the shoulders of the street. Subsurface monitoring points should be constructed in general accordance with the guidelines presented in the Design Bulletin No. 83-05. Surface monitoring points should be used to supplement the subsurface points; however, surface monitoring points should not be used alone to monitor ground settlement. In general, we recommend that subsurface and surface monitoring points be spaced at approximately 50-foot intervals. The actual locations of monitoring points should be approved by the project engineer

and will be influenced by traffic conditions at the site, available space, and possible other factors. Remote sensing of subsurface monitoring points may also be considered for the project.

Once installed, monitoring points should be surveyed prior to drilling to establish a baseline. According to Caltrans, the surface and subsurface monitoring points should be read hourly when the boring operation reaches within about 25 feet of the point, otherwise the points should be read at least once a day or every 50 feet of advancement, whichever is more frequent. The settlement monitoring points should be installed and monitored by an independent consultant/contractor. Caltrans recommends a survey accuracy of 0.005 foot. The following table, reproduced from Caltrans Design Bulletin No. 83-05, provides the frequency of reading, action level, and maximum allowed settlement for ground settlement monitoring points. The settlement monitoring program should be established in accordance with the Caltrans District 12 requirements.

Table 5 – Ground Settlement Monitoring

Type of Settlement Monitoring Point	Frequency of Reading	Action Level	Maximum Allowed
Surface	Hourly when heading is within 25 feet, otherwise daily	0.25 inch	0.50 inch
Surface (in traffic lanes)	Before and after tunneling	---	0.25 inch
Subsurface	Hourly when heading is within 25 feet, otherwise daily	1.5 inches	2.5 inches

9.5 Action Level

The action level is the amount of allowable settlement at which corrective action should be taken, such as filling voids or the contractor altering their procedures, such as limiting the amount of radial overcut and filling the annulus with bentonite slurry during drilling. If the action level is reached during tunneling operations, the tunneling operations should be stopped until an appropriate corrective action can be implemented.

9.6 Maximum Allowed Settlement

The maximum allowed settlement is the amount of settlement at which mitigation, such as grouting, is required. The contractor should be responsible for maintaining the total settlement beneath adjacent structures to less than 0.5 inch. If settlements reach 0.25 inch, we recommend that a review of the contractor's methods be performed and appropriate changes be made, if needed.

9.7 Lateral Movement for Shoring Support System

In particularly sensitive areas, it may be appropriate to install inclinometers or establish survey points behind excavations located in areas where existing structures are located above a 1:1

(horizontal to vertical) plane projected from the bottom of the proposed excavations to the ground surface. The inclinometers or survey points should be monitored and evaluated daily during excavation activities to provide an advanced warning system of potential problems. As discussed previously, we recommend that the shoring system be designed to limit the ground settlement behind the shoring system to 0.5 inch or less to reduce the potential for distress to adjacent structures/improvements. If settlements reach 0.25 inch, we recommend that a review of the contractor's methods be performed and appropriate changes be made, if needed.

10 CONSTRUCTION OBSERVATION

The recommendations provided in this report are based on our understanding of the proposed project and our evaluation of the data collected based on subsurface conditions observed in our exploratory borings. It is imperative that Ninyo & Moore checks the subsurface conditions during construction. Observation and testing of compacted fill and backfill should also be performed by our representative during construction. We further recommend that the project plans and specifications be reviewed by this office prior to construction. It should be noted that, upon review of these documents, some recommendations presented in this report might be revised or modified.

During construction, we recommend that Ninyo & Moore's duties include, but not be limited to:

- Observing clearing, grubbing, and removals.
- Observing ground improvement pilot testing, evaluating degree of improvement achieved within the pilot test area by performing CPT before and after the pilot test program, and reviewing and approving the ground improvement plans and specifications.
- Observing ground improvement during construction and versifying the degree of improvement achieved.
- Review of data from the construction monitoring program.
- Observing remedial grading bottoms.
- Observe the placement and compaction of fill and trench backfill.
- Evaluating imported materials prior to their use as fill.
- Performing field tests to evaluate fill compaction.
- Observing foundation excavations for bearing materials and cleaning prior to placement of reinforcing steel or concrete.
- Performing material testing services including concrete compressive strength and steel tensile strength tests and inspections.

The recommendations provided in this report are based on the assumption that Ninyo & Moore will provide geotechnical observation and testing services during construction. In the event that the services of Ninyo & Moore are not utilized during construction, we request that the selected consultant provide the owner with a letter (with a copy to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the design parameters and recommendations contained in this report.

11 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with

time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

12 REFERENCES

American Concrete Institute, 2025, ACI Manual of Concrete Practice.

American Society of Civil Engineers, 2022, Minimum Design Loads for Buildings and Other Structures, Standard ASCE/SEI 7-22.

American Society of Civil Engineers, 2025, Hazard Tool, https://ascehazardtool.org.

ASTM International (ASTM), 2025, Annual Book of ASTM Standards, West Conshohocken, Pennsylvania.

Boulanger, R.W., and Idriss, I.M., 2014, CPT-Based Liquefaction Triggering Procedure, dated September.

Bowles, J.E., 1996, Foundation Analysis and Design, Fifth Edition, The McGraw-Hill Companies, Inc.

Brandenberg, S.J., Bellana, N., and Shantz, T., 2010, Shear Wave Velocity as Function of SPT Penetration Resistance and Vertical Effective Stress at California Bridge Sites, Soil Dynamics and Earthquake Engineering, 30, pp. 1026-1035.

California Building Standards Commission, 2025, California Building Code: California Code: California Code of Regulations, Title 24, Part 2, Volumes 1 and 2, based on the 2024 international Building Code.

California Department of Conservation, Division of Mines and Geology, State of California, 1997, Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles, Orange County, California: Scale 1:24,000, Open File Report 03.

California Department of Conservation, Division of Mines and Geology, State of California, 1998, Seismic Hazard Zones, Anaheim Quadrangle, 7.5-Minute Series: Scale 1:24,000, dated April 15.

California Department of Transportation, 2018, Caltrans Encroachment Permits, Guidelines and Specifications for Trenchless Technology Projects, dated August.

California Department of Transportation, 2019, Caltrans ARS Online (V2.3.09), http://dap3.dot.ca.gov/ARS_Online/.

California Department of Transportation, Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office, 2020a, Transportation and Construction Vibration Guidance Manual, dated April.

California Department of Transportation, 2020b, Highway Design Manual, Seventh Edition, dated July1.

California Department of Transportation, 2020c, CalMe, Software Program for Designing Flexible Pavements, Version 3.DD001.3, dated August.

California Department of Transportation, 2021, Corrosion Guidelines, Version 3.0, Division of Engineering Services, Materials Engineering and Testing Services, Corrosion Technology Branch, dated March.

California Department of Transportation, 2022, CalMe, Software Program for Designing Flexible Pavements, Version 3.DD002.0, dated December.

California Department of Transportation, 2023, Design Information Bulletin No. 83-05, Caltrans Supplement to FHWA Culvert Repair Practices Manual, dated July 26.

California Geological Survey, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117A, dated September 11.

California Geological Survey, 2018, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California: Special Publication 42.

CivilTech, 2019, Liquefy Pro (Version 5.9d), a computer program for liquefaction and settlement analysis.

Geologismiki, 2023, CLiq, CPT Soil Liquefaction Software, v.3.5.2.17.

Google Earth, 2025, http://earth.google.com.

Hazen and Sawyer, 2026, Well 26 Civil Site Plan, Orange County Water District/City of Garden Grove Well 22, 26, and 27 PFAS Treatment Systems Project, dated April.

Idriss, I.M., and Boulanger, R.W., 2008, Soil Liquefaction During Earthquakes, Earthquake Engineering Research Institute, Monograph MNO-12.

Morton, D.M., and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30'x 60' quadrangles, California, United Stated Geologic Survey, Scale 1:100,00.

Naval Facilities Engineering Command, 1979, Pavement Design Manual, D.M. 5.4, dated October.

Ninyo & Moore, 2024, Proposal for Geotechnical Design and Construction Services, Wells 22, 26, and 27 PFAS Treatment Systems, Orange County Water District, Garden Grove, California, Proposal No. P04-0608, dated July 9.

Ninyo & Moore, 2025, Geotechnical Evaluation, Well 26 PFAS Treatment System, Orange County Water District, 12132 Trask Avenue, Garden Grove, California, dated September 29.

Norris, R.M., and Webb, R.W., 1990, Geology of California, Second Edition: John Wiley & Sons.

Public Works Standard, Inc., 2024, The "Greenbook": Standard Specifications for Public Works Construction, with Errata No. 1, dated 2019: BNI Building News, Vista, California.

Robertson, 2010, Soil Behavior Type from the CPT: An Update, 2nd International Symposium on Cone Penetration Testing, CPT' 10, Huntington Beach, California, USA, www.cpt10.com.

Seed, H.B., and Idriss, I.M., 1982, Ground Motions and Soil Liquefaction During Earthquakes, Volume 5 of Engineering Monographs on Earthquake Criteria, Structural Design, and Strong Motion Records: Berkeley, Earthquake Engineering Research Institute.

Structural Engineers Association of California (SEAOC), 2025, Seismic Design Maps, https://www.seismicmaps.org/.

United States Geological Survey and Southern California Earthquake Center, 2020, Open Seismic Hazard Analysis, http://www.opensha.org/.

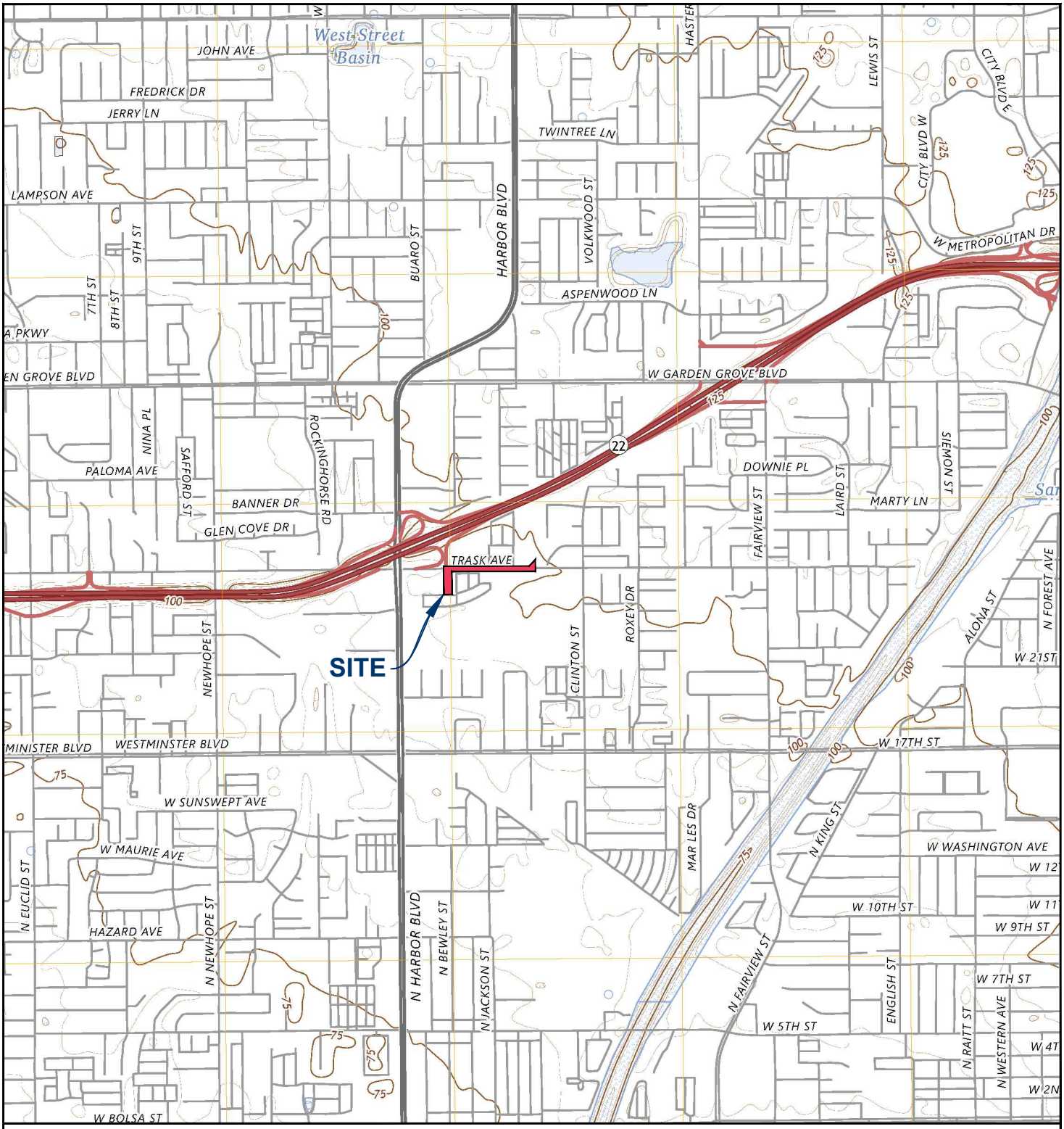
United States Geological Survey, 2022, USGS US Topo 7.5-Minute Map for Anaheim, CA: USGS - National Geospatial Technical Operations Center (NGTOC).

United States Geological Survey, 2025, Unified Hazard Tool; https://earthquake.usgs.gov/hazard.

Youd, T.L., Hansen, C.M., and Bartlett, S.F., 2002, Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 128, No. 12, ASCE: dated December 1.

Zhang, G., Robertson, P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180.

FIGURES



NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: USGS, 2022.

N

FEET
0 2,000 4,000

213012001_Well26.dwg_SL 04/23/2026 DRAFTED BY: JDP

FIGURE 1

Ninyo & Moore
A SOCOTEC COMPANY

SITE LOCATION

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26

213012001_Well26.dwg_SP&SEL 05/26/2026 DRAFTED BY: JDP/JLC

LEGEND

B-6 TD=11.5 — BORING TD=TOTAL DEPTH IN FEET

CPT-7 TD=100.2 — CONE PENETRATION TEST TD=TOTAL DEPTH IN FEET

IT-1 TD=3.2 — TEST PIT TD=TOTAL DEPTH IN FEET

N

FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: HAZEN AND SAWYER, 2026; GOOGLE EARTH, 2025.

FIGURE 2

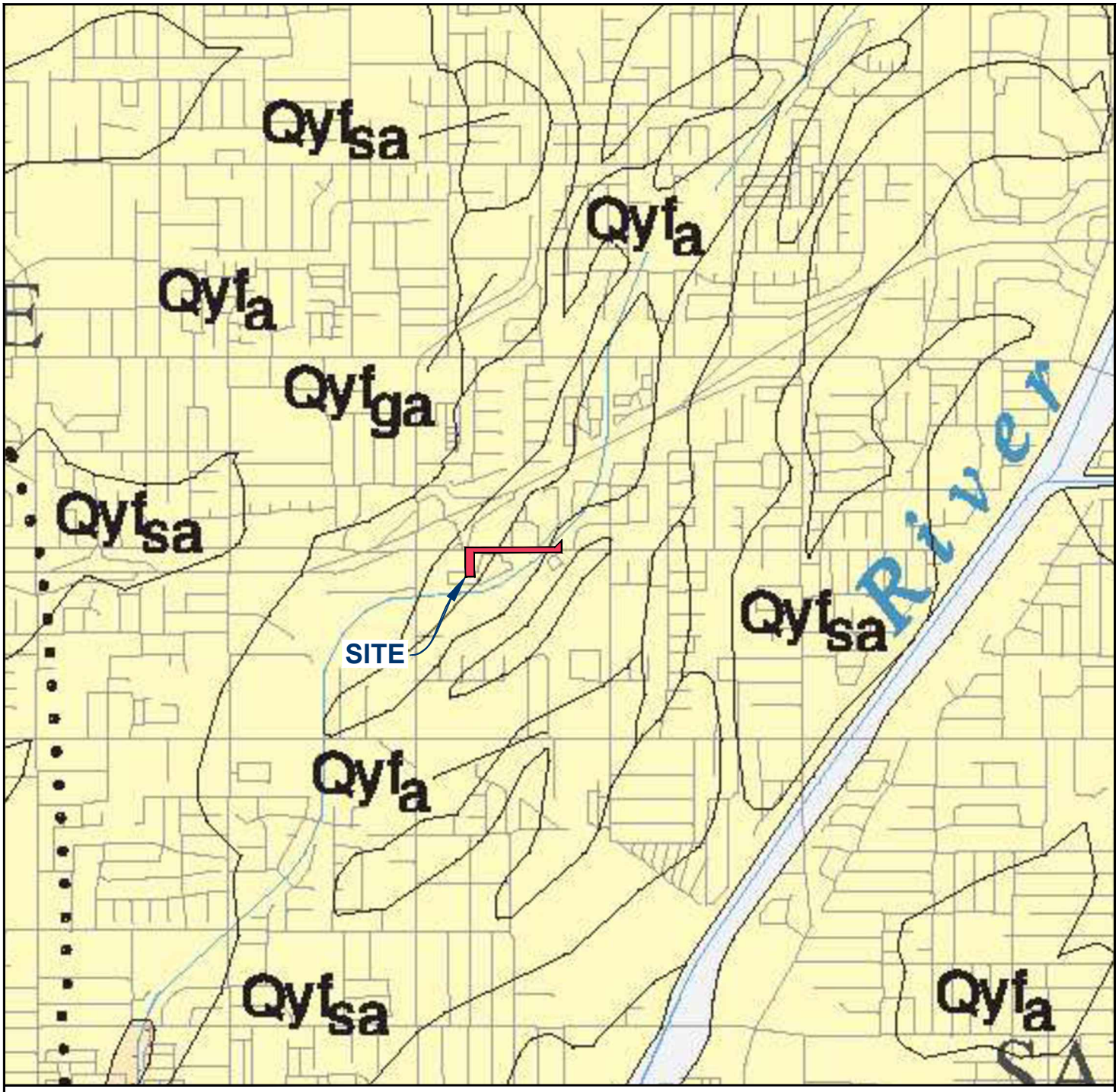
Ninyo & Moore

A SOCOTEC COMPANY

SITE PLAN AND SUBSURFACE EXPLORATION LOCATIONS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26



LEGEND

Qyf$_{a}$	YOUNG ALLUVIAL FAN DEPOSITS (SAND)
Qyf$_{sa}$	YOUNG ALLUVIAL FAN DEPOSITS (SILT AND SAND)
Qyf$_{ga}$	YOUNG ALLUVIAL FAN DEPOSITS (GRAVEL AND SAND)

GEOLOGIC CONTACT

BURIED FAULT

N

FEET

0 2,000 4,000

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: MORTON AND MILLER, 2006.

213012001_Well26.dwg_RG 04/23/2026 DRAFTED BY: JDP

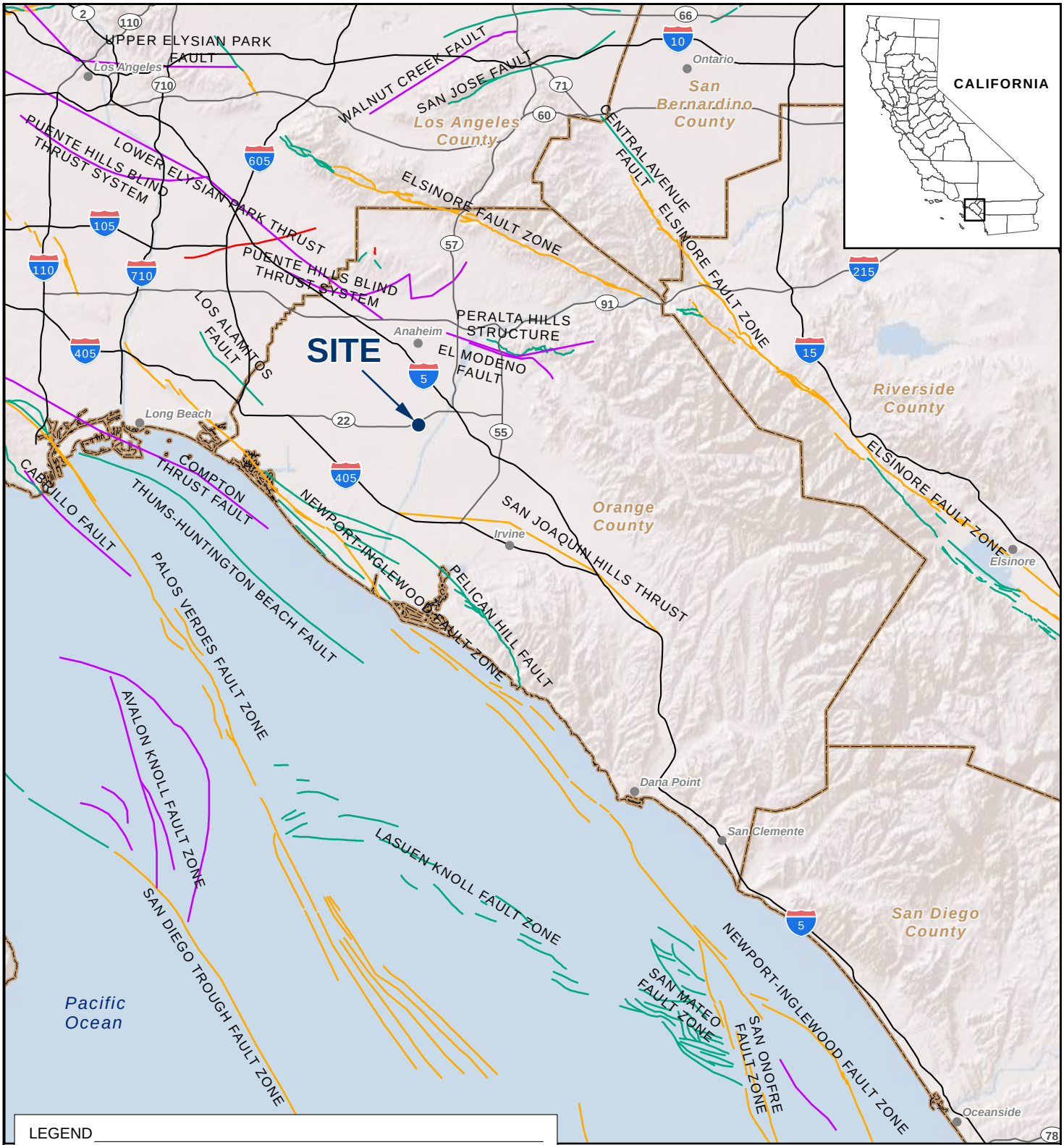
FIGURE 3

Ninyo & Moore
A SOCOTEC COMPANY

REGIONAL GEOLOGY

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26



LEGEND

CALIFORNIA FAULT ACTIVITY

- HISTORICALLY ACTIVE
- HOLOCENE ACTIVE
- LATE QUATERNARY (POTENTIALLY ACTIVE)
- QUATERNARY (POTENTIALLY ACTIVE)
- STATE/COUNTY BOUNDARY

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

SOURCES: QUATERNARY FAULTS DATABASE - U.S. GEOLOGICAL SURVEY AND CALIFORNIA GEOLOGICAL SURVEY, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES, ACCESSED NOVEMBER 4, 2024, AT: https://www.usgs.gov/programs/earthquake-hazards/faults

N

MILES

0 8 16

P213012001_W26.aprx 6/3/2025 DRAFTED BY: JDL

FIGURE 4

Ninyo & Moore
A SOCOTEC COMPANY

FAULT LOCATIONS

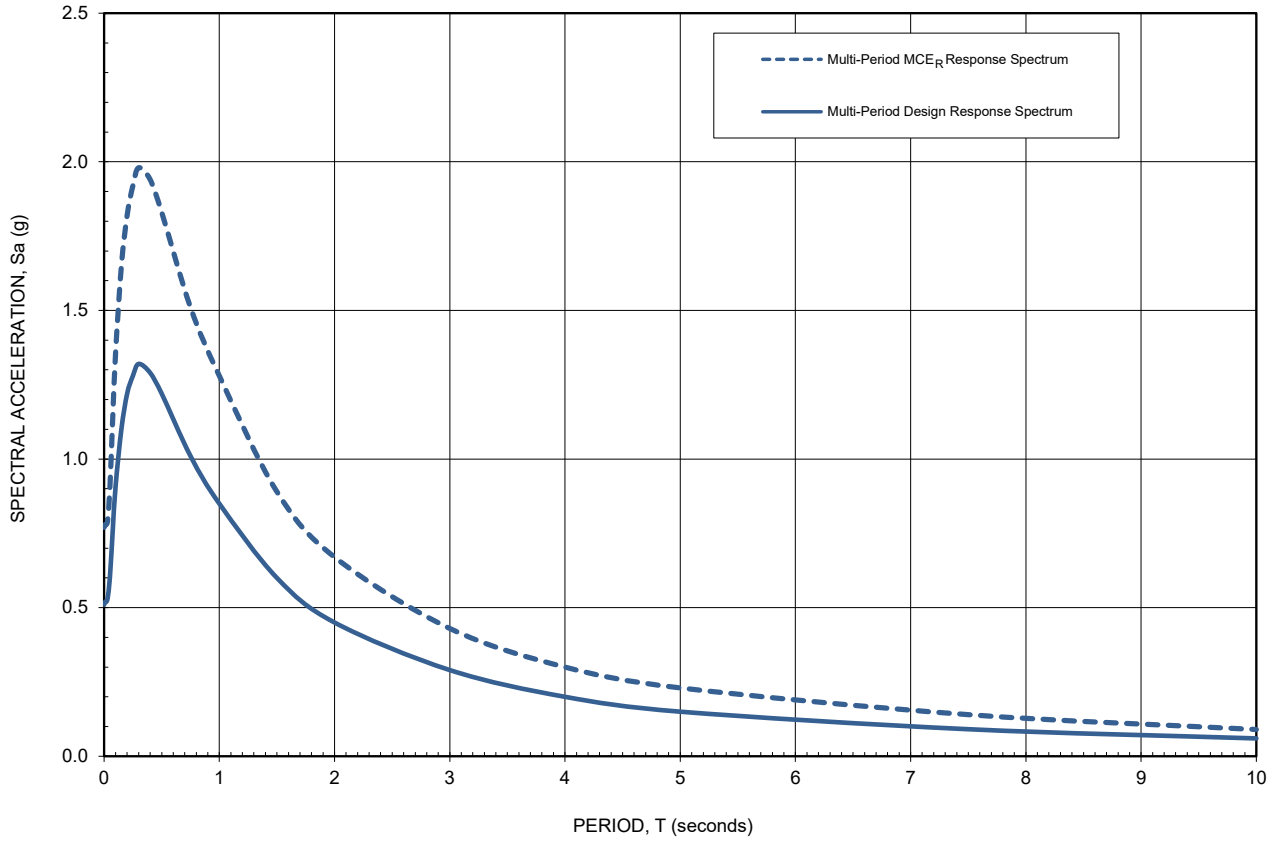
WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

PERIOD (seconds)	MULTI-PERIOD MCE_R RESPONSE SPECTRUM Sa (g)	MULTI-PERIOD DESIGN RESPONSE SPECTRUM Sa (g)
0.00	0.770	0.510
0.01	0.780	0.520
0.02	0.780	0.520
0.03	0.790	0.530
0.05	0.900	0.600
0.08	1.140	0.760
0.10	1.360	0.910
0.15	1.650	1.100
0.20	1.820	1.220
0.25	1.920	1.280
0.30	1.980	1.320

PERIOD (seconds)	MULTI-PERIOD MCE_R RESPONSE SPECTRUM Sa (g)	MULTI-PERIOD DESIGN RESPONSE SPECTRUM Sa (g)
0.40	1.940	1.290
0.50	1.830	1.220
0.75	1.510	1.010
1.00	1.280	0.850
1.50	0.890	0.600
2.00	0.670	0.450
3.00	0.430	0.290
4.00	0.300	0.200
5.00	0.230	0.150
7.50	0.140	0.091
10.00	0.090	0.060

S_{MS} =	1.780 g	S_{M1} =	1.280 g	S_{DS} =	1.190 g	S_{D1} =	0.850 g	PGA_M =	0.670 g



NOTES:

1 The multi-period design and MCE_R response spectra were computed from the USGS Seismic Design Geodatabase per ASCE 7-22 Section 11.4.

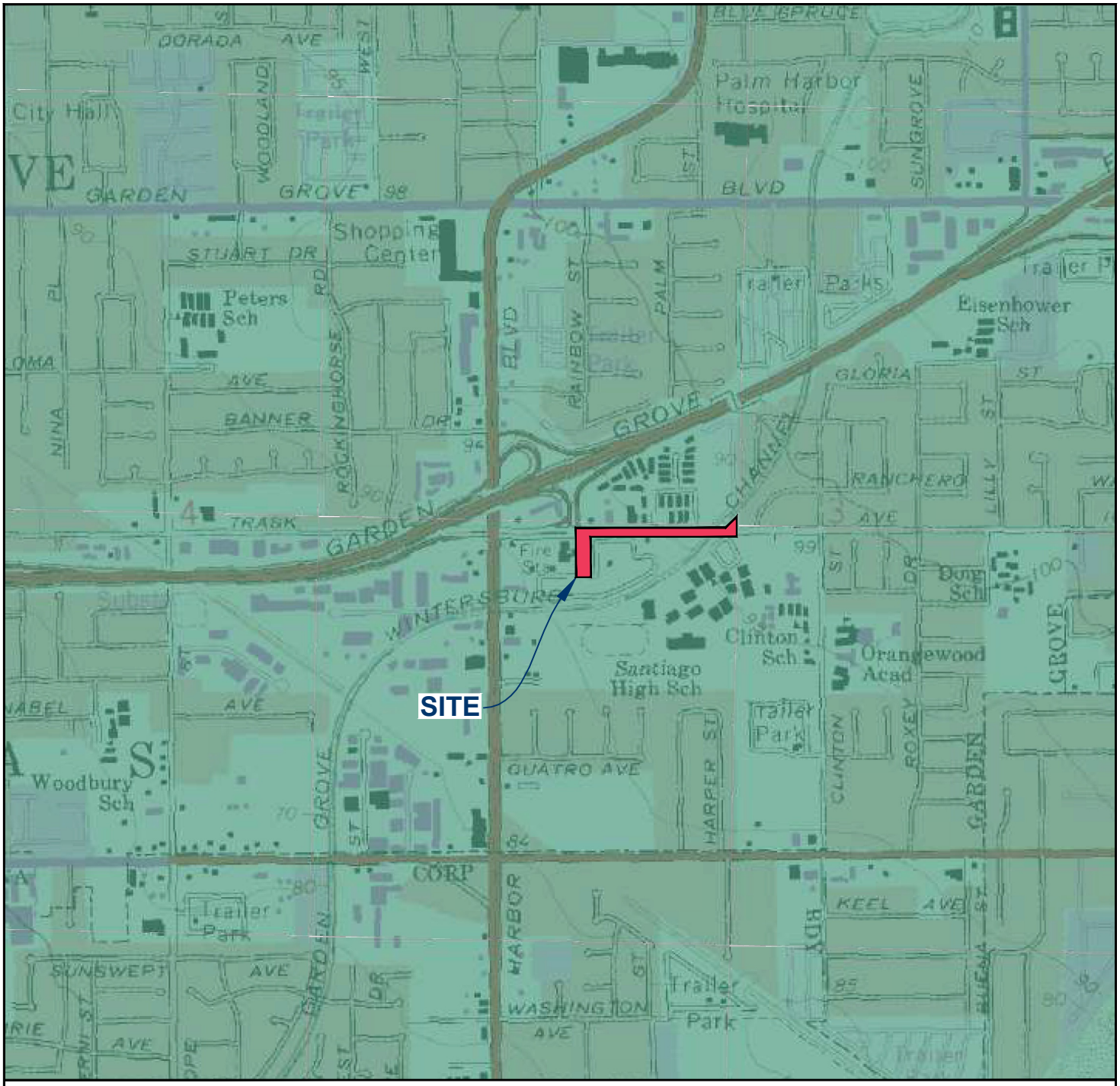
2 The response spectra are based on Site Class D (Medium Dense Sand or Stiff Clay).

FIGURE 5

Ninyo & Moore
A SOCOTEC COMPANY

ACCELERATION RESPONSE SPECTRA

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA



LEGEND

LIQUEFACTION
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

N

FEET
0 1,200 2,400

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. I REFERENCE: CGS, 1998.

FIGURE 6

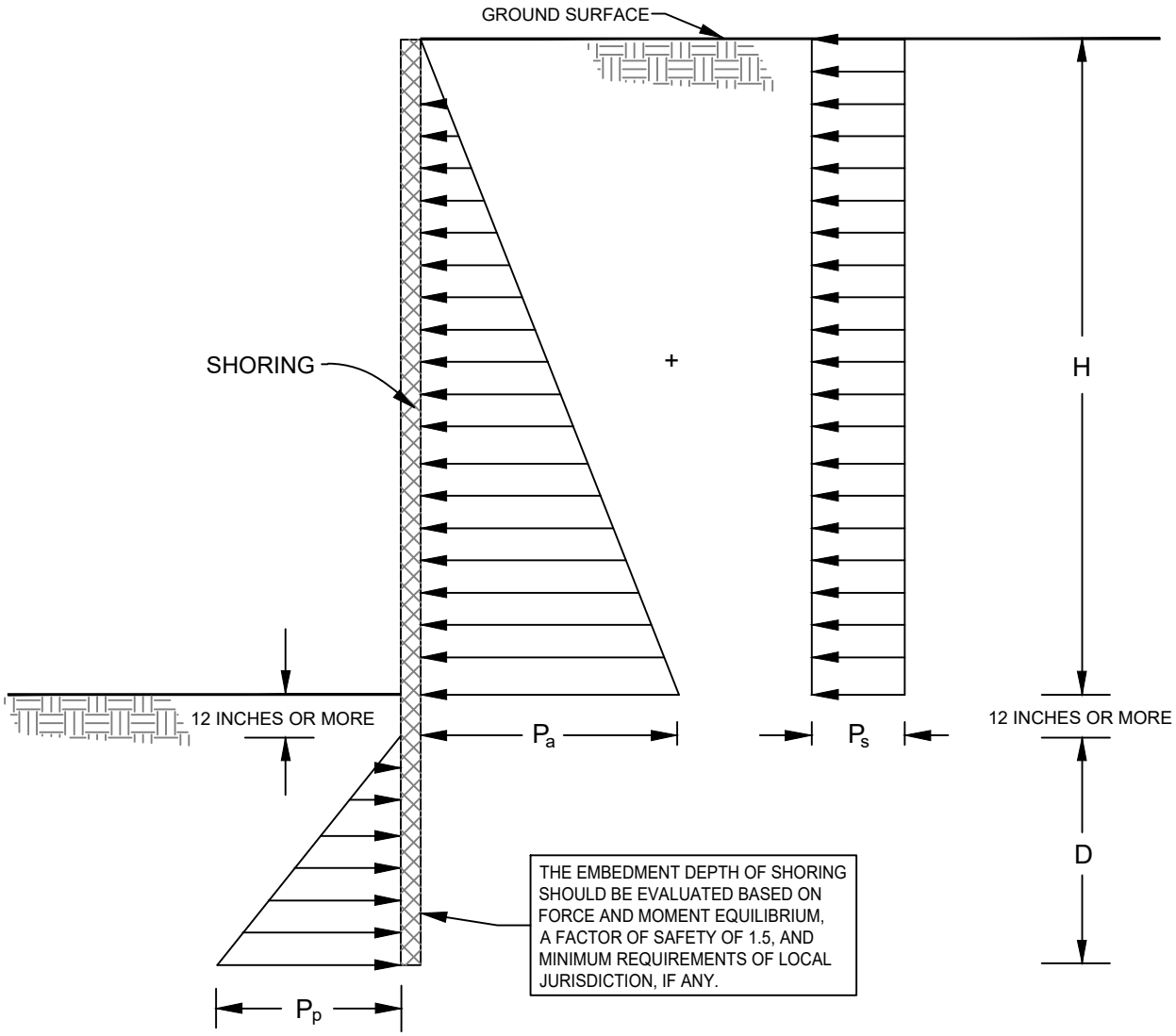
Ninyo & Moore
A SOCOTEC COMPANY

SEISMIC HAZARD ZONES

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26

213012001_Well26.dwg_SHZ 04/23/2026 DRAFTED BY: JDP



NOTES:

1. ACTIVE LATERAL EARTH PRESSURE, P_a
   P_a = 37H psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   P_s = 72 psf
3. PASSIVE LATERAL EARTH PRESSURE, P_p
   P_p = 260D psf
4. ASSUMES GROUNDWATER IS NOT PRESENT
5. H AND D ARE IN FEET

NOT TO SCALE

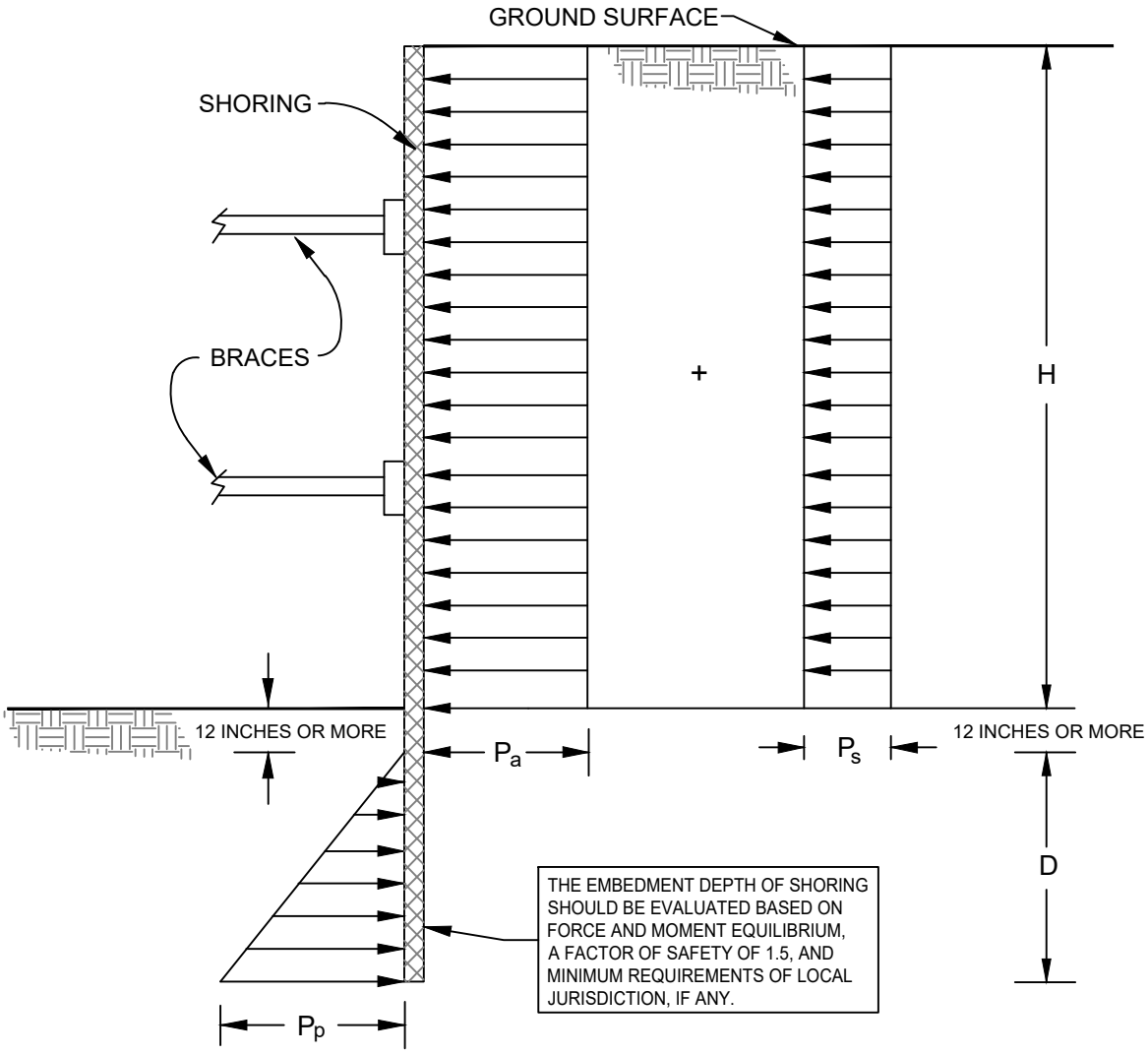
FIGURE 7

LATERAL EARTH PRESSURES FOR TEMPORARY CANTILEVERED SHORING

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26

Ninyo & Moore
A SOCOTEC COMPANY



NOTES:

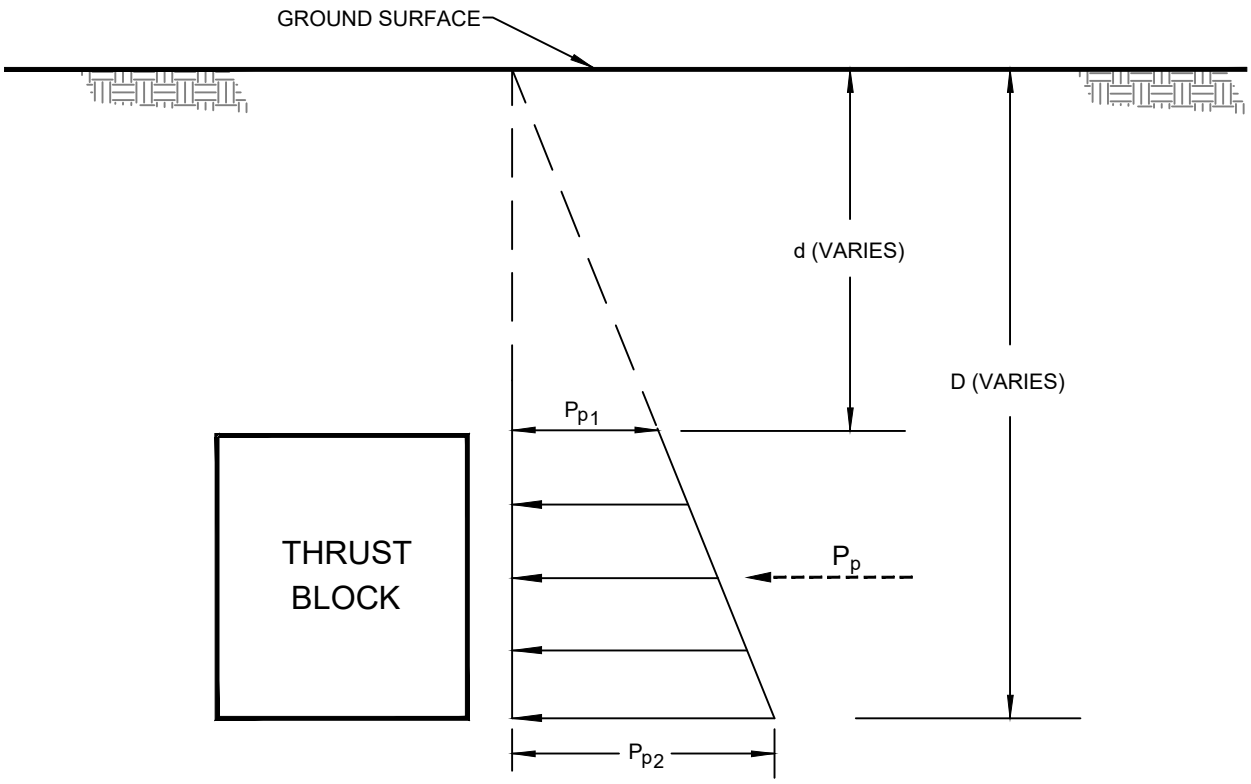
1. APPARENT LATERAL EARTH PRESSURE, P_a
   P_a = 24H psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   P_s = 120 psf
3. PASSIVE LATERAL EARTH PRESSURE, P_p
   P_p = 260D psf
4. ASSUMES GROUNDWATER IS NOT PRESENT
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H AND D ARE IN FEET

NOT TO SCALE

FIGURE 8

LATERAL EARTH PRESSURES FOR BRACED EXCAVATION

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA



NOTES:

1. GROUNDWATER BELOW BLOCK
   $P_p = 130(D^2-d^2)$ lb/ft
2. ASSUMES BACKFILL IS GRANULAR MATERIAL
3. ASSUMES THRUST BLOCK IS ADJACENT TO COMPETENT MATERIAL
4. D AND d ARE IN FEET

NOT TO SCALE

FIGURE 9

THRUST BLOCK LATERAL EARTH PRESSURE DIAGRAM

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 I 5/26

Ninyo & Moore
A SOCOTEC COMPANY

APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following methods.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of approximately 1.4 inches. The sampler was driven into the ground 18 inches with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sampler barrel in the brass rings, sealed, and transported to the laboratory for testing.

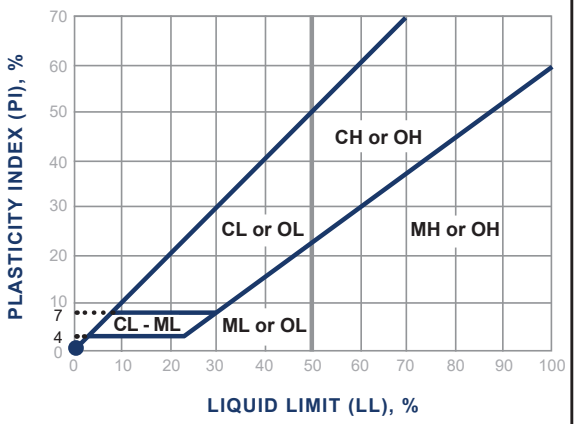
Soil Classification Chart Per ASTM D 2488

Primary Divisions			Secondary Divisions	
			Group Symbol	Group Name
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

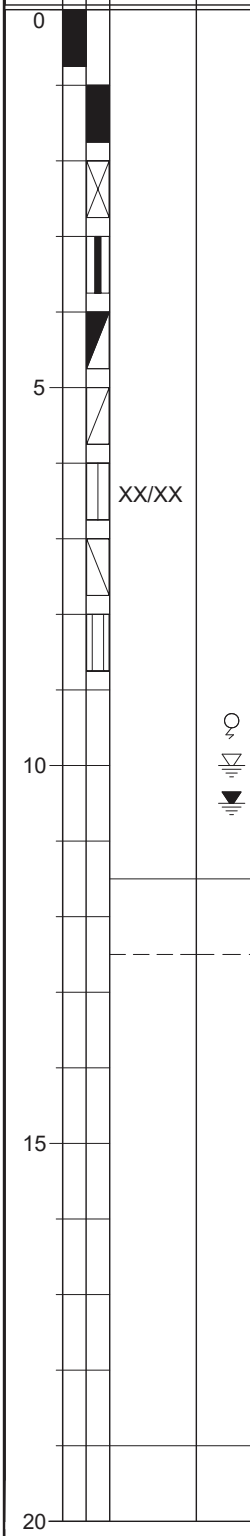
Consistency - Fine-Grained Soil

Consis-tency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

Ninyo & Moore
A SOCOTEC COMPANY

USCS METHOD OF SOIL CLASSIFICATION

BORING LOG EXPLANATION SHEET



Bulk sample.

Modified split-barrel drive sampler.

No recovery with modified split-barrel drive sampler.

Sample retained by others.

Standard Penetration Test (SPT).

No recovery with a SPT.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.

No recovery with Shelby tube sampler.

Continuous Push Sample.

Seepage.

Groundwater encountered during drilling.

Groundwater measured after drilling.

SM

MAJOR MATERIAL TYPE (SOIL):

Solid line denotes unit change.

CL

Dashed line denotes material change.

Attitudes: Strike/Dip
b: Bedding
c: Contact
j: Joint
f: Fracture
F: Fault
cs: Clay Seam
s: Shear
bss: Basal Slide Surface
sf: Shear Fracture
sz: Shear Zone
sbs: Shear Bedding Surface

The total depth line is a solid line that is drawn at the bottom of the boring.

DATE DRILLED 5/15/25 BORING NO. B-1

GROUND ELEVATION 97' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SM	ASPHALT CONCRETE: Approximately 4 inches thick.
						SM	AGGREGATE BASE: Grayish brown, moist, medium dense, silty SAND with gravel; approximately 2 inches thick.
						SP	FILL: Brown, moist, medium dense, silty SAND; trace debris.
		14	5.8	99.2			ALLUVIUM: Light brown, moist, loose, poorly graded SAND; trace silt. Trace fine gravel.
10		20					Medium dense.
		12	4.2	89.9			Loose.
							@19': Groundwater encountered during drilling.
20		36					Wet; medium dense; increase in medium to coarse grained sand.
		27					Dense.
30		6				ML	Brown, wet, loose, sandy SILT; micaceous; trace clay.
						CL-ML	Brown to grayish brown, wet, stiff, silty CLAY; few sand; micaceous.
		17				SM	Brown, wet, medium dense, silty SAND; fine sand; micaceous.
40							

FIGURE A- 1

Ninyo & Moore
A SOCOTEC COMPANY

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

DATE DRILLED 5/15/25 BORING NO. B-1

GROUND ELEVATION 97' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40		35				SP-SM	ALLUVIUM: (Continued) Brown to grayish brown, wet, very dense, poorly graded SAND with silt; micaceous.
		22					Grayish brown; dense.
50		11				CL	Grayish brown, wet, very stiff, lean CLAY; trace sand; micaceous.
		16				SM	Brown to grayish brown, wet, medium dense, silty SAND; fine sand; trace gravel; micaceous.
60		14				CL	Brown to grayish brown, wet, very stiff, lean CLAY; micaceous.
		29				SP-SM	Gray, wet, dense, poorly graded SAND with silt; micaceous.
						CL	Gray, wet, very stiff, lean CLAY with sand; trace gravel; micaceous.
70		19				ML	Gray, wet, medium dense, sandy SILT; micaceous.
							Total Depth = 71.5 feet. Groundwater encountered during drilling at approximately 19 feet. Boring caved at approximately 28 feet after augers were removed. Backfilled with cement grout and patched with rapid-set concrete dyed black on 5/15/25. Notes: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
80							

FIGURE A- 2

Ninyo & Moore
A SOCOTEC COMPANY

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

DATE DRILLED 5/15/25 BORING NO. B-2

GROUND ELEVATION 97' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SM	ASPHALT CONCRETE: Approximately 4 inches thick.
						SM	AGGREGATE BASE: Grayish brown, moist, medium dense, silty SAND; approximately 4 inches thick.
						SP	FILL: Brown, moist, medium dense, silty SAND.
		12					ALLUVIUM: Light brown, moist, loose, poorly graded SAND; trace silt; micaceous. Trace fine gravel.
10		10	2.0	108.2		SM	Brown, moist, loose, silty SAND; fine sand; micaceous.
		24				SP-SM	Light brown, moist, medium dense, poorly graded SAND with silt; micaceous.
20		15	▽				@20': Groundwater encounter during drilling. Wet.
		41				SM	Brown, wet, medium dense, silty SAND; micaceous; iron oxide staining.
							Total Depth = 23 feet. Groundwater encountered during drilling at approximately 20 feet. Boring caved at approximately 11 feet after augers were removed. Backfilled with cement grout and patched with rapid-set concrete dyed black on 5/15/25.
30							Notes: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
40							

FIGURE A- 3

Ninyo & Moore
A SOCOTEC COMPANY

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

DATE DRILLED 5/15/25 BORING NO. B-3

GROUND ELEVATION 100' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SM	ASPHALT CONCRETE: Approximately 4 inches thick.
						SM	AGGREGATE BASE: Grayish brown, moist, medium dense, silty SAND with gravel; approximately 6 inches thick.
						ML	FILL: Brown, moist, medium dense, silty SAND; fine sand; trace gravel; trace concrete fragments.
		9					ALLUVIUM: Brown, moist, loose, sandy SILT; micaceous. Brown to light brown; iron oxide staining.
						SP-SM	Light brown to grayish brown, moist, medium dense, poorly graded SAND with silt; micaceous; iron oxide staining.
10		16				SM	Brown, moist, medium dense, silty SAND; micaceous.
		18	4.6	97.4		SP	Light brown, moist, medium dense, poorly graded SAND.
							@20': Groundwater encountered during drilling.
20		27	14.1	110.9		SP-SM	Light brown to grayish brown, wet, medium dense, poorly graded SAND with silt; few to little gravel; micaceous.
							Total Depth = 21.5 feet. Groundwater encountered during drilling at approximately 20 feet. Boring caved at approximately 15 feet after augers were removed. Backfilled with cement grout and patched with rapid-set concrete dyed black on 5/15/25.
30							Notes: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
40							

FIGURE A- 4

Ninyo & Moore
A SOCOTEC COMPANY

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

DATE DRILLED 6/10/25 BORING NO. B-4

GROUND ELEVATION 96' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 9.5 inches thick.
						GM	AGGREGATE BASE: Grayish brown, moist, dense, silty GRAVEL with sand; approximately 4 inches thick.
						SP	FILL: Light brown, moist, medium dense, poorly graded SAND; trace gravel.
						SP	ALLUVIUM: Light brown, moist, medium dense, poorly graded SAND.
		15	3.0	96.3			
10		18	17.7	110.3		SC	Grayish brown, moist, medium dense, clayey SAND; trace clay; micaceous; iron oxide staining.
							Total Depth = 11.5 feet. Groundwater not encountered during drilling. Backfilled with soil cuttings and patched with rapid-set concrete dyed black on 6/10/25.
20							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30							
40							

DATE DRILLED 6/10/25 BORING NO. B-5

GROUND ELEVATION 97' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SM	ASPHALT CONCRETE: Approximately 4 inches thick.
						SM	AGGREGATE BASE: Grayish brown, moist, medium dense, silty SAND with gravel; approximately 6 inches thick.
						SP-SM	FILL: Brown, moist, medium dense, silty SAND; trace asphalt concrete debris.
							ALLUVIUM: Brown, moist, medium dense, poorly graded SAND with silt; trace gravel.
		20	1.9	98.8		SP	Light brown, moist, medium dense, poorly graded SAND; trace silt; trace fine gravel.
10		30					Iron oxide staining.
							Total Depth = 11.5 feet. Groundwater not encountered during drilling. Backfilled with soil cuttings and patched with rapid-set concrete dyed black on 6/10/25.
20							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30							
40							

DATE DRILLED 6/10/25 BORING NO. B-6

GROUND ELEVATION 98' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Hollow-Stem Auger (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY JCR LOGGED BY JCR REVIEWED BY MLP

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SM	ASPHALT CONCRETE: Approximately 4 inches thick.
						SM	AGGREGATE BASE: Brown, moist, medium dense, silty SAND with gravel; approximately 5 inches thick.
						SP	FILL: Brown, moist, medium dense, silty SAND; trace gravel. @ 1.9': Thin layer of clay.
		16	2.6	97.0			ALLUVIUM: Light brown, moist, medium dense, poorly graded SAND; trace silt; trace gravel; iron oxide staining.
10		24	4.1	97.2			
							Total Depth = 11.5 feet. Groundwater not encountered during drilling. Backfilled with soil cuttings and patched with rapid-set concrete dyed black on 6/10/25.
							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							
30							
40							

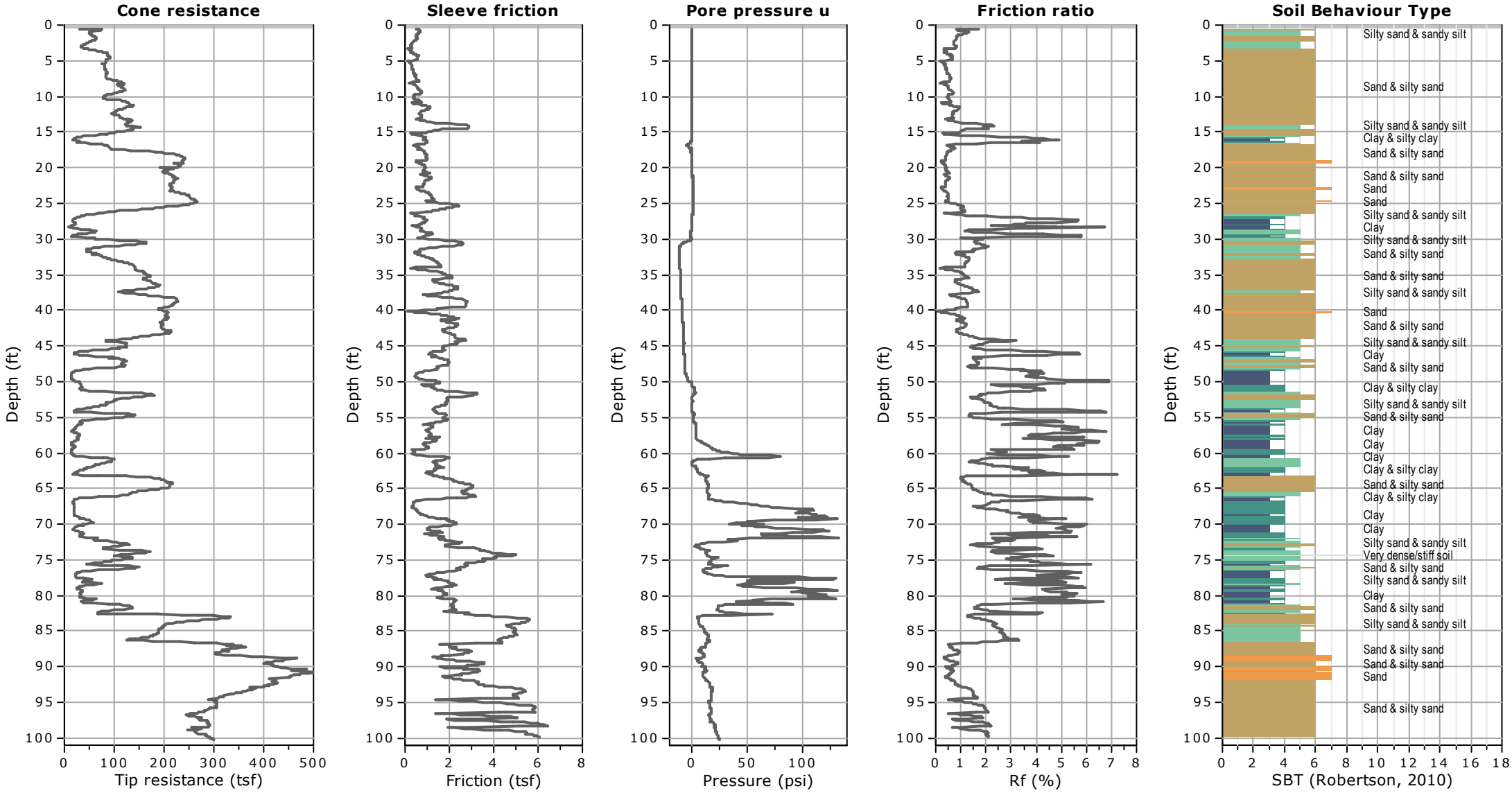
APPENDIX B

CPT Sounding

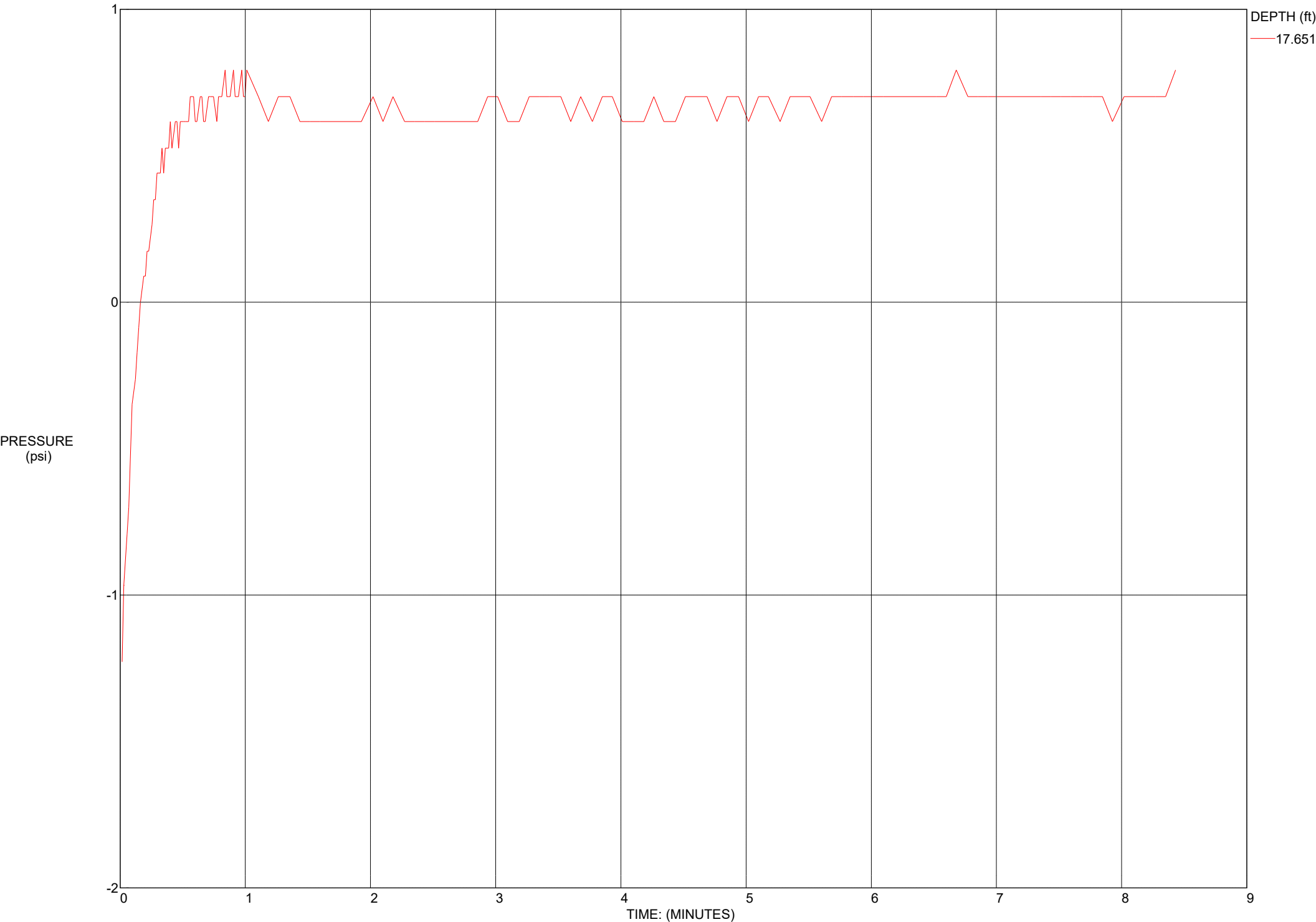
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Ninyo & Moore / Well 26
Location: 12351 Trask Ave, Garden Grove, CA

CPT-7
Total depth: 100.20 ft, Date: 11/13/2025



TEST ID: CPT-7



Ninyo & Moore
Wells 22, 26 & 27
Garden Grove, CA

CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)	
CPT-7 (Well 26)	10.01	9.01	9.23	15.10	611		
	19.98	18.98	19.09	34.16	559	517	
	29.99	28.99	29.06	49.12	592	667	
	39.99	38.99	39.04	61.64	633	797	
	50.00	49.00	49.04	72.68	675	906	
	60.07	59.07	59.10	85.20	694	804	
	70.01	69.01	69.04	98.18	703	765	
	79.99	78.99	79.02	109.84	719	856	
	89.99	88.99	89.01	120.56	738	933	
	100.00	99.00	99.02	129.02	767	1183	
							sum

Shear Wave Source Offset - 2 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

APPENDIX C

Laboratory Testing

APPENDIX C

LABORATORY TESTING

Classification
Soils were visually and texturally classified in adherence to the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory borings in Appendix A.

In-Place Moisture and Density Tests
The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix A.

200 Wash
An evaluation of the percentage of particles finer than the No. 200 sieve on selected soil samples was performed in general accordance with ASTM D 1140. The results of the tests are presented on Figures C-1 and C-2.

Atterberg Limits
Tests were performed on a selected representative fine-grained soil sample to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are summarized on Figure C-3.

Direct Shear Tests
Direct shear testing was performed on relatively undisturbed samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of the selected materials. The samples were inundated during shearing to represent the adverse field conditions. The test results are presented on Figures C-4 through C-9.

R-Value
The resistance value, or R-value, for site soils was evaluated in general accordance with CT 301. Samples were prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are summarized on Figure C-10.

Soil Corrosivity Tests
Soil pH and resistivity tests were performed on representative samples in general accordance with CT 643. The soluble sulfate and chloride content of the selected samples were evaluated in general accordance with CT 417 and CT 422, respectively. The test results are summarized on Figure C-11.

SAMPLE LOCATION	SAMPLE DEPTH (ft)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS (TOTAL SAMPLE)
B-1	5.0-6.5	POORLY GRADED SAND	99	3	SP
B-1	15.0-16.5	POORLY GRADED SAND	100	1	SP
B-1	30.0-31.0	SANDY SILT	100	61	ML
B-1	40.0-41.5	POORLY GRADED SAND WITH SILT	100	10	SP-SM
B-1	55.0-56.5	SILTY SAND	99	38	SM
B-1	70.0-71.0	LEAN CLAY WITH SAND	99	82	CL
B-2	0.0-3.0	SILTY SAND	100	19	SM
B-2	5.0-6.5	POORLY GRADED SAND	98	1	SP
B-3	15.0-16.5	POORLY GRADED SAND	100	3	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 1140

FIGURE C-1

Ninyo & Moore
A SOCOTEC COMPANY

NO. 200 SIEVE ANALYSIS TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

SAMPLE LOCATION	SAMPLE DEPTH (ft)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS (TOTAL SAMPLE)
B-3	20.0-21.5	POORLY GRADED SAND WITH SILT	89	7	SP-SM
B-4	5.0-6.5	POORLY GRADED SAND	97	1	SP
B-4	10.0-11.5	CLAYEY SAND	100	43	SC
B-5	5.0-6.5	POORLY GRADED SAND	99	1	SP
B-5	10.0-11.5	POORLY GRADED SAND	99	1	SP
B-6	2.0-3.0	POORLY GRADED SAND WITH SILT	98	14	SP-SM
B-6	5.0-6.5	POORLY GRADED SAND	98	1	SP
B-6	10.0-11.5	POORLY GRADED SAND	99	1	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 1140

FIGURE C-2

NO. 200 SIEVE ANALYSIS TEST RESULTS

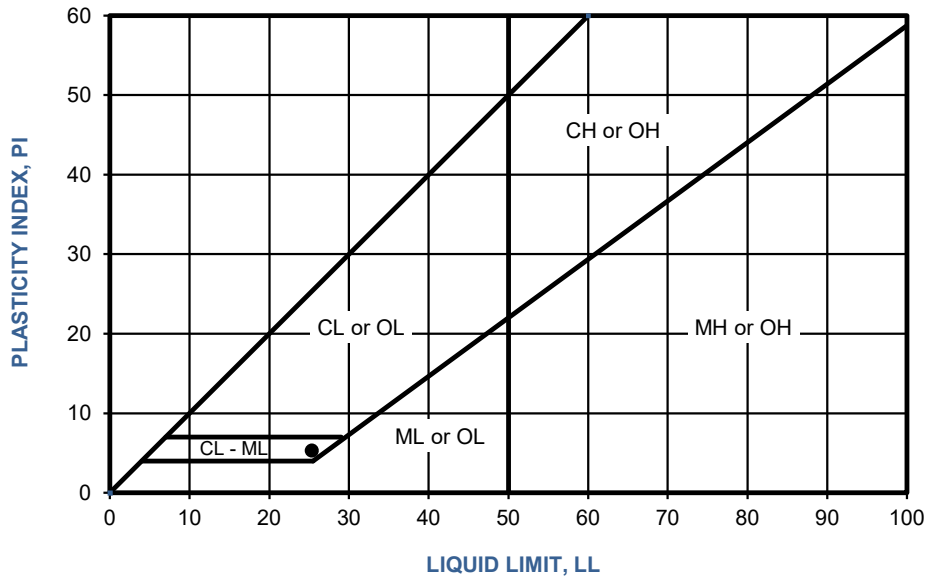
WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

Ninyo & Moore
A SOCOTEC COMPANY

213012001 Fig C-2 200-WASH @ B-3 -- B-6

SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-1	31.0-31.5	25	20	5	CL-ML	CL-ML



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318

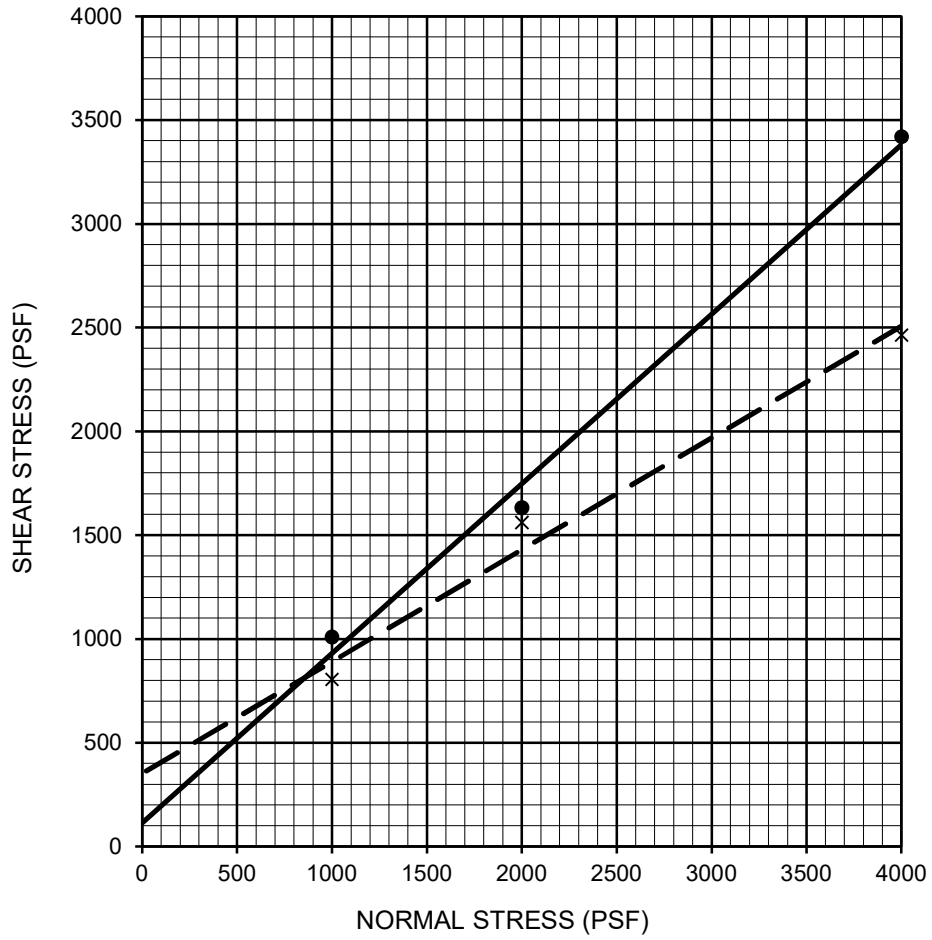
FIGURE C-3

Ninyo & Moore
A SOCOTEC COMPANY

ATTERBERG LIMITS TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/25



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND	—●—	B-2	5.0-6.5	Peak	114	39	SP
POORLY GRADED SAND	– – X – –	B-2	5.0-6.5	Ultimate	352	28	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

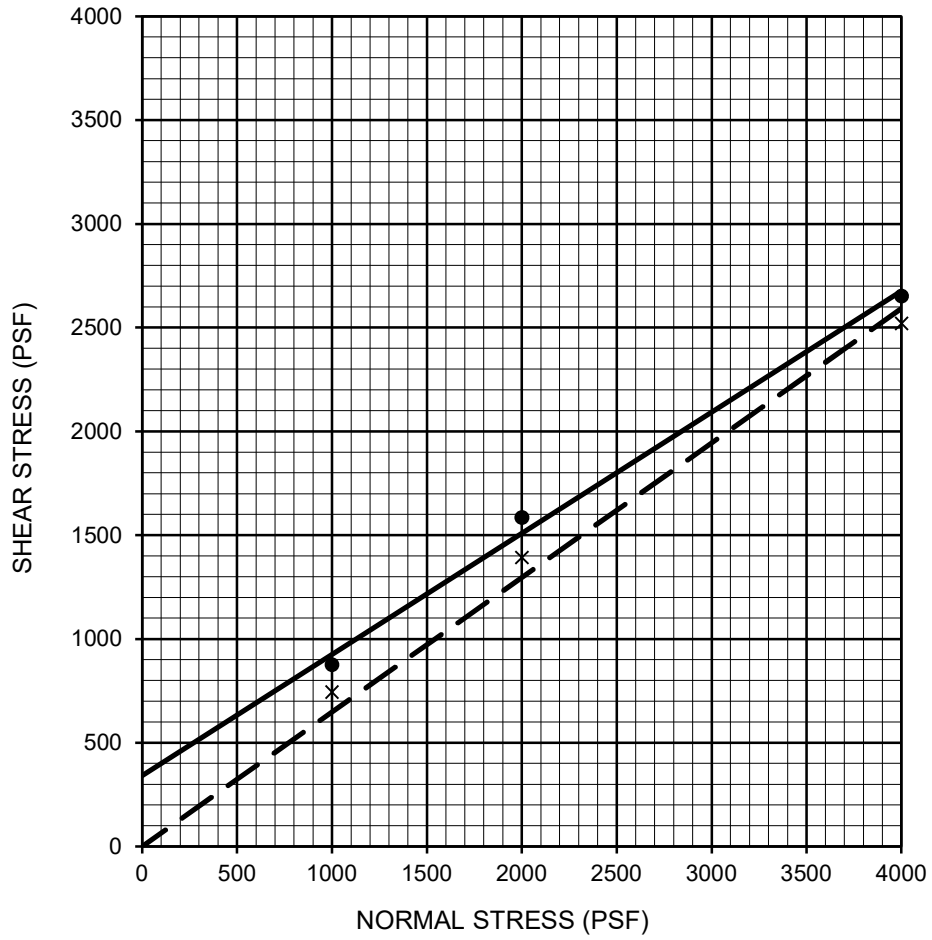
FIGURE C-4

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

Ninyo & Moore
A SOCOTEC COMPANY



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND	●——	B-3	15.0-16.5	Peak	342	30	SP
POORLY GRADED SAND	– – X – –	B-3	15.0-16.5	Ultimate	180	30	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

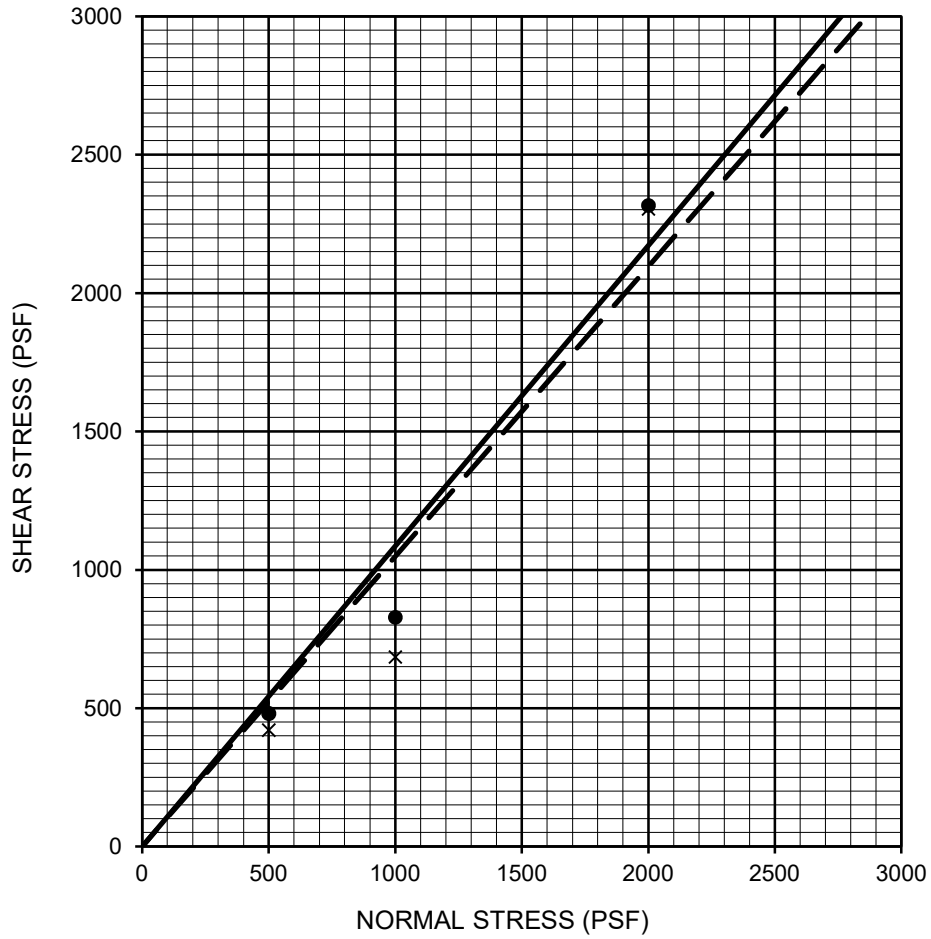
FIGURE C-5

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

Ninyo & Moore
A SOCOTEC COMPANY



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND	—●—	B-4	5.0-6.5	Peak	0	52	SP
POORLY GRADED SAND	– – X – –	B-4	5.0-6.5	Ultimate	0	53	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

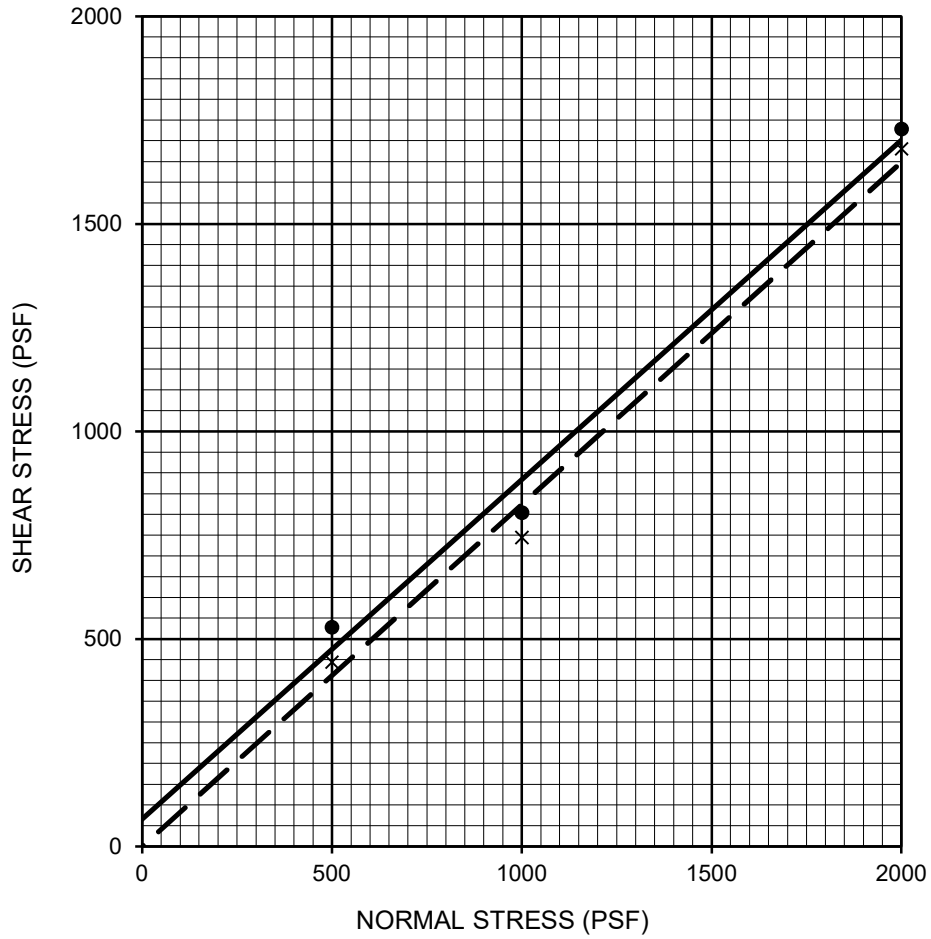
FIGURE C-6

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

Ninyo & Moore
A SOCOTEC COMPANY



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
CLAYEY SAND	—●—	B-4	10.0-11.5	Peak	66	39	SC
CLAYEY SAND	– – X – –	B-4	10.0-11.5	Ultimate	0	40	SC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

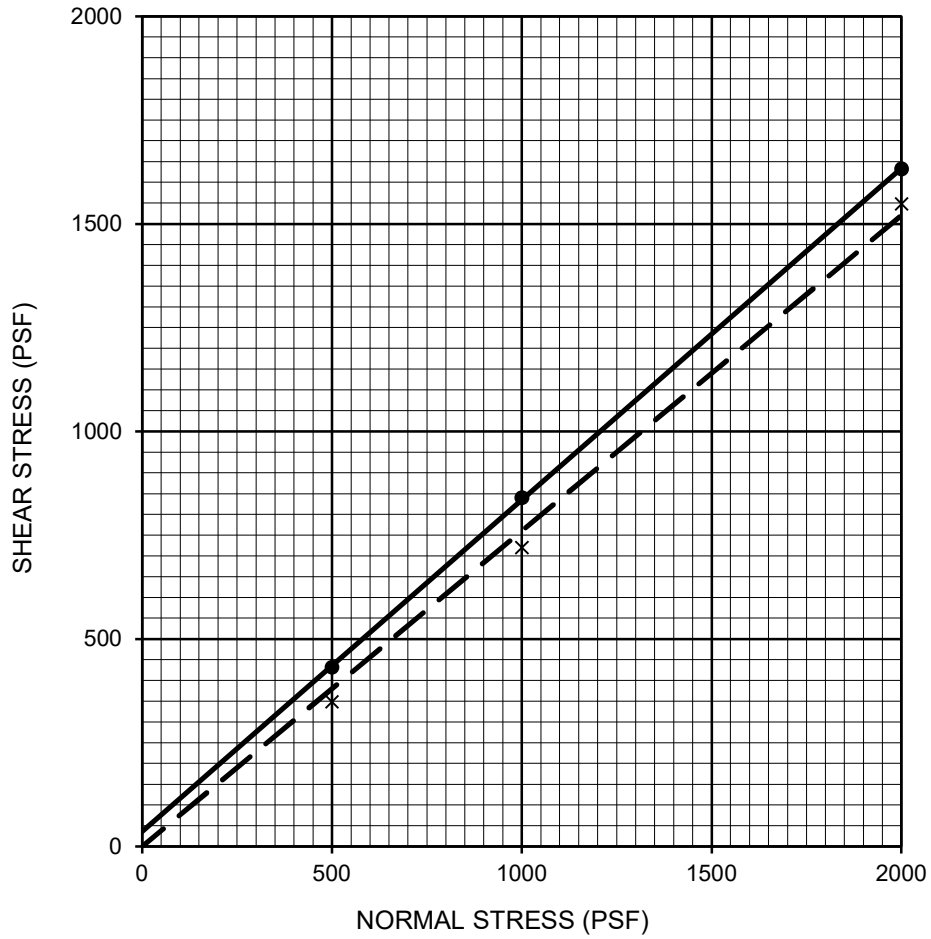
FIGURE C-7

Ninyo & Moore
A SOCOTEC COMPANY

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND	—●—	B-5	10.0-11.5	Peak	36	39	SP
POORLY GRADED SAND	– – X – –	B-5	10.0-11.5	Ultimate	0	39	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

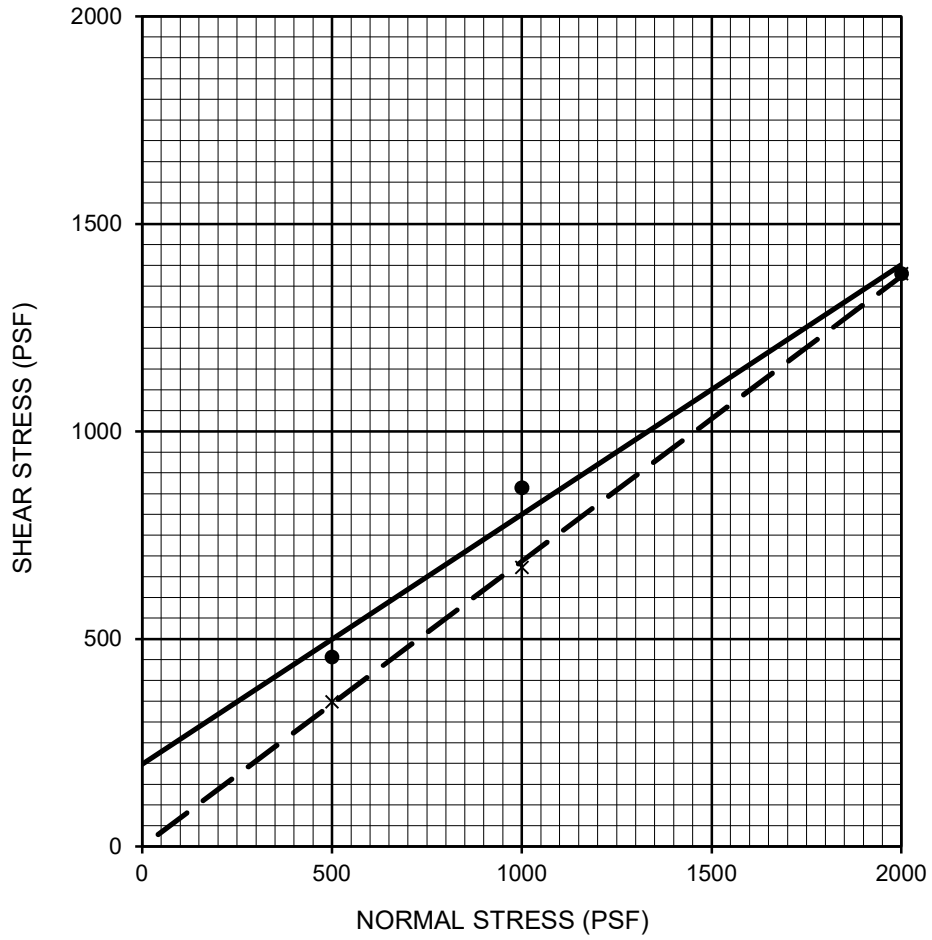
FIGURE C-8

Ninyo & Moore
A SOCOTEC COMPANY

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion (psf)	Friction Angle (degrees)	Soil Type
POORLY GRADED SAND	—●—	B-6	10.0-11.5	Peak	198	31	SP
POORLY GRADED SAND	– – X – –	B-6	10.0-11.5	Ultimate	0	35	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

FIGURE C-9

DIRECT SHEAR TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

Ninyo & Moore
A SOCOTEC COMPANY

SAMPLE LOCATION	SAMPLE DEPTH (ft)	SOIL TYPE	R-VALUE
B-2	0.0-3.0	SM	73

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

FIGURE C-10

Ninyo & Moore
A SOCOTEC COMPANY

R-VALUE TEST RESULTS

WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
B-1	0.0-2.5	7.4	12,588	10	0.001	10
B-5	0.75-2.0	8.1	6,598	10	0.001	25

[1] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 643
[2] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 417
[3] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 422

FIGURE C-11

Ninyo & Moore
A SOCOTEC COMPANY

CORROSIVITY TEST RESULTS

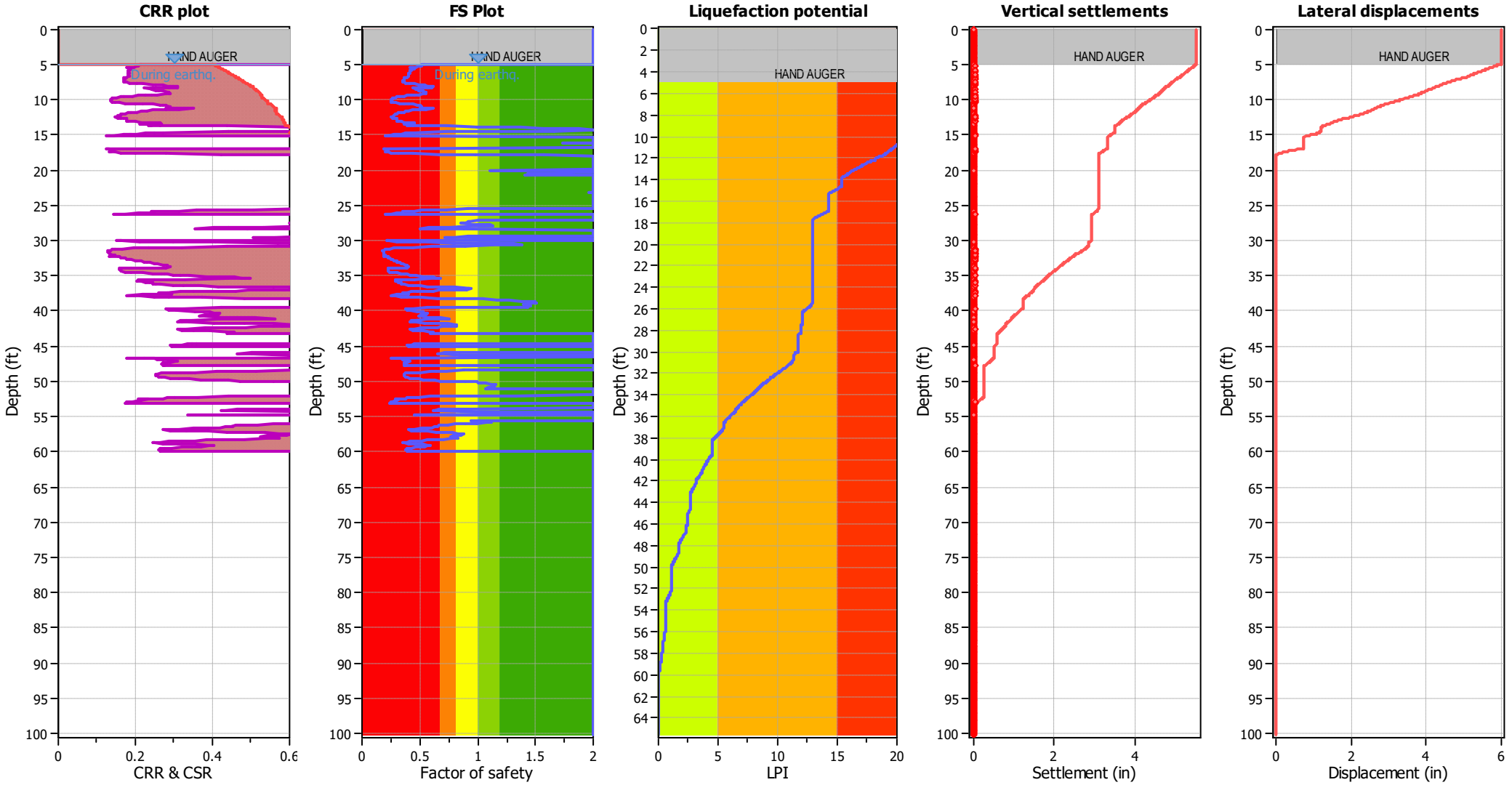
WELL 26 PFAS TREATMENT SYSTEM
GARDEN GROVE, CALIFORNIA

213012001 | 5/26

APPENDIX D

Liquefaction Analysis

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.67	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	16.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

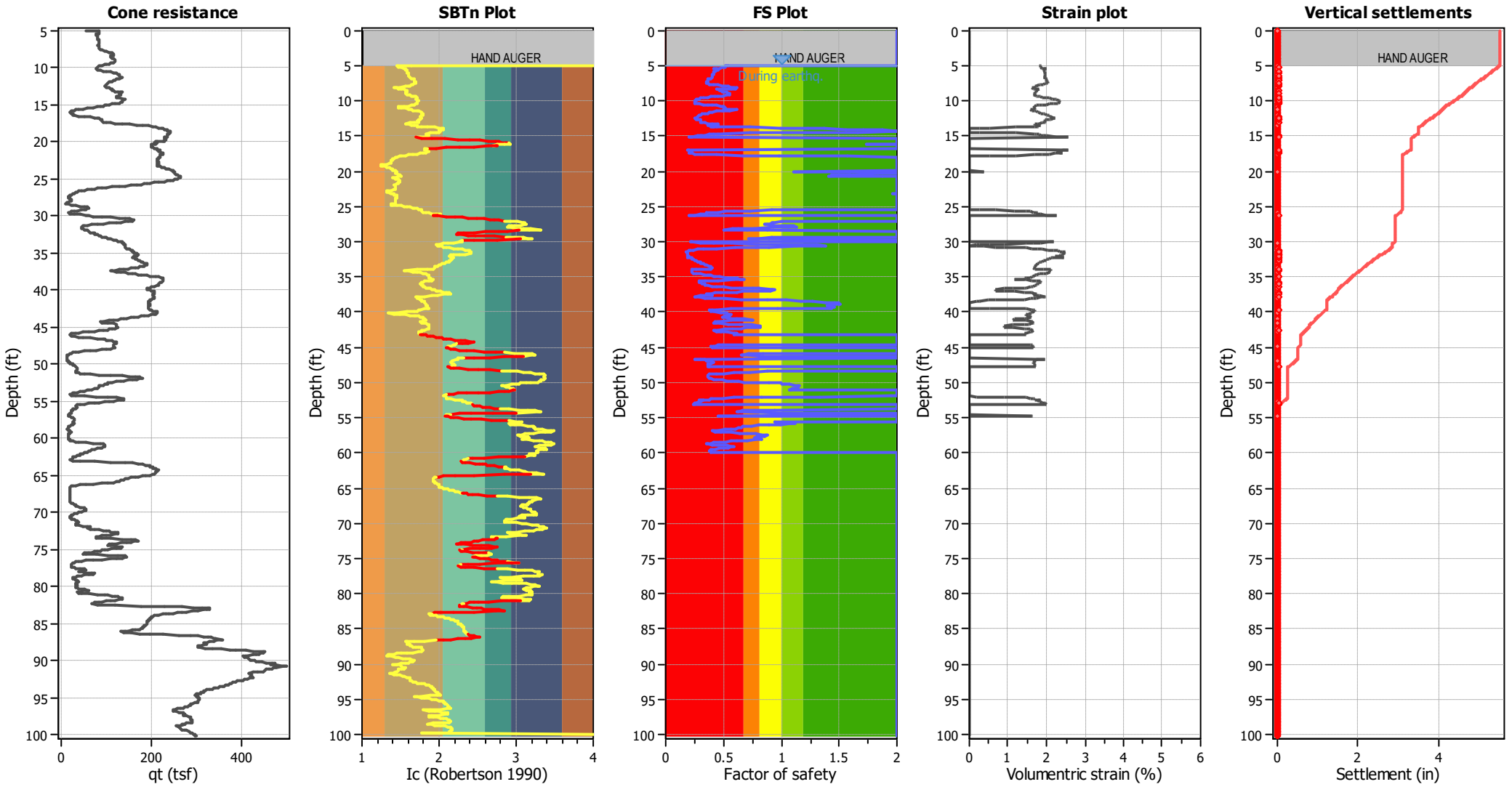
F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.07	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.15	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.21	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.27	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.34	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.39	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.46	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.53	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.61	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.67	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.73	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.80	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.88	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.92	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
0.99	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.09	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.12	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.19	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.26	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.33	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.38	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.45	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.53	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.58	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.65	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.72	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.77	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.85	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.92	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
1.97	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.05	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.11	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.19	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.25	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.31	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.37	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.44	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.50	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.56	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.65	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.70	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.77	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.83	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.89	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
2.96	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.03	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.09	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.15	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
3.23	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.29	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.36	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.42	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.48	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.57	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.62	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.67	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.75	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.81	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.90	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
3.96	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.01	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.10	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.15	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.21	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.28	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.34	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.40	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.49	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.55	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.60	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.66	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.74	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.80	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.87	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000
4.93	4.06	-1.00	54.25	-54.25	0	0	0.00	0.000	0.00	0.00	0.00	0.000

Total estimated settlement: 0.00

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
5.00	135.65	0.54	1.82	1.00	0.02	5.06	134.67	0.53	1.83	1.00	0.01
5.12	134.03	0.52	1.84	1.00	0.01	5.21	133.53	0.51	1.84	1.00	0.02
5.27	133.01	0.50	1.85	1.00	0.01	5.32	132.37	0.50	1.86	1.00	0.01
5.38	129.24	0.47	1.89	1.00	0.01	5.46	121.85	0.42	1.99	1.00	0.02
5.52	125.57	0.44	1.94	1.00	0.02	5.60	127.48	0.45	1.91	1.00	0.02
5.66	127.45	0.45	1.92	1.00	0.01	5.72	126.66	0.44	1.93	1.00	0.01
5.82	124.84	0.43	1.95	1.00	0.02	5.84	125.37	0.43	1.94	1.00	0.01
5.91	123.71	0.42	1.96	1.00	0.02	5.99	124.23	0.42	1.96	1.00	0.02

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
6.05	124.15	0.41	1.96	1.00	0.01	6.11	124.37	0.41	1.95	1.00	0.01
6.18	124.48	0.41	1.95	1.00	0.02	6.25	124.92	0.41	1.95	1.00	0.01
6.30	124.55	0.41	1.95	1.00	0.01	6.40	124.01	0.40	1.96	1.00	0.02
6.43	123.67	0.40	1.96	1.00	0.01	6.50	123.97	0.40	1.96	1.00	0.02
6.58	124.90	0.40	1.95	1.00	0.02	6.63	125.49	0.40	1.94	1.00	0.01
6.70	124.69	0.40	1.95	1.00	0.02	6.78	122.95	0.39	1.97	1.00	0.02
6.84	121.17	0.38	2.00	1.00	0.01	6.90	119.67	0.37	2.02	1.00	0.02
6.96	119.58	0.37	2.02	1.00	0.01	7.03	119.71	0.36	2.02	1.00	0.02
7.12	120.14	0.36	2.01	1.00	0.02	7.18	120.37	0.36	2.01	1.00	0.01
7.23	119.95	0.36	2.01	1.00	0.01	7.29	118.96	0.36	2.03	1.00	0.02
7.35	118.84	0.35	2.03	1.00	0.01	7.44	119.27	0.35	2.02	1.00	0.02
7.50	120.31	0.36	2.01	1.00	0.01	7.55	122.47	0.37	1.98	1.00	0.01
7.61	125.61	0.38	1.94	1.00	0.01	7.71	132.30	0.42	1.86	1.00	0.02
7.76	136.52	0.45	1.81	1.00	0.01	7.85	142.27	0.50	1.75	1.00	0.02
7.89	143.92	0.51	1.73	1.00	0.01	7.96	147.05	0.54	1.70	1.00	0.01
8.03	149.16	0.57	1.70	1.00	0.01	8.08	150.28	0.58	1.68	1.00	0.01
8.14	151.11	0.59	1.67	1.00	0.01	8.21	152.86	0.61	1.64	1.00	0.01
8.28	152.69	0.61	1.64	1.00	0.01	8.34	149.93	0.57	1.69	1.00	0.01
8.41	137.21	0.44	1.80	1.00	0.01	8.49	142.13	0.48	1.75	1.00	0.02
8.53	141.15	0.47	1.76	1.00	0.01	8.61	141.90	0.48	1.75	1.00	0.02
8.68	143.79	0.49	1.73	1.00	0.01	8.75	145.48	0.51	1.72	1.00	0.01
8.79	147.07	0.52	1.70	1.00	0.01	8.89	148.89	0.54	1.69	1.00	0.02
8.94	149.34	0.55	1.68	1.00	0.01	8.99	149.59	0.55	1.68	1.00	0.01
9.06	150.39	0.56	1.68	1.00	0.01	9.13	149.80	0.55	1.68	1.00	0.01
9.19	148.28	0.53	1.69	1.00	0.01	9.28	144.44	0.49	1.73	1.00	0.02
9.34	141.20	0.46	1.76	1.00	0.01	9.38	138.01	0.43	1.79	1.00	0.01
9.46	132.81	0.39	1.85	1.00	0.02	9.52	128.36	0.36	1.90	1.00	0.01
9.61	119.91	0.32	2.01	1.00	0.02	9.67	114.72	0.30	2.09	1.00	0.01
9.72	110.19	0.29	2.16	1.00	0.01	9.79	105.71	0.27	2.23	1.00	0.02
9.87	102.91	0.27	2.28	1.00	0.02	9.92	101.58	0.26	2.31	1.00	0.01
10.00	99.91	0.26	2.34	1.00	0.02	10.04	99.62	0.25	2.34	1.00	0.01
10.11	99.32	0.25	2.35	1.00	0.02	10.18	98.94	0.25	2.36	1.00	0.02
10.25	99.88	0.25	2.34	1.00	0.02	10.31	101.73	0.26	2.30	1.00	0.02
10.38	107.26	0.27	2.21	1.00	0.02	10.45	114.53	0.29	2.09	1.00	0.02
10.51	121.59	0.32	1.99	1.00	0.01	10.56	131.13	0.37	1.87	1.00	0.01
10.63	136.57	0.40	1.81	1.00	0.01	10.70	142.25	0.44	1.75	1.00	0.01
10.76	145.81	0.48	1.72	1.00	0.01	10.84	147.19	0.49	1.70	1.00	0.02
10.89	148.72	0.50	1.69	1.00	0.01	10.97	149.89	0.52	1.68	1.00	0.02
11.03	150.36	0.52	1.67	1.00	0.01	11.09	149.01	0.50	1.68	1.00	0.01
11.17	148.64	0.50	1.69	1.00	0.02	11.22	151.16	0.53	1.67	1.00	0.01
11.31	157.69	0.62	1.57	1.00	0.02	11.37	153.21	0.55	1.64	1.00	0.01
11.42	148.22	0.49	1.69	1.00	0.01	11.49	142.49	0.44	1.75	1.00	0.02
11.56	138.71	0.41	1.79	1.00	0.02	11.64	136.56	0.39	1.81	1.00	0.02
11.68	134.80	0.38	1.83	1.00	0.01	11.76	131.62	0.36	1.87	1.00	0.02
11.83	127.12	0.33	1.92	1.00	0.02	11.88	124.10	0.32	1.96	1.00	0.01
11.95	120.40	0.30	2.01	1.00	0.02	12.02	117.69	0.29	2.04	1.00	0.02
12.08	116.32	0.29	2.06	1.00	0.01	12.17	115.28	0.28	2.08	1.00	0.02
12.22	114.10	0.28	2.10	1.00	0.01	12.28	112.53	0.27	2.12	1.00	0.01

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
12.37	108.39	0.26	2.19	1.00	0.02	12.42	107.11	0.25	2.21	1.00	0.01
12.48	107.79	0.26	2.20	1.00	0.01	12.56	112.46	0.27	2.12	1.00	0.02
12.62	116.36	0.28	2.06	1.00	0.01	12.68	119.89	0.30	2.01	1.00	0.01
12.76	123.17	0.31	1.97	1.00	0.02	12.82	123.03	0.31	1.97	1.00	0.01
12.87	122.70	0.31	1.98	1.00	0.01	12.93	122.46	0.30	1.98	1.00	0.01
13.02	123.14	0.31	1.97	1.00	0.02	13.06	124.69	0.31	1.95	1.00	0.01
13.16	130.24	0.34	1.88	1.00	0.02	13.21	135.39	0.37	1.82	1.00	0.01
13.27	140.96	0.41	1.76	1.00	0.01	13.32	145.64	0.45	1.72	1.00	0.01
13.41	146.29	0.45	1.71	1.00	0.02	13.45	134.20	0.36	1.84	1.00	0.01
13.54	141.73	0.41	1.76	1.00	0.02	13.60	141.56	0.41	1.76	1.00	0.01
13.65	139.46	0.39	1.78	1.00	0.01	13.72	145.80	0.45	1.72	1.00	0.02
13.79	165.68	0.74	1.20	1.00	0.01	13.86	174.79	0.99	0.53	1.00	0.00
13.92	180.42	1.23	0.27	1.00	0.00	13.99	183.27	1.38	0.00	1.00	0.00
14.05	186.22	1.56	0.00	1.00	0.00	14.11	188.18	1.70	0.00	1.00	0.00
14.18	190.26	1.88	0.00	1.00	0.00	14.26	207.82	2.00	0.00	1.00	0.00
14.30	188.85	1.75	0.00	1.00	0.00	14.37	192.77	2.00	0.00	1.00	0.00
14.45	187.68	1.66	0.00	1.00	0.00	14.50	180.25	1.21	0.27	1.00	0.00
14.57	165.74	0.73	1.20	1.00	0.01	14.64	147.40	0.45	1.70	1.00	0.01
14.71	142.72	0.41	1.75	1.00	0.01	14.77	137.88	0.37	1.80	1.00	0.01
14.84	132.10	0.34	1.86	1.00	0.01	14.91	127.42	0.31	1.92	1.00	0.02
14.96	125.66	0.30	1.94	1.00	0.01	15.04	119.55	0.28	2.02	1.00	0.02
15.10	103.03	0.23	2.28	1.00	0.02	15.16	95.06	0.21	2.44	1.00	0.02
15.24	89.60	0.20	2.56	1.00	0.03	15.29	84.65	2.00	0.00	1.00	0.00
15.36	94.97	2.00	0.00	1.00	0.00	15.45	107.25	2.00	0.00	1.00	0.00
15.50	100.28	2.00	0.00	1.00	0.00	15.56	99.14	2.00	0.00	1.00	0.00
15.62	91.43	2.00	0.00	1.00	0.00	15.70	27.23	2.00	0.00	1.00	0.00
15.75	25.77	2.00	0.00	1.00	0.00	15.81	22.99	2.00	0.00	1.00	0.00
15.89	21.92	2.00	0.00	1.00	0.00	15.95	20.58	2.00	0.00	1.00	0.00
16.05	18.22	2.00	0.00	1.00	0.00	16.09	17.30	2.00	0.00	1.00	0.00
16.14	19.29	1.74	0.00	1.00	0.00	16.23	27.47	2.00	0.00	1.00	0.00
16.29	29.54	2.00	0.00	1.00	0.00	16.37	26.92	2.00	0.00	1.00	0.00
16.43	24.30	2.00	0.00	1.00	0.00	16.48	25.68	2.00	0.00	1.00	0.00
16.57	100.98	2.00	0.00	1.00	0.00	16.63	110.15	2.00	0.00	1.00	0.00
16.68	112.77	2.00	0.00	1.00	0.00	16.74	107.51	2.00	0.00	1.00	0.00
16.82	90.37	2.00	0.00	1.00	0.00	16.88	84.01	2.00	0.00	1.00	0.00
16.96	88.45	0.19	2.58	1.00	0.03	17.02	92.08	0.20	2.50	1.00	0.02
17.06	95.37	0.21	2.43	1.00	0.01	17.15	99.30	0.21	2.35	1.00	0.03
17.21	103.37	0.22	2.27	1.00	0.02	17.27	102.17	0.22	2.30	1.00	0.02
17.36	100.09	0.21	2.33	1.00	0.02	17.39	96.12	0.21	2.41	1.00	0.01
17.46	105.74	0.23	2.23	1.00	0.02	17.53	116.39	0.26	2.06	1.00	0.02
17.59	130.22	0.31	1.88	1.00	0.01	17.65	148.65	0.44	1.69	1.00	0.01
17.73	164.59	0.67	1.21	1.00	0.01	17.79	176.01	0.98	0.52	1.00	0.00
17.85	187.41	1.57	0.00	1.00	0.00	17.94	195.39	2.00	0.00	1.00	0.00
17.99	201.32	2.00	0.00	1.00	0.00	18.07	209.96	2.00	0.00	1.00	0.00
18.13	214.53	2.00	0.00	1.00	0.00	18.18	217.49	2.00	0.00	1.00	0.00
18.26	220.50	2.00	0.00	1.00	0.00	18.33	221.97	2.00	0.00	1.00	0.00
18.38	224.46	2.00	0.00	1.00	0.00	18.45	226.33	2.00	0.00	1.00	0.00
18.52	229.05	2.00	0.00	1.00	0.00	18.57	230.86	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
18.64	231.20	2.00	0.00	1.00	0.00	18.72	230.85	2.00	0.00	1.00	0.00
18.77	230.75	2.00	0.00	1.00	0.00	18.84	228.33	2.00	0.00	1.00	0.00
18.91	227.90	2.00	0.00	1.00	0.00	18.98	227.20	2.00	0.00	1.00	0.00
19.03	225.09	2.00	0.00	1.00	0.00	19.10	224.02	2.00	0.00	1.00	0.00
19.18	223.59	2.00	0.00	1.00	0.00	19.24	224.44	2.00	0.00	1.00	0.00
19.30	225.67	2.00	0.00	1.00	0.00	19.38	208.51	2.00	0.00	1.00	0.00
19.44	218.81	2.00	0.00	1.00	0.00	19.50	220.41	2.00	0.00	1.00	0.00
19.56	220.12	2.00	0.00	1.00	0.00	19.64	220.06	2.00	0.00	1.00	0.00
19.70	219.38	2.00	0.00	1.00	0.00	19.78	217.22	2.00	0.00	1.00	0.00
19.83	215.69	2.00	0.00	1.00	0.00	19.89	214.53	2.00	0.00	1.00	0.00
19.95	211.74	2.00	0.00	1.00	0.00	20.02	179.85	1.10	0.38	1.00	0.00
20.08	205.67	2.00	0.00	1.00	0.00	20.16	201.71	2.00	0.00	1.00	0.00
20.21	199.03	2.00	0.00	1.00	0.00	20.28	195.49	2.00	0.00	1.00	0.00
20.35	191.36	1.84	0.00	1.00	0.00	20.41	188.87	1.62	0.00	1.00	0.00
20.47	186.17	1.43	0.00	1.00	0.00	20.55	188.60	1.60	0.00	1.00	0.00
20.61	185.82	1.41	0.00	1.00	0.00	20.68	188.38	1.58	0.00	1.00	0.00
20.75	191.85	1.87	0.00	1.00	0.00	20.81	194.90	2.00	0.00	1.00	0.00
20.87	196.98	2.00	0.00	1.00	0.00	20.95	198.26	2.00	0.00	1.00	0.00
21.01	199.58	2.00	0.00	1.00	0.00	21.09	203.05	2.00	0.00	1.00	0.00
21.14	204.86	2.00	0.00	1.00	0.00	21.22	204.20	2.00	0.00	1.00	0.00
21.27	200.72	2.00	0.00	1.00	0.00	21.34	203.44	2.00	0.00	1.00	0.00
21.42	206.73	2.00	0.00	1.00	0.00	21.46	209.40	2.00	0.00	1.00	0.00
21.54	211.17	2.00	0.00	1.00	0.00	21.60	209.81	2.00	0.00	1.00	0.00
21.66	206.94	2.00	0.00	1.00	0.00	21.72	203.59	2.00	0.00	1.00	0.00
21.80	203.35	2.00	0.00	1.00	0.00	21.86	203.31	2.00	0.00	1.00	0.00
21.93	203.13	2.00	0.00	1.00	0.00	22.00	203.09	2.00	0.00	1.00	0.00
22.05	202.90	2.00	0.00	1.00	0.00	22.12	201.44	2.00	0.00	1.00	0.00
22.19	199.43	2.00	0.00	1.00	0.00	22.25	197.05	2.00	0.00	1.00	0.00
22.32	195.78	2.00	0.00	1.00	0.00	22.38	196.72	2.00	0.00	1.00	0.00
22.46	195.72	2.00	0.00	1.00	0.00	22.51	196.40	2.00	0.00	1.00	0.00
22.59	197.30	2.00	0.00	1.00	0.00	22.66	198.61	2.00	0.00	1.00	0.00
22.71	197.95	2.00	0.00	1.00	0.00	22.77	197.18	2.00	0.00	1.00	0.00
22.86	197.74	2.00	0.00	1.00	0.00	22.91	196.67	2.00	0.00	1.00	0.00
22.98	197.61	2.00	0.00	1.00	0.00	23.05	198.34	2.00	0.00	1.00	0.00
23.11	197.75	2.00	0.00	1.00	0.00	23.18	193.47	1.96	0.00	1.00	0.00
23.23	197.09	2.00	0.00	1.00	0.00	23.32	201.58	2.00	0.00	1.00	0.00
23.38	204.03	2.00	0.00	1.00	0.00	23.43	207.83	2.00	0.00	1.00	0.00
23.51	211.11	2.00	0.00	1.00	0.00	23.56	212.83	2.00	0.00	1.00	0.00
23.63	214.90	2.00	0.00	1.00	0.00	23.71	220.45	2.00	0.00	1.00	0.00
23.77	223.59	2.00	0.00	1.00	0.00	23.82	226.44	2.00	0.00	1.00	0.00
23.91	228.09	2.00	0.00	1.00	0.00	23.97	228.37	2.00	0.00	1.00	0.00
24.06	228.68	2.00	0.00	1.00	0.00	24.10	229.36	2.00	0.00	1.00	0.00
24.16	229.64	2.00	0.00	1.00	0.00	24.23	229.50	2.00	0.00	1.00	0.00
24.30	230.99	2.00	0.00	1.00	0.00	24.36	232.99	2.00	0.00	1.00	0.00
24.42	235.55	2.00	0.00	1.00	0.00	24.50	236.74	2.00	0.00	1.00	0.00
24.55	237.99	2.00	0.00	1.00	0.00	24.63	239.56	2.00	0.00	1.00	0.00
24.69	241.45	2.00	0.00	1.00	0.00	24.74	241.55	2.00	0.00	1.00	0.00
24.81	240.48	2.00	0.00	1.00	0.00	24.89	238.89	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
24.94	234.99	2.00	0.00	1.00	0.00	25.02	228.72	2.00	0.00	1.00	0.00
25.07	229.29	2.00	0.00	1.00	0.00	25.14	225.64	2.00	0.00	1.00	0.00
25.21	221.52	2.00	0.00	1.00	0.00	25.26	214.38	2.00	0.00	1.00	0.00
25.33	205.14	2.00	0.00	1.00	0.00	25.39	196.70	2.00	0.00	1.00	0.00
25.47	183.73	1.22	0.27	1.00	0.00	25.53	176.89	0.92	0.67	1.00	0.00
25.61	170.03	0.72	1.16	1.00	0.01	25.68	163.68	0.59	1.49	1.00	0.01
25.73	158.51	0.51	1.60	1.00	0.01	25.79	153.38	0.45	1.65	1.00	0.01
25.87	142.61	0.36	1.75	1.00	0.02	25.93	141.57	0.35	1.76	1.00	0.01
25.99	142.72	0.36	1.75	1.00	0.01	26.06	134.47	0.31	1.83	1.00	0.02
26.12	132.92	0.30	1.85	1.00	0.01	26.19	120.43	0.25	2.01	1.00	0.02
26.27	103.99	0.21	2.26	1.00	0.02	26.33	86.97	2.00	0.00	1.00	0.00
26.38	92.31	2.00	0.00	1.00	0.00	26.47	97.39	2.00	0.00	1.00	0.00
26.53	96.12	2.00	0.00	1.00	0.00	26.58	92.20	2.00	0.00	1.00	0.00
26.66	89.48	2.00	0.00	1.00	0.00	26.72	89.28	2.00	0.00	1.00	0.00
26.78	86.11	2.00	0.00	1.00	0.00	26.86	26.11	2.00	0.00	1.00	0.00
26.91	26.28	2.00	0.00	1.00	0.00	26.99	23.80	2.00	0.00	1.00	0.00
27.04	21.17	2.00	0.00	1.00	0.00	27.12	18.20	2.00	0.00	1.00	0.00
27.18	15.68	1.01	0.00	1.00	0.00	27.24	14.80	0.94	0.00	1.00	0.00
27.31	15.04	0.92	0.00	1.00	0.00	27.36	15.21	0.93	0.00	1.00	0.00
27.44	14.93	0.89	0.00	1.00	0.00	27.50	13.64	0.86	0.00	1.00	0.00
27.57	13.71	0.88	0.00	1.00	0.00	27.64	15.85	0.95	0.00	1.00	0.00
27.69	16.78	1.03	0.00	1.00	0.00	27.77	17.63	1.08	0.00	1.00	0.00
27.84	17.79	1.11	0.00	1.00	0.00	27.89	18.46	1.13	0.00	1.00	0.00
27.95	18.37	1.05	0.00	1.00	0.00	28.04	14.57	0.93	0.00	1.00	0.00
28.10	12.77	0.76	0.00	1.00	0.00	28.15	10.97	0.63	0.00	1.00	0.00
28.24	8.58	0.58	0.00	1.00	0.00	28.30	10.36	0.51	0.00	1.00	0.00
28.36	7.98	0.70	0.00	1.00	0.00	28.45	17.25	0.89	0.00	1.00	0.00
28.51	18.95	2.00	0.00	1.00	0.00	28.55	20.56	2.00	0.00	1.00	0.00
28.64	28.36	2.00	0.00	1.00	0.00	28.70	94.49	2.00	0.00	1.00	0.00
28.75	99.81	2.00	0.00	1.00	0.00	28.81	107.49	2.00	0.00	1.00	0.00
28.89	109.00	2.00	0.00	1.00	0.00	28.95	109.46	2.00	0.00	1.00	0.00
29.01	109.12	2.00	0.00	1.00	0.00	29.09	107.67	2.00	0.00	1.00	0.00
29.14	105.67	2.00	0.00	1.00	0.00	29.21	99.01	2.00	0.00	1.00	0.00
29.28	29.47	2.00	0.00	1.00	0.00	29.34	23.88	2.00	0.00	1.00	0.00
29.43	17.90	2.00	0.00	1.00	0.00	29.48	15.43	0.92	0.00	1.00	0.00
29.53	13.15	0.80	0.00	1.00	0.00	29.60	12.21	0.72	0.00	1.00	0.00
29.67	11.70	0.89	0.00	1.00	0.00	29.74	21.29	2.00	0.00	1.00	0.00
29.80	95.44	2.00	0.00	1.00	0.00	29.86	105.42	2.00	0.00	1.00	0.00
29.93	108.03	2.00	0.00	1.00	0.00	29.99	109.01	0.21	2.18	1.00	0.02
30.06	115.06	0.23	2.08	1.00	0.02	30.12	134.24	0.30	1.84	1.00	0.01
30.21	151.58	0.42	1.66	1.00	0.02	30.26	163.33	0.57	1.49	1.00	0.01
30.33	173.54	0.79	0.91	1.00	0.01	30.40	179.83	1.00	0.51	1.00	0.00
30.45	183.39	1.15	0.27	1.00	0.00	30.52	186.45	1.31	0.19	1.00	0.00
30.58	187.56	1.38	0.00	1.00	0.00	30.65	186.97	1.34	0.19	1.00	0.00
30.71	182.93	1.13	0.37	1.00	0.00	30.79	176.96	0.89	0.67	1.00	0.01
30.84	173.10	0.77	0.91	1.00	0.01	30.91	165.62	0.61	1.46	1.00	0.01
30.99	154.26	0.44	1.64	1.00	0.02	31.05	139.87	0.33	1.77	1.00	0.01
31.11	129.65	0.28	1.89	1.00	0.01	31.18	117.82	0.23	2.04	1.00	0.02

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
31.26	107.59	0.21	2.20	1.00	0.02	31.32	102.18	0.20	2.30	1.00	0.02
31.36	99.43	0.19	2.35	1.00	0.01	31.44	95.21	0.19	2.43	1.00	0.02
31.52	93.20	0.18	2.48	1.00	0.02	31.57	95.48	0.19	2.43	1.00	0.01
31.64	93.79	0.18	2.46	1.00	0.02	31.70	95.11	0.19	2.43	1.00	0.02
31.76	95.02	0.19	2.44	1.00	0.02	31.84	96.78	0.19	2.40	1.00	0.02
31.91	95.90	0.19	2.42	1.00	0.02	31.96	97.16	0.19	2.39	1.00	0.01
32.04	100.54	0.19	2.33	1.00	0.02	32.10	106.60	0.21	2.22	1.00	0.02
32.17	94.97	0.18	2.44	1.00	0.02	32.23	110.75	0.22	2.15	1.00	0.01
32.30	110.60	0.21	2.15	1.00	0.02	32.35	112.92	0.22	2.12	1.00	0.01
32.42	115.71	0.23	2.07	1.00	0.02	32.50	118.62	0.24	2.03	1.00	0.02
32.57	121.14	0.24	2.00	1.00	0.02	32.61	122.26	0.25	1.98	1.00	0.01
32.69	125.43	0.26	1.94	1.00	0.02	32.74	127.01	0.26	1.92	1.00	0.01
32.83	130.65	0.28	1.88	1.00	0.02	32.88	132.35	0.29	1.86	1.00	0.01
32.95	135.09	0.30	1.83	1.00	0.02	33.01	136.73	0.31	1.81	1.00	0.01
33.08	138.91	0.32	1.78	1.00	0.02	33.15	141.07	0.33	1.76	1.00	0.01
33.22	142.75	0.34	1.75	1.00	0.02	33.28	143.94	0.35	1.73	1.00	0.01
33.34	144.32	0.35	1.73	1.00	0.01	33.42	147.19	0.37	1.70	1.00	0.02
33.47	147.15	0.37	1.70	1.00	0.01	33.54	147.64	0.38	1.70	1.00	0.01
33.61	148.95	0.39	1.69	1.00	0.02	33.68	149.03	0.39	1.68	1.00	0.01
33.73	149.25	0.39	1.68	1.00	0.01	33.81	150.17	0.40	1.67	1.00	0.02
33.87	148.39	0.38	1.69	1.00	0.01	33.92	126.70	0.26	1.92	1.00	0.01
34.02	114.08	0.22	2.10	1.00	0.02	34.07	114.02	0.22	2.10	1.00	0.01
34.12	114.42	0.22	2.09	1.00	0.01	34.21	114.76	0.22	2.09	1.00	0.02
34.26	115.41	0.23	2.08	1.00	0.01	34.33	115.29	0.23	2.08	1.00	0.02
34.40	115.19	0.23	2.08	1.00	0.02	34.47	121.36	0.24	1.99	1.00	0.02
34.52	127.33	0.26	1.92	1.00	0.01	34.59	136.06	0.30	1.82	1.00	0.02
34.67	142.47	0.34	1.75	1.00	0.02	34.73	146.65	0.37	1.71	1.00	0.01
34.79	148.19	0.38	1.69	1.00	0.01	34.85	149.23	0.39	1.68	1.00	0.01
34.95	151.49	0.41	1.66	1.00	0.02	34.99	153.72	0.43	1.64	1.00	0.01
35.04	156.48	0.46	1.62	1.00	0.01	35.13	161.38	0.53	1.58	1.00	0.02
35.18	164.07	0.57	1.48	1.00	0.01	35.24	167.00	0.62	1.44	1.00	0.01
35.33	168.11	0.64	1.43	1.00	0.01	35.38	169.70	0.68	1.16	1.00	0.01
35.44	165.75	0.60	1.46	1.00	0.01	35.53	155.30	0.45	1.63	1.00	0.02
35.59	142.89	0.34	1.74	1.00	0.01	35.64	133.26	0.29	1.85	1.00	0.01
35.72	132.50	0.28	1.86	1.00	0.02	35.78	134.68	0.29	1.83	1.00	0.01
35.83	135.64	0.30	1.82	1.00	0.01	35.92	137.72	0.31	1.80	1.00	0.02
35.97	141.05	0.33	1.76	1.00	0.01	36.03	142.32	0.34	1.75	1.00	0.01
36.11	142.37	0.34	1.75	1.00	0.02	36.17	143.47	0.34	1.74	1.00	0.01
36.23	146.02	0.36	1.71	1.00	0.01	36.32	151.45	0.41	1.66	1.00	0.02
36.37	155.04	0.44	1.63	1.00	0.01	36.42	159.70	0.50	1.59	1.00	0.01
36.51	163.83	0.56	1.48	1.00	0.02	36.57	168.00	0.64	1.43	1.00	0.01
36.62	172.90	0.75	1.13	1.00	0.01	36.70	175.03	0.81	0.90	1.00	0.01
36.76	178.95	0.93	0.66	1.00	0.00	36.85	178.58	0.92	0.66	1.00	0.01
36.91	179.17	0.94	0.66	1.00	0.00	36.95	178.31	0.91	0.67	1.00	0.00
37.02	174.32	0.79	0.90	1.00	0.01	37.10	169.40	0.67	1.16	1.00	0.01
37.15	167.15	0.62	1.44	1.00	0.01	37.24	157.80	0.48	1.61	1.00	0.02
37.30	153.87	0.43	1.64	1.00	0.01	37.34	149.04	0.39	1.68	1.00	0.01
37.44	145.24	0.36	1.72	1.00	0.02	37.47	145.04	0.36	1.72	1.00	0.01

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
37.53	149.30	0.39	1.68	1.00	0.01	37.60	150.61	0.40	1.67	1.00	0.01
37.67	136.47	0.30	1.81	1.00	0.01	37.76	122.48	0.25	1.98	1.00	0.02
37.81	123.83	0.25	1.96	1.00	0.01	37.87	129.13	0.27	1.89	1.00	0.01
37.93	133.74	0.29	1.84	1.00	0.01	38.01	143.14	0.34	1.74	1.00	0.02
38.06	149.96	0.39	1.68	1.00	0.01	38.15	160.29	0.51	1.59	1.00	0.02
38.19	168.68	0.65	1.42	1.00	0.01	38.26	177.47	0.88	0.67	1.00	0.01
38.32	182.04	1.05	0.51	1.00	0.00	38.40	184.59	1.17	0.26	1.00	0.00
38.46	185.50	1.21	0.26	1.00	0.00	38.53	186.67	1.27	0.19	1.00	0.00
38.58	188.52	1.39	0.00	1.00	0.00	38.68	189.63	1.46	0.00	1.00	0.00
38.72	190.16	1.50	0.00	1.00	0.00	38.80	190.13	1.49	0.00	1.00	0.00
38.86	190.40	1.51	0.00	1.00	0.00	38.92	189.84	1.47	0.00	1.00	0.00
39.00	188.66	1.39	0.00	1.00	0.00	39.05	188.80	1.40	0.00	1.00	0.00
39.11	188.73	1.40	0.00	1.00	0.00	39.19	188.97	1.41	0.00	1.00	0.00
39.24	189.62	1.46	0.00	1.00	0.00	39.31	189.66	1.46	0.00	1.00	0.00
39.39	189.51	1.45	0.00	1.00	0.00	39.44	189.29	1.43	0.00	1.00	0.00
39.51	180.10	0.97	0.51	1.00	0.00	39.58	164.46	0.57	1.48	1.00	0.01
39.65	154.82	0.44	1.63	1.00	0.01	39.70	151.14	0.40	1.67	1.00	0.01
39.80	148.51	0.38	1.69	1.00	0.02	39.85	149.43	0.39	1.68	1.00	0.01
39.90	152.49	0.42	1.65	1.00	0.01	39.98	152.48	0.42	1.65	1.00	0.02
40.04	158.16	0.48	1.60	1.00	0.01	40.09	160.62	0.51	1.58	1.00	0.01
40.19	162.06	0.53	1.57	1.00	0.02	40.23	163.01	0.55	1.57	1.00	0.01
40.30	163.41	0.55	1.49	1.00	0.01	40.37	164.19	0.56	1.48	1.00	0.01
40.44	163.74	0.56	1.48	1.00	0.01	40.49	163.12	0.55	1.56	1.00	0.01
40.56	161.76	0.53	1.58	1.00	0.01	40.63	160.77	0.51	1.58	1.00	0.01
40.70	159.60	0.50	1.59	1.00	0.01	40.77	159.32	0.49	1.59	1.00	0.01
40.82	160.90	0.51	1.58	1.00	0.01	40.91	164.53	0.57	1.47	1.00	0.02
40.96	167.40	0.62	1.44	1.00	0.01	41.02	170.34	0.68	1.15	1.00	0.01
41.11	173.17	0.75	1.13	1.00	0.01	41.16	173.10	0.75	1.13	1.00	0.01
41.21	164.18	0.56	1.48	1.00	0.01	41.27	157.61	0.47	1.61	1.00	0.01
41.34	155.66	0.45	1.63	1.00	0.01	41.41	153.89	0.43	1.64	1.00	0.01
41.49	152.84	0.42	1.65	1.00	0.02	41.55	153.53	0.43	1.64	1.00	0.01
41.61	154.42	0.43	1.64	1.00	0.01	41.67	156.81	0.46	1.62	1.00	0.01
41.74	163.02	0.54	1.57	1.00	0.01	41.80	168.71	0.65	1.42	1.00	0.01
41.87	173.07	0.74	1.13	1.00	0.01	41.95	175.37	0.81	0.89	1.00	0.01
42.00	175.82	0.82	0.89	1.00	0.01	42.09	175.53	0.81	0.89	1.00	0.01
42.14	174.17	0.77	0.90	1.00	0.01	42.20	172.92	0.74	1.13	1.00	0.01
42.27	170.92	0.69	1.15	1.00	0.01	42.33	168.87	0.65	1.42	1.00	0.01
42.39	165.26	0.58	1.47	1.00	0.01	42.48	160.95	0.51	1.58	1.00	0.02
42.52	155.57	0.45	1.63	1.00	0.01	42.63	154.09	0.43	1.64	1.00	0.02
42.65	153.06	0.42	1.65	1.00	0.00	42.72	154.42	0.43	1.64	1.00	0.01
42.81	158.01	0.47	1.61	1.00	0.02	42.86	161.89	0.53	1.57	1.00	0.01
42.92	165.86	0.59	1.46	1.00	0.01	43.00	167.02	0.61	1.44	1.00	0.01
43.05	166.23	0.60	1.45	1.00	0.01	43.12	165.70	0.59	1.46	1.00	0.01
43.22	163.00	2.00	0.00	1.00	0.00	43.27	161.70	2.00	0.00	1.00	0.00
43.31	163.70	2.00	0.00	1.00	0.00	43.38	162.75	2.00	0.00	1.00	0.00
43.44	171.77	2.00	0.00	1.00	0.00	43.52	172.32	2.00	0.00	1.00	0.00
43.60	173.10	2.00	0.00	1.00	0.00	43.64	175.81	2.00	0.00	1.00	0.00
43.70	170.39	2.00	0.00	1.00	0.00	43.78	168.70	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
43.84	166.55	2.00	0.00	1.00	0.00	43.92	163.52	2.00	0.00	1.00	0.00
43.98	161.46	2.00	0.00	1.00	0.00	44.04	156.28	2.00	0.00	1.00	0.00
44.11	146.46	2.00	0.00	1.00	0.00	44.17	139.36	2.00	0.00	1.00	0.00
44.23	129.23	2.00	0.00	1.00	0.00	44.32	127.75	2.00	0.00	1.00	0.00
44.36	132.87	2.00	0.00	1.00	0.00	44.42	142.89	2.00	0.00	1.00	0.00
44.50	158.32	2.00	0.00	1.00	0.00	44.57	159.51	2.00	0.00	1.00	0.00
44.64	158.84	0.48	1.60	1.00	0.01	44.70	157.65	0.47	1.61	1.00	0.01
44.75	156.08	0.45	1.62	1.00	0.01	44.83	154.22	0.43	1.64	1.00	0.01
44.91	152.20	0.41	1.66	1.00	0.02	44.96	150.07	0.39	1.68	1.00	0.01
45.03	150.67	0.40	1.67	1.00	0.01	45.09	150.61	2.00	0.00	1.00	0.00
45.15	152.29	2.00	0.00	1.00	0.00	45.21	137.45	2.00	0.00	1.00	0.00
45.29	143.54	2.00	0.00	1.00	0.00	45.34	139.43	2.00	0.00	1.00	0.00
45.43	131.78	2.00	0.00	1.00	0.00	45.49	126.90	2.00	0.00	1.00	0.00
45.54	120.41	2.00	0.00	1.00	0.00	45.63	104.73	2.00	0.00	1.00	0.00
45.69	34.27	2.00	0.00	1.00	0.00	45.75	28.03	2.00	0.00	1.00	0.00
45.84	20.64	2.00	0.00	1.00	0.00	45.88	15.85	0.84	0.00	1.00	0.00
45.93	13.77	0.71	0.00	1.00	0.00	46.02	13.69	0.66	0.00	1.00	0.00
46.08	13.25	0.66	0.00	1.00	0.00	46.14	13.60	0.71	0.00	1.00	0.00
46.23	16.67	0.84	0.00	1.00	0.00	46.27	20.49	2.00	0.00	1.00	0.00
46.33	24.26	2.00	0.00	1.00	0.00	46.42	34.02	2.00	0.00	1.00	0.00
46.48	107.83	2.00	0.00	1.00	0.00	46.52	119.30	2.00	0.00	1.00	0.00
46.62	131.53	2.00	0.00	1.00	0.00	46.67	137.15	0.31	1.80	1.00	0.01
46.73	123.10	0.25	1.97	1.00	0.01	46.79	143.07	0.34	1.74	1.00	0.01
46.87	144.69	0.35	1.73	1.00	0.02	46.93	147.41	0.37	1.70	1.00	0.01
46.99	149.11	0.38	1.68	1.00	0.01	47.07	152.25	0.41	1.66	1.00	0.02
47.13	152.71	0.42	1.65	1.00	0.01	47.18	152.64	0.42	1.65	1.00	0.01
47.26	150.45	0.40	1.67	1.00	0.02	47.32	149.00	0.38	1.68	1.00	0.01
47.38	147.14	0.37	1.70	1.00	0.01	47.46	146.60	0.36	1.71	1.00	0.02
47.52	146.89	0.37	1.70	1.00	0.01	47.58	147.84	0.37	1.70	1.00	0.01
47.67	147.92	0.37	1.70	1.00	0.02	47.72	147.31	0.37	1.70	1.00	0.01
47.77	147.44	0.37	1.70	1.00	0.01	47.86	142.98	2.00	0.00	1.00	0.00
47.91	139.28	2.00	0.00	1.00	0.00	48.00	131.15	2.00	0.00	1.00	0.00
48.05	127.14	2.00	0.00	1.00	0.00	48.10	120.32	2.00	0.00	1.00	0.00
48.16	108.43	2.00	0.00	1.00	0.00	48.24	34.60	2.00	0.00	1.00	0.00
48.30	27.31	2.00	0.00	1.00	0.00	48.37	21.16	2.00	0.00	1.00	0.00
48.43	17.67	0.88	0.00	1.00	0.00	48.50	14.49	0.73	0.00	1.00	0.00
48.57	13.08	0.64	0.00	1.00	0.00	48.63	12.73	0.59	0.00	1.00	0.00
48.70	11.48	0.50	0.00	1.00	0.00	48.77	8.53	0.44	0.00	1.00	0.00
48.82	9.07	0.38	0.00	1.00	0.00	48.89	8.59	0.38	0.00	1.00	0.00
48.96	8.38	0.37	0.00	1.00	0.00	49.03	8.31	0.36	0.00	1.00	0.00
49.08	8.30	0.36	0.00	1.00	0.00	49.15	8.44	0.36	0.00	1.00	0.00
49.22	8.43	0.37	0.00	1.00	0.00	49.28	8.43	0.37	0.00	1.00	0.00
49.36	8.49	0.37	0.00	1.00	0.00	49.45	8.76	0.38	0.00	1.00	0.00
49.49	8.89	0.40	0.00	1.00	0.00	49.55	9.29	0.42	0.00	1.00	0.00
49.62	9.90	0.45	0.00	1.00	0.00	49.68	10.44	0.49	0.00	1.00	0.00
49.74	11.46	0.53	0.00	1.00	0.00	49.82	12.20	0.57	0.00	1.00	0.00
49.87	13.09	0.63	0.00	1.00	0.00	49.94	14.68	0.67	0.00	1.00	0.00
50.01	14.52	0.80	0.00	1.00	0.00	50.08	19.91	0.89	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
50.13	20.04	0.99	0.00	1.00	0.00	50.21	20.38	1.01	0.00	1.00	0.00
50.27	20.72	1.03	0.00	1.00	0.00	50.33	21.49	1.07	0.00	1.00	0.00
50.42	22.73	1.11	0.00	1.00	0.00	50.48	23.20	1.15	0.00	1.00	0.00
50.53	23.27	1.15	0.00	1.00	0.00	50.59	23.20	1.14	0.00	1.00	0.00
50.67	22.69	1.14	0.00	1.00	0.00	50.74	23.29	1.15	0.00	1.00	0.00
50.79	23.39	1.14	0.00	1.00	0.00	50.88	22.39	1.11	0.00	1.00	0.00
50.93	21.32	1.09	0.00	1.00	0.00	51.02	22.37	1.07	0.00	1.00	0.00
51.08	21.22	1.09	0.00	1.00	0.00	51.13	22.35	2.00	0.00	1.00	0.00
51.21	25.89	2.00	0.00	1.00	0.00	51.27	29.09	2.00	0.00	1.00	0.00
51.32	33.50	2.00	0.00	1.00	0.00	51.40	43.23	2.00	0.00	1.00	0.00
51.44	121.20	2.00	0.00	1.00	0.00	51.52	147.70	2.00	0.00	1.00	0.00
51.58	172.16	2.00	0.00	1.00	0.00	51.66	185.37	2.00	0.00	1.00	0.00
51.71	189.58	2.00	0.00	1.00	0.00	51.78	195.36	2.00	0.00	1.00	0.00
51.86	197.32	2.00	0.00	1.00	0.00	51.91	197.68	2.00	0.00	1.00	0.00
51.97	196.13	1.95	0.00	1.00	0.00	52.05	188.21	1.33	0.18	1.00	0.00
52.12	176.25	0.82	0.89	1.00	0.01	52.18	165.80	0.59	1.46	1.00	0.01
52.24	158.98	0.49	1.60	1.00	0.01	52.32	151.79	0.41	1.66	1.00	0.02
52.38	149.09	0.38	1.68	1.00	0.01	52.44	147.43	0.37	1.70	1.00	0.01
52.51	133.46	0.29	1.84	1.00	0.02	52.57	140.12	0.32	1.77	1.00	0.01
52.65	135.43	0.30	1.82	1.00	0.02	52.71	134.60	0.29	1.83	1.00	0.01
52.76	134.11	0.29	1.84	1.00	0.01	52.85	128.80	0.27	1.90	1.00	0.02
52.91	124.87	0.25	1.95	1.00	0.01	52.96	123.04	0.25	1.97	1.00	0.01
53.05	121.55	0.24	1.99	1.00	0.02	53.10	122.64	0.25	1.98	1.00	0.01
53.16	124.29	0.25	1.96	1.00	0.01	53.22	121.50	2.00	0.00	1.00	0.00
53.28	117.63	2.00	0.00	1.00	0.00	53.35	113.40	2.00	0.00	1.00	0.00
53.41	109.62	2.00	0.00	1.00	0.00	53.50	104.42	2.00	0.00	1.00	0.00
53.54	39.09	2.00	0.00	1.00	0.00	53.61	35.75	2.00	0.00	1.00	0.00
53.69	32.37	2.00	0.00	1.00	0.00	53.74	28.53	2.00	0.00	1.00	0.00
53.81	24.04	2.00	0.00	1.00	0.00	53.89	19.26	0.94	0.00	1.00	0.00
53.95	15.51	0.77	0.00	1.00	0.00	54.01	13.75	0.67	0.00	1.00	0.00
54.08	13.48	0.63	0.00	1.00	0.00	54.15	13.27	0.61	0.00	1.00	0.00
54.21	12.87	0.65	0.00	1.00	0.00	54.27	15.74	1.02	0.00	1.00	0.00
54.34	35.22	2.00	0.00	1.00	0.00	54.41	118.11	2.00	0.00	1.00	0.00
54.46	134.51	2.00	0.00	1.00	0.00	54.53	150.90	2.00	0.00	1.00	0.00
54.60	155.20	2.00	0.00	1.00	0.00	54.68	156.42	0.46	1.62	1.00	0.02
54.74	156.13	0.45	1.62	1.00	0.01	54.79	155.31	2.00	0.00	1.00	0.00
54.87	152.70	2.00	0.00	1.00	0.00	54.94	148.49	2.00	0.00	1.00	0.00
55.02	141.90	2.00	0.00	1.00	0.00	55.06	137.01	2.00	0.00	1.00	0.00
55.12	132.29	2.00	0.00	1.00	0.00	55.20	120.40	2.00	0.00	1.00	0.00
55.26	114.09	2.00	0.00	1.00	0.00	55.33	42.14	2.00	0.00	1.00	0.00
55.41	31.68	2.00	0.00	1.00	0.00	55.46	26.99	2.00	0.00	1.00	0.00
55.51	23.59	2.00	0.00	1.00	0.00	55.60	20.35	1.01	0.00	1.00	0.00
55.65	19.46	0.94	0.00	1.00	0.00	55.71	19.31	0.98	0.00	1.00	0.00
55.80	22.43	1.05	0.00	1.00	0.00	55.85	23.92	1.12	0.00	1.00	0.00
55.91	23.43	1.09	0.00	1.00	0.00	55.99	20.48	1.00	0.00	1.00	0.00
56.05	18.65	0.89	0.00	1.00	0.00	56.10	17.10	0.81	0.00	1.00	0.00
56.19	15.55	0.75	0.00	1.00	0.00	56.25	15.08	0.68	0.00	1.00	0.00
56.32	13.42	0.67	0.00	1.00	0.00	56.37	14.54	0.65	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
56.44	14.14	0.65	0.00	1.00	0.00	56.52	13.73	0.63	0.00	1.00	0.00
56.58	13.20	0.61	0.00	1.00	0.00	56.63	12.74	0.56	0.00	1.00	0.00
56.71	11.24	0.51	0.00	1.00	0.00	56.76	10.32	0.46	0.00	1.00	0.00
56.83	9.61	0.42	0.00	1.00	0.00	56.91	9.03	0.40	0.00	1.00	0.00
56.96	9.22	0.42	0.00	1.00	0.00	57.05	11.08	0.48	0.00	1.00	0.00
57.11	12.50	0.56	0.00	1.00	0.00	57.17	13.74	0.64	0.00	1.00	0.00
57.24	15.30	0.71	0.00	1.00	0.00	57.30	16.68	0.78	0.00	1.00	0.00
57.36	17.74	0.83	0.00	1.00	0.00	57.44	18.53	0.87	0.00	1.00	0.00
57.50	18.79	0.88	0.00	1.00	0.00	57.55	18.71	0.88	0.00	1.00	0.00
57.61	18.44	0.86	0.00	1.00	0.00	57.70	17.62	0.83	0.00	1.00	0.00
57.75	16.69	0.79	0.00	1.00	0.00	57.84	16.22	0.76	0.00	1.00	0.00
57.90	16.08	0.77	0.00	1.00	0.00	57.95	17.06	0.80	0.00	1.00	0.00
58.01	18.11	0.83	0.00	1.00	0.00	58.09	17.91	0.83	0.00	1.00	0.00
58.14	17.17	0.78	0.00	1.00	0.00	58.23	15.06	0.70	0.00	1.00	0.00
58.27	13.29	0.62	0.00	1.00	0.00	58.35	12.38	0.56	0.00	1.00	0.00
58.41	11.54	0.51	0.00	1.00	0.00	58.47	10.70	0.47	0.00	1.00	0.00
58.55	9.55	0.42	0.00	1.00	0.00	58.60	8.97	0.38	0.00	1.00	0.00
58.69	8.66	0.36	0.00	1.00	0.00	58.75	8.47	0.36	0.00	1.00	0.00
58.80	8.59	0.36	0.00	1.00	0.00	58.86	8.83	0.40	0.00	1.00	0.00
58.95	10.41	0.45	0.00	1.00	0.00	59.00	11.75	0.52	0.00	1.00	0.00
59.09	12.89	0.57	0.00	1.00	0.00	59.14	13.02	0.59	0.00	1.00	0.00
59.20	12.75	0.57	0.00	1.00	0.00	59.28	12.04	0.54	0.00	1.00	0.00
59.34	11.27	0.51	0.00	1.00	0.00	59.39	10.69	0.47	0.00	1.00	0.00
59.45	9.74	0.43	0.00	1.00	0.00	59.52	9.23	0.40	0.00	1.00	0.00
59.59	8.98	0.39	0.00	1.00	0.00	59.66	9.04	0.38	0.00	1.00	0.00
59.72	8.84	0.38	0.00	1.00	0.00	59.78	8.90	0.38	0.00	1.00	0.00
59.85	9.21	0.39	0.00	1.00	0.00	59.91	8.92	0.38	0.00	1.00	0.00
60.01	8.64	2.00	0.00	1.00	0.00	60.06	8.95	2.00	0.00	1.00	0.00
60.11	9.45	2.00	0.00	1.00	0.00	60.20	10.64	2.00	0.00	1.00	0.00
60.25	11.71	2.00	0.00	1.00	0.00	60.30	9.69	2.00	0.00	1.00	0.00
60.40	13.29	2.00	0.00	1.00	0.00	60.45	14.70	2.00	0.00	1.00	0.00
60.53	18.33	2.00	0.00	1.00	0.00	60.57	21.83	2.00	0.00	1.00	0.00
60.64	33.34	2.00	0.00	1.00	0.00	60.74	116.18	2.00	0.00	1.00	0.00
60.76	121.04	2.00	0.00	1.00	0.00	60.84	130.74	2.00	0.00	1.00	0.00
60.90	130.99	2.00	0.00	1.00	0.00	60.96	128.45	2.00	0.00	1.00	0.00
61.03	126.31	2.00	0.00	1.00	0.00	61.10	124.68	2.00	0.00	1.00	0.00
61.17	124.04	2.00	0.00	1.00	0.00	61.23	122.09	2.00	0.00	1.00	0.00
61.30	120.19	2.00	0.00	1.00	0.00	61.35	118.68	2.00	0.00	1.00	0.00
61.42	115.16	2.00	0.00	1.00	0.00	61.49	110.83	2.00	0.00	1.00	0.00
61.56	107.61	2.00	0.00	1.00	0.00	61.64	103.09	2.00	0.00	1.00	0.00
61.69	39.85	2.00	0.00	1.00	0.00	61.75	39.29	2.00	0.00	1.00	0.00
61.83	37.55	2.00	0.00	1.00	0.00	61.88	37.17	2.00	0.00	1.00	0.00
61.95	32.69	2.00	0.00	1.00	0.00	62.03	29.46	2.00	0.00	1.00	0.00
62.07	28.10	2.00	0.00	1.00	0.00	62.15	27.20	2.00	0.00	1.00	0.00
62.21	26.85	2.00	0.00	1.00	0.00	62.29	24.57	2.00	0.00	1.00	0.00
62.34	23.84	2.00	0.00	1.00	0.00	62.41	22.32	2.00	0.00	1.00	0.00
62.49	19.23	2.00	0.00	1.00	0.00	62.55	17.34	2.00	0.00	1.00	0.00
62.61	16.37	2.00	0.00	1.00	0.00	62.68	15.91	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
62.74	14.70	2.00	0.00	1.00	0.00	62.81	13.24	2.00	0.00	1.00	0.00
62.88	12.35	2.00	0.00	1.00	0.00	62.94	13.03	2.00	0.00	1.00	0.00
63.00	10.23	2.00	0.00	1.00	0.00	63.09	12.83	2.00	0.00	1.00	0.00
63.14	22.96	2.00	0.00	1.00	0.00	63.19	103.14	2.00	0.00	1.00	0.00
63.27	144.53	2.00	0.00	1.00	0.00	63.33	149.85	2.00	0.00	1.00	0.00
63.39	154.77	2.00	0.00	1.00	0.00	63.47	157.44	2.00	0.00	1.00	0.00
63.52	157.04	2.00	0.00	1.00	0.00	63.60	162.01	2.00	0.00	1.00	0.00
63.66	166.79	2.00	0.00	1.00	0.00	63.72	170.37	2.00	0.00	1.00	0.00
63.81	172.72	2.00	0.00	1.00	0.00	63.86	171.36	2.00	0.00	1.00	0.00
63.92	172.45	2.00	0.00	1.00	0.00	64.02	177.33	2.00	0.00	1.00	0.00
64.04	176.67	2.00	0.00	1.00	0.00	64.12	187.42	2.00	0.00	1.00	0.00
64.18	181.46	2.00	0.00	1.00	0.00	64.24	192.97	2.00	0.00	1.00	0.00
64.32	194.72	2.00	0.00	1.00	0.00	64.37	199.07	2.00	0.00	1.00	0.00
64.45	200.63	2.00	0.00	1.00	0.00	64.51	202.64	2.00	0.00	1.00	0.00
64.58	203.88	2.00	0.00	1.00	0.00	64.66	203.83	2.00	0.00	1.00	0.00
64.71	203.39	2.00	0.00	1.00	0.00	64.77	203.30	2.00	0.00	1.00	0.00
64.85	202.47	2.00	0.00	1.00	0.00	64.90	201.45	2.00	0.00	1.00	0.00
64.99	194.64	2.00	0.00	1.00	0.00	65.05	191.69	2.00	0.00	1.00	0.00
65.10	188.43	2.00	0.00	1.00	0.00	65.16	183.24	2.00	0.00	1.00	0.00
65.24	177.38	2.00	0.00	1.00	0.00	65.29	173.63	2.00	0.00	1.00	0.00
65.39	167.48	2.00	0.00	1.00	0.00	65.44	164.50	2.00	0.00	1.00	0.00
65.49	162.98	2.00	0.00	1.00	0.00	65.58	159.69	2.00	0.00	1.00	0.00
65.63	158.91	2.00	0.00	1.00	0.00	65.70	155.40	2.00	0.00	1.00	0.00
65.77	157.02	2.00	0.00	1.00	0.00	65.82	156.70	2.00	0.00	1.00	0.00
65.92	151.15	2.00	0.00	1.00	0.00	65.95	148.98	2.00	0.00	1.00	0.00
66.02	140.19	2.00	0.00	1.00	0.00	66.08	58.56	2.00	0.00	1.00	0.00
66.16	44.21	2.00	0.00	1.00	0.00	66.21	34.03	2.00	0.00	1.00	0.00
66.28	24.38	2.00	0.00	1.00	0.00	66.36	18.21	2.00	0.00	1.00	0.00
66.41	14.58	2.00	0.00	1.00	0.00	66.48	11.93	2.00	0.00	1.00	0.00
66.55	11.32	2.00	0.00	1.00	0.00	66.64	10.96	2.00	0.00	1.00	0.00
66.67	10.89	2.00	0.00	1.00	0.00	66.75	10.52	2.00	0.00	1.00	0.00
66.80	10.22	2.00	0.00	1.00	0.00	66.87	10.21	2.00	0.00	1.00	0.00
66.94	10.21	2.00	0.00	1.00	0.00	67.02	10.20	2.00	0.00	1.00	0.00
67.08	10.27	2.00	0.00	1.00	0.00	67.13	10.44	2.00	0.00	1.00	0.00
67.22	10.61	2.00	0.00	1.00	0.00	67.27	10.67	2.00	0.00	1.00	0.00
67.33	10.79	2.00	0.00	1.00	0.00	67.40	10.78	2.00	0.00	1.00	0.00
67.47	10.90	2.00	0.00	1.00	0.00	67.52	10.96	2.00	0.00	1.00	0.00
67.59	11.07	2.00	0.00	1.00	0.00	67.67	11.25	2.00	0.00	1.00	0.00
67.72	11.30	2.00	0.00	1.00	0.00	67.80	11.06	2.00	0.00	1.00	0.00
67.87	11.00	2.00	0.00	1.00	0.00	67.94	10.75	2.00	0.00	1.00	0.00
67.99	10.63	2.00	0.00	1.00	0.00	68.05	10.62	2.00	0.00	1.00	0.00
68.14	10.79	2.00	0.00	1.00	0.00	68.18	11.04	2.00	0.00	1.00	0.00
68.24	11.03	2.00	0.00	1.00	0.00	68.32	10.78	2.00	0.00	1.00	0.00
68.38	10.60	2.00	0.00	1.00	0.00	68.45	10.48	2.00	0.00	1.00	0.00
68.52	10.47	2.00	0.00	1.00	0.00	68.58	10.47	2.00	0.00	1.00	0.00
68.64	10.64	2.00	0.00	1.00	0.00	68.72	11.24	2.00	0.00	1.00	0.00
68.78	11.65	2.00	0.00	1.00	0.00	68.83	13.52	2.00	0.00	1.00	0.00
68.92	17.37	2.00	0.00	1.00	0.00	68.97	18.11	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
69.05	17.98	2.00	0.00	1.00	0.00	69.11	17.85	2.00	0.00	1.00	0.00
69.17	17.28	2.00	0.00	1.00	0.00	69.25	19.89	2.00	0.00	1.00	0.00
69.29	22.41	2.00	0.00	1.00	0.00	69.37	27.16	2.00	0.00	1.00	0.00
69.42	29.48	2.00	0.00	1.00	0.00	69.51	31.45	2.00	0.00	1.00	0.00
69.56	31.42	2.00	0.00	1.00	0.00	69.65	32.48	2.00	0.00	1.00	0.00
69.70	33.72	2.00	0.00	1.00	0.00	69.77	34.64	2.00	0.00	1.00	0.00
69.82	31.81	2.00	0.00	1.00	0.00	69.92	25.90	2.00	0.00	1.00	0.00
69.96	22.88	2.00	0.00	1.00	0.00	70.02	21.04	2.00	0.00	1.00	0.00
70.09	22.48	2.00	0.00	1.00	0.00	70.16	19.58	2.00	0.00	1.00	0.00
70.22	16.60	2.00	0.00	1.00	0.00	70.29	14.29	2.00	0.00	1.00	0.00
70.35	13.26	2.00	0.00	1.00	0.00	70.41	11.99	2.00	0.00	1.00	0.00
70.50	11.10	2.00	0.00	1.00	0.00	70.55	10.62	2.00	0.00	1.00	0.00
70.60	10.15	2.00	0.00	1.00	0.00	70.68	9.79	2.00	0.00	1.00	0.00
70.74	9.96	2.00	0.00	1.00	0.00	70.82	10.90	2.00	0.00	1.00	0.00
70.88	11.90	2.00	0.00	1.00	0.00	70.94	13.15	2.00	0.00	1.00	0.00
71.03	15.49	2.00	0.00	1.00	0.00	71.08	16.88	2.00	0.00	1.00	0.00
71.13	18.53	2.00	0.00	1.00	0.00	71.20	20.63	2.00	0.00	1.00	0.00
71.28	21.98	2.00	0.00	1.00	0.00	71.33	22.40	2.00	0.00	1.00	0.00
71.43	21.46	2.00	0.00	1.00	0.00	71.47	20.41	2.00	0.00	1.00	0.00
71.53	19.10	2.00	0.00	1.00	0.00	71.61	17.49	2.00	0.00	1.00	0.00
71.66	19.18	2.00	0.00	1.00	0.00	71.72	16.87	2.00	0.00	1.00	0.00
71.80	19.25	2.00	0.00	1.00	0.00	71.86	26.76	2.00	0.00	1.00	0.00
71.93	33.97	2.00	0.00	1.00	0.00	72.00	39.81	2.00	0.00	1.00	0.00
72.05	38.93	2.00	0.00	1.00	0.00	72.14	35.43	2.00	0.00	1.00	0.00
72.19	34.06	2.00	0.00	1.00	0.00	72.25	36.06	2.00	0.00	1.00	0.00
72.33	44.43	2.00	0.00	1.00	0.00	72.39	117.92	2.00	0.00	1.00	0.00
72.47	128.33	2.00	0.00	1.00	0.00	72.53	130.71	2.00	0.00	1.00	0.00
72.58	133.02	2.00	0.00	1.00	0.00	72.64	137.98	2.00	0.00	1.00	0.00
72.71	142.14	2.00	0.00	1.00	0.00	72.77	146.90	2.00	0.00	1.00	0.00
72.85	147.32	2.00	0.00	1.00	0.00	72.91	144.65	2.00	0.00	1.00	0.00
72.97	141.94	2.00	0.00	1.00	0.00	73.05	131.81	2.00	0.00	1.00	0.00
73.10	127.12	2.00	0.00	1.00	0.00	73.19	123.92	2.00	0.00	1.00	0.00
73.25	52.27	2.00	0.00	1.00	0.00	73.30	48.20	2.00	0.00	1.00	0.00
73.39	48.38	2.00	0.00	1.00	0.00	73.44	48.37	2.00	0.00	1.00	0.00
73.50	48.43	2.00	0.00	1.00	0.00	73.58	141.50	2.00	0.00	1.00	0.00
73.64	162.12	2.00	0.00	1.00	0.00	73.69	178.17	2.00	0.00	1.00	0.00
73.78	189.65	2.00	0.00	1.00	0.00	73.83	190.47	2.00	0.00	1.00	0.00
73.89	189.31	2.00	0.00	1.00	0.00	73.97	183.80	2.00	0.00	1.00	0.00
74.04	178.65	2.00	0.00	1.00	0.00	74.09	172.57	2.00	0.00	1.00	0.00
74.17	159.82	2.00	0.00	1.00	0.00	74.23	153.57	2.00	0.00	1.00	0.00
74.28	73.08	2.00	0.00	1.00	0.00	74.37	64.48	2.00	0.00	1.00	0.00
74.43	63.63	2.00	0.00	1.00	0.00	74.50	68.82	2.00	0.00	1.00	0.00
74.56	148.09	2.00	0.00	1.00	0.00	74.62	153.08	2.00	0.00	1.00	0.00
74.69	163.42	2.00	0.00	1.00	0.00	74.76	163.38	2.00	0.00	1.00	0.00
74.81	160.55	2.00	0.00	1.00	0.00	74.89	151.02	2.00	0.00	1.00	0.00
74.95	143.99	2.00	0.00	1.00	0.00	75.01	134.66	2.00	0.00	1.00	0.00
75.09	58.88	2.00	0.00	1.00	0.00	75.14	57.92	2.00	0.00	1.00	0.00
75.22	52.52	2.00	0.00	1.00	0.00	75.27	48.77	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
75.33	44.72	2.00	0.00	1.00	0.00	75.40	41.28	2.00	0.00	1.00	0.00
75.47	35.72	2.00	0.00	1.00	0.00	75.53	29.34	2.00	0.00	1.00	0.00
75.59	25.54	2.00	0.00	1.00	0.00	75.66	27.65	2.00	0.00	1.00	0.00
75.73	44.97	2.00	0.00	1.00	0.00	75.80	134.13	2.00	0.00	1.00	0.00
75.85	150.81	2.00	0.00	1.00	0.00	75.94	163.98	2.00	0.00	1.00	0.00
76.00	165.04	2.00	0.00	1.00	0.00	76.06	161.92	2.00	0.00	1.00	0.00
76.13	158.16	2.00	0.00	1.00	0.00	76.19	154.39	2.00	0.00	1.00	0.00
76.26	146.75	2.00	0.00	1.00	0.00	76.31	136.03	2.00	0.00	1.00	0.00
76.38	122.15	2.00	0.00	1.00	0.00	76.45	40.33	2.00	0.00	1.00	0.00
76.53	29.99	2.00	0.00	1.00	0.00	76.58	25.30	2.00	0.00	1.00	0.00
76.66	20.39	2.00	0.00	1.00	0.00	76.73	17.45	2.00	0.00	1.00	0.00
76.77	15.56	2.00	0.00	1.00	0.00	76.84	14.39	2.00	0.00	1.00	0.00
76.92	13.39	2.00	0.00	1.00	0.00	76.97	12.76	2.00	0.00	1.00	0.00
77.07	12.40	2.00	0.00	1.00	0.00	77.11	12.40	2.00	0.00	1.00	0.00
77.19	12.17	2.00	0.00	1.00	0.00	77.25	11.76	2.00	0.00	1.00	0.00
77.30	11.48	2.00	0.00	1.00	0.00	77.37	11.70	2.00	0.00	1.00	0.00
77.46	12.89	2.00	0.00	1.00	0.00	77.51	14.21	2.00	0.00	1.00	0.00
77.57	16.95	2.00	0.00	1.00	0.00	77.63	21.46	2.00	0.00	1.00	0.00
77.71	30.05	2.00	0.00	1.00	0.00	77.77	32.09	2.00	0.00	1.00	0.00
77.83	28.80	2.00	0.00	1.00	0.00	77.91	24.79	2.00	0.00	1.00	0.00
77.96	21.98	2.00	0.00	1.00	0.00	78.05	20.58	2.00	0.00	1.00	0.00
78.10	23.30	2.00	0.00	1.00	0.00	78.16	29.99	2.00	0.00	1.00	0.00
78.23	41.83	2.00	0.00	1.00	0.00	78.30	45.04	2.00	0.00	1.00	0.00
78.36	42.40	2.00	0.00	1.00	0.00	78.45	33.95	2.00	0.00	1.00	0.00
78.50	28.79	2.00	0.00	1.00	0.00	78.55	24.51	2.00	0.00	1.00	0.00
78.61	20.32	2.00	0.00	1.00	0.00	78.69	18.00	2.00	0.00	1.00	0.00
78.74	16.94	2.00	0.00	1.00	0.00	78.84	14.61	2.00	0.00	1.00	0.00
78.89	13.69	2.00	0.00	1.00	0.00	78.94	13.68	2.00	0.00	1.00	0.00
79.01	14.08	2.00	0.00	1.00	0.00	79.08	14.82	2.00	0.00	1.00	0.00
79.14	16.08	2.00	0.00	1.00	0.00	79.23	17.82	2.00	0.00	1.00	0.00
79.27	18.47	2.00	0.00	1.00	0.00	79.35	20.23	2.00	0.00	1.00	0.00
79.41	19.87	2.00	0.00	1.00	0.00	79.47	18.74	2.00	0.00	1.00	0.00
79.56	17.61	2.00	0.00	1.00	0.00	79.61	17.08	2.00	0.00	1.00	0.00
79.67	17.07	2.00	0.00	1.00	0.00	79.73	17.07	2.00	0.00	1.00	0.00
79.80	17.70	2.00	0.00	1.00	0.00	79.89	18.75	2.00	0.00	1.00	0.00
79.94	17.92	2.00	0.00	1.00	0.00	80.00	15.83	2.00	0.00	1.00	0.00
80.05	17.21	2.00	0.00	1.00	0.00	80.13	16.45	2.00	0.00	1.00	0.00
80.21	16.20	2.00	0.00	1.00	0.00	80.27	16.90	2.00	0.00	1.00	0.00
80.32	19.35	2.00	0.00	1.00	0.00	80.38	25.06	2.00	0.00	1.00	0.00
80.48	36.91	2.00	0.00	1.00	0.00	80.52	36.45	2.00	0.00	1.00	0.00
80.58	31.31	2.00	0.00	1.00	0.00	80.66	24.93	2.00	0.00	1.00	0.00
80.71	21.55	2.00	0.00	1.00	0.00	80.79	20.11	2.00	0.00	1.00	0.00
80.85	21.71	2.00	0.00	1.00	0.00	80.91	17.35	2.00	0.00	1.00	0.00
80.99	21.86	2.00	0.00	1.00	0.00	81.05	31.91	2.00	0.00	1.00	0.00
81.14	52.71	2.00	0.00	1.00	0.00	81.19	123.58	2.00	0.00	1.00	0.00
81.24	127.33	2.00	0.00	1.00	0.00	81.30	133.34	2.00	0.00	1.00	0.00
81.38	140.08	2.00	0.00	1.00	0.00	81.44	143.25	2.00	0.00	1.00	0.00
81.50	146.85	2.00	0.00	1.00	0.00	81.58	149.46	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
81.64	150.68	2.00	0.00	1.00	0.00	81.71	151.42	2.00	0.00	1.00	0.00
81.76	150.23	2.00	0.00	1.00	0.00	81.83	149.02	2.00	0.00	1.00	0.00
81.92	140.06	2.00	0.00	1.00	0.00	81.97	133.47	2.00	0.00	1.00	0.00
82.03	125.99	2.00	0.00	1.00	0.00	82.10	117.92	2.00	0.00	1.00	0.00
82.16	113.01	2.00	0.00	1.00	0.00	82.22	43.88	2.00	0.00	1.00	0.00
82.29	38.18	2.00	0.00	1.00	0.00	82.36	38.10	2.00	0.00	1.00	0.00
82.43	38.09	2.00	0.00	1.00	0.00	82.49	37.85	2.00	0.00	1.00	0.00
82.56	129.66	2.00	0.00	1.00	0.00	82.63	193.48	2.00	0.00	1.00	0.00
82.69	220.35	2.00	0.00	1.00	0.00	82.75	232.29	2.00	0.00	1.00	0.00
82.84	245.16	2.00	0.00	1.00	0.00	82.89	254.24	2.00	0.00	1.00	0.00
82.96	260.70	2.00	0.00	1.00	0.00	83.01	271.70	2.00	0.00	1.00	0.00
83.10	279.29	2.00	0.00	1.00	0.00	83.15	286.59	2.00	0.00	1.00	0.00
83.21	286.85	2.00	0.00	1.00	0.00	83.28	286.15	2.00	0.00	1.00	0.00
83.35	280.96	2.00	0.00	1.00	0.00	83.43	274.11	2.00	0.00	1.00	0.00
83.49	269.61	2.00	0.00	1.00	0.00	83.54	265.13	2.00	0.00	1.00	0.00
83.62	257.29	2.00	0.00	1.00	0.00	83.67	252.02	2.00	0.00	1.00	0.00
83.73	245.79	2.00	0.00	1.00	0.00	83.80	236.93	2.00	0.00	1.00	0.00
83.86	231.76	2.00	0.00	1.00	0.00	83.94	225.48	2.00	0.00	1.00	0.00
83.99	220.92	2.00	0.00	1.00	0.00	84.08	216.20	2.00	0.00	1.00	0.00
84.13	214.63	2.00	0.00	1.00	0.00	84.20	213.26	2.00	0.00	1.00	0.00
84.26	212.88	2.00	0.00	1.00	0.00	84.32	212.62	2.00	0.00	1.00	0.00
84.40	212.21	2.00	0.00	1.00	0.00	84.47	210.78	2.00	0.00	1.00	0.00
84.54	210.93	2.00	0.00	1.00	0.00	84.59	213.51	2.00	0.00	1.00	0.00
84.66	207.52	2.00	0.00	1.00	0.00	84.73	209.23	2.00	0.00	1.00	0.00
84.78	206.72	2.00	0.00	1.00	0.00	84.85	206.01	2.00	0.00	1.00	0.00
84.91	206.69	2.00	0.00	1.00	0.00	84.97	205.41	2.00	0.00	1.00	0.00
85.05	206.14	2.00	0.00	1.00	0.00	85.11	206.04	2.00	0.00	1.00	0.00
85.18	205.49	2.00	0.00	1.00	0.00	85.24	205.46	2.00	0.00	1.00	0.00
85.31	201.95	2.00	0.00	1.00	0.00	85.37	203.16	2.00	0.00	1.00	0.00
85.44	201.75	2.00	0.00	1.00	0.00	85.50	200.48	2.00	0.00	1.00	0.00
85.58	196.74	2.00	0.00	1.00	0.00	85.63	195.97	2.00	0.00	1.00	0.00
85.70	194.44	2.00	0.00	1.00	0.00	85.78	191.14	2.00	0.00	1.00	0.00
85.83	187.41	2.00	0.00	1.00	0.00	85.90	184.59	2.00	0.00	1.00	0.00
85.97	173.86	2.00	0.00	1.00	0.00	86.04	169.85	2.00	0.00	1.00	0.00
86.09	164.14	2.00	0.00	1.00	0.00	86.16	154.06	2.00	0.00	1.00	0.00
86.23	148.09	2.00	0.00	1.00	0.00	86.32	179.67	2.00	0.00	1.00	0.00
86.36	193.06	2.00	0.00	1.00	0.00	86.42	193.59	2.00	0.00	1.00	0.00
86.49	238.54	2.00	0.00	1.00	0.00	86.56	252.51	2.00	0.00	1.00	0.00
86.64	256.50	2.00	0.00	1.00	0.00	86.69	208.78	2.00	0.00	1.00	0.00
86.76	215.03	2.00	0.00	1.00	0.00	86.82	221.55	2.00	0.00	1.00	0.00
86.88	229.63	2.00	0.00	1.00	0.00	86.94	235.81	2.00	0.00	1.00	0.00
87.01	219.99	2.00	0.00	1.00	0.00	87.08	249.71	2.00	0.00	1.00	0.00
87.15	248.62	2.00	0.00	1.00	0.00	87.22	258.19	2.00	0.00	1.00	0.00
87.28	250.62	2.00	0.00	1.00	0.00	87.34	239.40	2.00	0.00	1.00	0.00
87.41	229.77	2.00	0.00	1.00	0.00	87.50	230.15	2.00	0.00	1.00	0.00
87.55	217.02	2.00	0.00	1.00	0.00	87.61	212.42	2.00	0.00	1.00	0.00
87.67	211.57	2.00	0.00	1.00	0.00	87.74	222.36	2.00	0.00	1.00	0.00
87.80	225.33	2.00	0.00	1.00	0.00	87.88	212.15	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
87.93	207.58	2.00	0.00	1.00	0.00	87.99	202.22	2.00	0.00	1.00	0.00
88.08	200.52	2.00	0.00	1.00	0.00	88.14	200.82	2.00	0.00	1.00	0.00
88.20	198.29	2.00	0.00	1.00	0.00	88.26	197.44	2.00	0.00	1.00	0.00
88.34	215.61	2.00	0.00	1.00	0.00	88.40	232.58	2.00	0.00	1.00	0.00
88.46	247.11	2.00	0.00	1.00	0.00	88.53	264.51	2.00	0.00	1.00	0.00
88.60	278.87	2.00	0.00	1.00	0.00	88.65	281.83	2.00	0.00	1.00	0.00
88.72	307.24	2.00	0.00	1.00	0.00	88.78	316.89	2.00	0.00	1.00	0.00
88.85	329.66	2.00	0.00	1.00	0.00	88.92	312.42	2.00	0.00	1.00	0.00
88.99	312.43	2.00	0.00	1.00	0.00	89.06	312.44	2.00	0.00	1.00	0.00
89.11	309.68	2.00	0.00	1.00	0.00	89.18	308.98	2.00	0.00	1.00	0.00
89.26	297.09	2.00	0.00	1.00	0.00	89.32	293.05	2.00	0.00	1.00	0.00
89.37	287.31	2.00	0.00	1.00	0.00	89.45	285.03	2.00	0.00	1.00	0.00
89.50	282.78	2.00	0.00	1.00	0.00	89.59	290.47	2.00	0.00	1.00	0.00
89.65	289.78	2.00	0.00	1.00	0.00	89.71	293.71	2.00	0.00	1.00	0.00
89.78	294.43	2.00	0.00	1.00	0.00	89.84	292.53	2.00	0.00	1.00	0.00
89.90	296.82	2.00	0.00	1.00	0.00	89.99	300.44	2.00	0.00	1.00	0.00
90.03	298.77	2.00	0.00	1.00	0.00	90.09	306.33	2.00	0.00	1.00	0.00
90.18	310.37	2.00	0.00	1.00	0.00	90.23	313.45	2.00	0.00	1.00	0.00
90.29	319.57	2.00	0.00	1.00	0.00	90.36	329.74	2.00	0.00	1.00	0.00
90.43	341.18	2.00	0.00	1.00	0.00	90.49	330.78	2.00	0.00	1.00	0.00
90.56	331.89	2.00	0.00	1.00	0.00	90.62	320.27	2.00	0.00	1.00	0.00
90.69	346.23	2.00	0.00	1.00	0.00	90.75	366.52	2.00	0.00	1.00	0.00
90.83	342.33	2.00	0.00	1.00	0.00	90.88	332.86	2.00	0.00	1.00	0.00
90.96	333.34	2.00	0.00	1.00	0.00	91.02	330.60	2.00	0.00	1.00	0.00
91.09	328.69	2.00	0.00	1.00	0.00	91.16	324.17	2.00	0.00	1.00	0.00
91.22	319.50	2.00	0.00	1.00	0.00	91.27	316.91	2.00	0.00	1.00	0.00
91.36	318.04	2.00	0.00	1.00	0.00	91.42	316.57	2.00	0.00	1.00	0.00
91.47	315.04	2.00	0.00	1.00	0.00	91.54	312.51	2.00	0.00	1.00	0.00
91.61	288.61	2.00	0.00	1.00	0.00	91.67	294.14	2.00	0.00	1.00	0.00
91.74	292.25	2.00	0.00	1.00	0.00	91.81	293.82	2.00	0.00	1.00	0.00
91.87	296.95	2.00	0.00	1.00	0.00	91.96	298.36	2.00	0.00	1.00	0.00
92.00	292.53	2.00	0.00	1.00	0.00	92.06	294.74	2.00	0.00	1.00	0.00
92.14	294.82	2.00	0.00	1.00	0.00	92.20	297.09	2.00	0.00	1.00	0.00
92.26	297.47	2.00	0.00	1.00	0.00	92.33	299.24	2.00	0.00	1.00	0.00
92.40	293.68	2.00	0.00	1.00	0.00	92.47	290.51	2.00	0.00	1.00	0.00
92.54	285.80	2.00	0.00	1.00	0.00	92.59	287.38	2.00	0.00	1.00	0.00
92.67	282.37	2.00	0.00	1.00	0.00	92.73	278.45	2.00	0.00	1.00	0.00
92.79	280.06	2.00	0.00	1.00	0.00	92.85	263.53	2.00	0.00	1.00	0.00
92.92	281.93	2.00	0.00	1.00	0.00	92.99	284.57	2.00	0.00	1.00	0.00
93.06	286.22	2.00	0.00	1.00	0.00	93.11	292.56	2.00	0.00	1.00	0.00
93.19	294.39	2.00	0.00	1.00	0.00	93.25	293.88	2.00	0.00	1.00	0.00
93.32	296.17	2.00	0.00	1.00	0.00	93.39	296.84	2.00	0.00	1.00	0.00
93.45	295.08	2.00	0.00	1.00	0.00	93.51	294.65	2.00	0.00	1.00	0.00
93.58	293.22	2.00	0.00	1.00	0.00	93.65	289.62	2.00	0.00	1.00	0.00
93.71	288.46	2.00	0.00	1.00	0.00	93.77	285.92	2.00	0.00	1.00	0.00
93.83	284.95	2.00	0.00	1.00	0.00	93.91	284.99	2.00	0.00	1.00	0.00
93.97	275.62	2.00	0.00	1.00	0.00	94.03	279.80	2.00	0.00	1.00	0.00
94.10	279.33	2.00	0.00	1.00	0.00	94.16	281.39	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
94.24	282.80	2.00	0.00	1.00	0.00	94.31	280.13	2.00	0.00	1.00	0.00
94.37	279.24	2.00	0.00	1.00	0.00	94.44	271.03	2.00	0.00	1.00	0.00
94.50	233.44	2.00	0.00	1.00	0.00	94.56	179.64	2.00	0.00	1.00	0.00
94.63	190.86	2.00	0.00	1.00	0.00	94.69	191.27	2.00	0.00	1.00	0.00
94.76	195.75	2.00	0.00	1.00	0.00	94.82	198.54	2.00	0.00	1.00	0.00
94.89	216.83	2.00	0.00	1.00	0.00	94.95	239.21	2.00	0.00	1.00	0.00
95.01	255.56	2.00	0.00	1.00	0.00	95.08	265.20	2.00	0.00	1.00	0.00
95.15	271.96	2.00	0.00	1.00	0.00	95.21	276.52	2.00	0.00	1.00	0.00
95.28	280.45	2.00	0.00	1.00	0.00	95.34	283.28	2.00	0.00	1.00	0.00
95.41	285.95	2.00	0.00	1.00	0.00	95.47	286.64	2.00	0.00	1.00	0.00
95.54	288.35	2.00	0.00	1.00	0.00	95.61	287.96	2.00	0.00	1.00	0.00
95.67	289.77	2.00	0.00	1.00	0.00	95.73	279.43	2.00	0.00	1.00	0.00
95.81	283.01	2.00	0.00	1.00	0.00	95.87	279.28	2.00	0.00	1.00	0.00
95.95	279.13	2.00	0.00	1.00	0.00	96.00	279.60	2.00	0.00	1.00	0.00
96.08	277.12	2.00	0.00	1.00	0.00	96.13	276.63	2.00	0.00	1.00	0.00
96.21	276.23	2.00	0.00	1.00	0.00	96.27	275.57	2.00	0.00	1.00	0.00
96.34	271.11	2.00	0.00	1.00	0.00	96.40	245.27	2.00	0.00	1.00	0.00
96.46	192.11	2.00	0.00	1.00	0.00	96.53	154.28	2.00	0.00	1.00	0.00
96.60	174.18	2.00	0.00	1.00	0.00	96.66	194.99	2.00	0.00	1.00	0.00
96.72	215.76	2.00	0.00	1.00	0.00	96.80	224.25	2.00	0.00	1.00	0.00
96.86	237.13	2.00	0.00	1.00	0.00	96.92	247.42	2.00	0.00	1.00	0.00
97.00	256.72	2.00	0.00	1.00	0.00	97.07	260.25	2.00	0.00	1.00	0.00
97.12	262.45	2.00	0.00	1.00	0.00	97.19	259.54	2.00	0.00	1.00	0.00
97.25	246.89	2.00	0.00	1.00	0.00	97.31	209.29	2.00	0.00	1.00	0.00
97.39	182.58	2.00	0.00	1.00	0.00	97.44	186.40	2.00	0.00	1.00	0.00
97.53	219.66	2.00	0.00	1.00	0.00	97.58	249.83	2.00	0.00	1.00	0.00
97.65	260.94	2.00	0.00	1.00	0.00	97.71	269.64	2.00	0.00	1.00	0.00
97.78	275.46	2.00	0.00	1.00	0.00	97.84	278.36	2.00	0.00	1.00	0.00
97.92	279.95	2.00	0.00	1.00	0.00	97.97	279.96	2.00	0.00	1.00	0.00
98.03	281.76	2.00	0.00	1.00	0.00	98.11	284.60	2.00	0.00	1.00	0.00
98.17	285.15	2.00	0.00	1.00	0.00	98.23	284.79	2.00	0.00	1.00	0.00
98.31	281.41	2.00	0.00	1.00	0.00	98.37	270.03	2.00	0.00	1.00	0.00
98.43	233.92	2.00	0.00	1.00	0.00	98.52	194.81	2.00	0.00	1.00	0.00
98.56	164.45	2.00	0.00	1.00	0.00	98.64	207.94	2.00	0.00	1.00	0.00
98.69	226.19	2.00	0.00	1.00	0.00	98.79	238.54	2.00	0.00	1.00	0.00
98.83	230.92	2.00	0.00	1.00	0.00	98.89	249.61	2.00	0.00	1.00	0.00
98.95	256.73	2.00	0.00	1.00	0.00	99.02	257.96	2.00	0.00	1.00	0.00
99.11	261.17	2.00	0.00	1.00	0.00	99.16	263.01	2.00	0.00	1.00	0.00
99.22	263.78	2.00	0.00	1.00	0.00	99.29	263.38	2.00	0.00	1.00	0.00
99.36	265.95	2.00	0.00	1.00	0.00	99.41	267.77	2.00	0.00	1.00	0.00
99.48	273.59	2.00	0.00	1.00	0.00	99.55	276.10	2.00	0.00	1.00	0.00
99.61	278.54	2.00	0.00	1.00	0.00	99.67	275.54	2.00	0.00	1.00	0.00
99.76	280.36	2.00	0.00	1.00	0.00	99.81	257.10	2.00	0.00	1.00	0.00
99.87	175.42	2.00	0.00	1.00	0.00	99.95	201.76	2.00	0.00	1.00	0.00
100.02	203.75	2.00	0.00	1.00	0.00	100.07	200.28	2.00	0.00	1.00	0.00
100.16	204.55	2.00	0.00	1.00	0.00	100.20	204.82	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

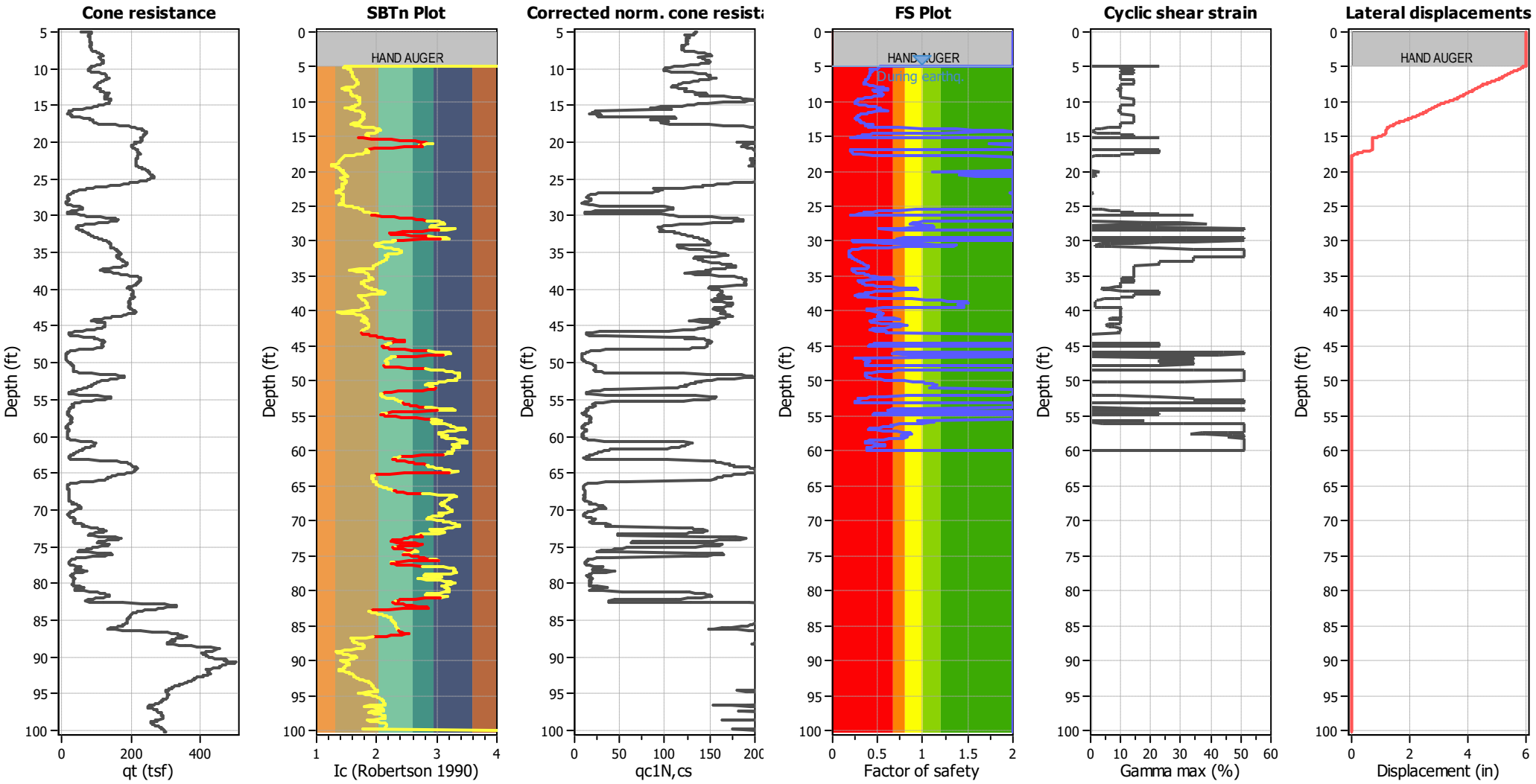
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)

Total estimated settlement: 5.52

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
5.00	56.08	89.62	0.26	135.65	0.54	63.38	22.70	0.08
5.06	83.89	133.89	0.24	134.67	0.53	76.63	10.00	0.03
5.12	83.59	131.69	0.20	134.03	0.52	76.08	10.00	0.03
5.21	83.45	132.40	0.24	133.53	0.51	76.26	10.00	0.04
5.27	83.39	133.02	0.28	133.01	0.50	76.42	10.00	0.02
5.32	82.58	132.01	0.29	132.37	0.50	76.17	10.00	0.02
5.38	80.05	128.09	0.32	129.24	0.47	75.17	10.00	0.03
5.46	78.63	125.81	0.34	121.85	0.42	74.58	14.50	0.05
5.52	78.57	125.70	0.35	125.57	0.44	74.55	14.50	0.04
5.60	80.35	128.56	0.36	127.48	0.45	75.29	10.00	0.04
5.66	80.99	129.47	0.37	127.45	0.45	75.52	10.00	0.03
5.72	80.69	128.73	0.37	126.66	0.44	75.33	10.00	0.03
5.82	80.57	127.72	0.37	124.84	0.43	75.08	10.00	0.05
5.84	80.23	127.01	0.37	125.37	0.43	74.89	14.50	0.02
5.91	80.50	127.06	0.38	123.71	0.42	74.90	14.50	0.04
5.99	80.59	126.93	0.39	124.23	0.42	74.87	14.50	0.06
6.05	81.16	127.55	0.41	124.15	0.41	75.03	10.00	0.03
6.11	81.60	127.93	0.42	124.37	0.41	75.13	10.00	0.03
6.18	82.17	128.21	0.42	124.48	0.41	75.20	10.00	0.03
6.25	82.57	128.33	0.42	124.92	0.41	75.23	10.00	0.03
6.30	82.84	128.31	0.42	124.55	0.41	75.23	10.00	0.03
6.40	82.84	127.59	0.42	124.01	0.40	75.04	10.00	0.05
6.43	83.05	127.72	0.43	123.67	0.40	75.08	10.00	0.02
6.50	83.62	128.18	0.44	123.97	0.40	75.19	10.00	0.03
6.58	84.50	128.95	0.45	124.90	0.40	75.39	10.00	0.04
6.63	85.07	129.52	0.46	125.49	0.40	75.54	10.00	0.03
6.70	84.90	129.05	0.47	124.69	0.40	75.42	10.00	0.03
6.78	84.05	127.54	0.48	122.95	0.39	75.03	10.00	0.04
6.84	83.01	126.17	0.50	121.17	0.38	74.67	14.50	0.04
6.90	82.37	125.34	0.53	119.67	0.37	74.46	14.50	0.04
6.96	82.31	125.14	0.55	119.58	0.37	74.40	14.50	0.04
7.03	82.81	125.23	0.55	119.71	0.36	74.43	14.50	0.05
7.12	83.42	125.20	0.54	120.14	0.36	74.42	14.50	0.06
7.18	83.82	125.25	0.54	120.37	0.36	74.43	14.50	0.04
7.23	83.79	125.10	0.56	119.95	0.36	74.39	14.50	0.03
7.29	83.65	124.68	0.57	118.96	0.36	74.28	14.50	0.04
7.35	83.82	124.64	0.58	118.84	0.35	74.27	14.50	0.04
7.44	84.56	125.04	0.59	119.27	0.35	74.38	14.50	0.06
7.50	85.94	126.41	0.59	120.31	0.36	74.74	14.50	0.04
7.55	88.06	128.77	0.58	122.47	0.37	75.35	10.00	0.02
7.61	91.90	133.29	0.58	125.61	0.38	76.49	10.00	0.03
7.71	96.38	138.32	0.57	132.30	0.42	77.71	10.00	0.04
7.76	101.73	144.67	0.57	136.52	0.45	79.19	10.00	0.02
7.85	105.53	148.63	0.56	142.27	0.50	80.08	10.00	0.04
7.89	109.07	152.60	0.55	143.92	0.51	80.95	10.00	0.02
7.96	111.49	153.22	0.46	147.05	0.54	81.08	10.00	0.03
8.03	113.78	152.49	0.34	149.16	0.57	80.93	10.46	0.03
8.08	115.36	151.23	0.24	150.28	0.58	80.65	9.98	0.02

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
8.14	116.84	152.44	0.24	151.11	0.59	80.92	9.66	0.03
8.21	117.95	154.69	0.29	152.86	0.61	81.40	8.94	0.03
8.28	117.95	155.34	0.33	152.69	0.61	81.54	9.07	0.03
8.34	113.51	150.71	0.37	149.93	0.57	80.54	10.42	0.03
8.41	110.65	147.65	0.40	137.21	0.44	79.86	10.00	0.03
8.49	108.29	144.83	0.44	142.13	0.48	79.23	10.00	0.04
8.53	110.08	147.07	0.45	141.15	0.47	79.73	10.00	0.02
8.61	110.92	147.88	0.47	141.90	0.48	79.91	10.00	0.04
8.68	112.63	149.70	0.48	143.79	0.49	80.32	10.00	0.03
8.75	114.55	151.57	0.48	145.48	0.51	80.73	10.00	0.03
8.79	116.51	153.49	0.48	147.07	0.52	81.14	10.00	0.02
8.89	118.06	154.60	0.47	148.89	0.54	81.38	10.00	0.04
8.94	119.20	155.73	0.48	149.34	0.55	81.62	10.00	0.02
8.99	119.97	156.71	0.50	149.59	0.55	81.83	10.00	0.02
9.06	120.44	157.36	0.53	150.39	0.56	81.96	10.00	0.03
9.13	120.37	157.38	0.57	149.80	0.55	81.97	10.00	0.03
9.19	118.89	155.77	0.60	148.28	0.53	81.63	10.00	0.03
9.28	116.57	152.79	0.64	144.44	0.49	80.99	10.00	0.04
9.34	113.71	149.28	0.67	141.20	0.46	80.22	10.00	0.03
9.38	110.41	145.10	0.68	138.01	0.43	79.29	10.00	0.02
9.46	106.75	140.19	0.69	132.81	0.39	78.15	10.00	0.04
9.52	101.53	133.47	0.69	128.36	0.36	76.53	10.00	0.03
9.61	96.31	126.23	0.67	119.91	0.32	74.69	14.50	0.06
9.67	91.09	118.92	0.61	114.72	0.30	72.72	14.50	0.04
9.72	87.09	113.02	0.54	110.19	0.29	71.04	14.50	0.04
9.79	83.86	108.32	0.50	105.71	0.27	69.64	14.50	0.05
9.87	81.57	105.18	0.50	102.91	0.27	68.67	14.50	0.05
9.92	80.12	103.24	0.51	101.58	0.26	68.05	14.50	0.03
10.00	79.34	101.87	0.50	99.91	0.26	67.61	14.50	0.05
10.04	78.90	100.97	0.48	99.62	0.25	67.32	14.50	0.03
10.11	78.83	100.46	0.47	99.32	0.25	67.15	14.50	0.05
10.18	79.17	100.62	0.48	98.94	0.25	67.20	14.50	0.04
10.25	80.15	101.59	0.49	99.88	0.25	67.52	14.50	0.05
10.31	82.91	104.78	0.51	101.73	0.26	68.54	14.50	0.04
10.38	87.62	110.18	0.54	107.26	0.27	70.20	14.50	0.05
10.45	93.95	117.35	0.55	114.53	0.29	72.28	14.50	0.05
10.51	101.59	126.02	0.55	121.59	0.32	74.63	14.50	0.04
10.56	108.76	134.05	0.56	131.13	0.37	76.67	10.00	0.03
10.63	115.60	141.67	0.57	136.57	0.40	78.50	10.00	0.03
10.70	120.61	147.25	0.59	142.25	0.44	79.77	10.00	0.03
10.76	124.35	150.48	0.54	145.81	0.48	80.49	10.00	0.03
10.84	126.74	151.07	0.43	147.19	0.49	80.62	10.00	0.04
10.89	128.39	150.81	0.32	148.72	0.50	80.56	10.00	0.02
10.97	129.70	151.62	0.31	149.89	0.52	80.74	10.00	0.04
11.03	130.11	153.08	0.38	150.36	0.52	81.05	10.00	0.02
11.09	130.01	153.97	0.48	149.01	0.50	81.24	10.00	0.03
11.17	130.58	155.10	0.55	148.64	0.50	81.49	10.00	0.04
11.22	133.77	159.08	0.61	151.16	0.53	82.32	10.00	0.02

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
11.31	135.59	161.15	0.67	157.69	0.62	82.75	8.75	0.04
11.37	134.95	160.79	0.74	153.21	0.55	82.68	10.00	0.02
11.42	130.27	155.96	0.82	148.22	0.49	81.67	10.00	0.02
11.49	125.83	150.97	0.89	142.49	0.44	80.60	10.00	0.03
11.56	122.33	146.76	0.93	138.71	0.41	79.66	10.00	0.03
11.64	120.07	143.67	0.93	136.56	0.39	78.96	10.00	0.03
11.68	118.02	140.91	0.91	134.80	0.38	78.32	10.00	0.02
11.76	115.16	137.06	0.90	131.62	0.36	77.41	10.00	0.04
11.83	111.82	132.75	0.89	127.12	0.33	76.35	10.00	0.03
11.88	108.39	128.45	0.87	124.10	0.32	75.26	10.00	0.02
11.95	105.70	124.75	0.83	120.40	0.30	74.30	14.50	0.05
12.02	103.68	121.79	0.78	117.69	0.29	73.51	14.50	0.05
12.08	102.50	119.88	0.74	116.32	0.29	72.99	14.50	0.04
12.17	101.69	118.31	0.71	115.28	0.28	72.55	14.50	0.06
12.22	100.75	116.85	0.68	114.10	0.28	72.14	14.50	0.04
12.28	98.77	114.35	0.68	112.53	0.27	71.43	14.50	0.04
12.37	96.68	111.64	0.69	108.39	0.26	70.63	14.50	0.06
12.42	95.37	109.97	0.69	107.11	0.25	70.14	14.50	0.03
12.48	96.95	111.44	0.69	107.79	0.26	70.57	14.50	0.04
12.56	100.28	114.66	0.68	112.46	0.27	71.52	14.50	0.06
12.62	104.49	118.96	0.68	116.36	0.28	72.73	14.50	0.04
12.68	108.22	122.75	0.67	119.89	0.30	73.76	14.50	0.04
12.76	110.65	124.94	0.67	123.17	0.31	74.35	14.50	0.06
12.82	111.83	125.94	0.67	123.03	0.31	74.61	14.50	0.04
12.87	111.83	125.69	0.68	122.70	0.31	74.55	14.50	0.04
12.93	112.13	125.76	0.69	122.46	0.30	74.57	14.50	0.04
13.02	113.04	126.30	0.68	123.14	0.31	74.71	14.50	0.06
13.06	115.90	128.54	0.59	124.69	0.31	75.29	10.00	0.02
13.16	120.20	131.95	0.48	130.24	0.34	76.15	10.00	0.04
13.21	125.86	137.10	0.41	135.39	0.37	77.41	10.00	0.03
13.27	131.22	142.80	0.45	140.96	0.41	78.76	10.00	0.02
13.32	135.12	147.19	0.52	145.64	0.45	79.76	10.00	0.03
13.41	133.14	145.26	0.61	146.29	0.45	79.32	10.00	0.04
13.45	132.13	144.45	0.69	134.20	0.36	79.14	10.00	0.02
13.54	130.81	142.99	0.76	141.73	0.41	78.80	10.00	0.04
13.60	132.83	145.00	0.80	141.56	0.41	79.26	10.00	0.03
13.65	131.18	143.45	0.90	139.46	0.39	78.91	10.00	0.02
13.72	128.55	141.24	1.16	145.80	0.45	78.40	10.00	0.03
13.79	125.73	138.96	1.53	165.68	0.74	77.86	6.10	0.02
13.86	123.91	137.23	1.82	174.79	0.99	77.45	3.27	0.01
13.92	123.20	136.54	2.03	180.42	1.23	77.28	2.10	0.01
13.99	123.80	136.93	2.15	183.27	1.38	77.37	1.66	0.01
14.05	125.59	138.60	2.25	186.22	1.56	77.77	1.27	0.00
14.11	129.76	142.65	2.22	188.18	1.70	78.73	1.06	0.00
14.18	139.32	152.10	2.07	190.26	1.88	80.84	0.87	0.00
14.26	142.22	154.59	2.03	207.82	2.00	81.38	0.00	0.00
14.30	142.46	154.45	2.02	188.85	1.75	81.35	1.00	0.00
14.37	136.03	147.26	2.10	192.77	2.00	79.77	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
14.45	135.83	146.37	2.02	187.68	1.66	79.57	1.12	0.00
14.50	136.37	145.97	1.73	180.25	1.21	79.48	2.17	0.01
14.57	137.11	145.56	1.40	165.74	0.73	79.39	6.22	0.02
14.64	136.43	143.75	1.14	147.40	0.45	78.98	10.00	0.03
14.71	133.30	139.90	1.07	142.72	0.41	78.08	10.00	0.03
14.77	127.71	133.72	1.03	137.88	0.37	76.59	10.00	0.03
14.84	119.97	125.36	1.02	132.10	0.34	74.46	14.50	0.04
14.91	112.56	117.35	1.00	127.42	0.31	72.28	14.50	0.05
14.96	106.37	110.68	0.98	125.66	0.30	70.35	14.50	0.04
15.04	101.72	105.47	0.92	119.55	0.28	68.76	14.50	0.05
15.10	97.04	99.99	0.69	103.03	0.23	67.00	14.50	0.04
15.16	92.47	94.65	0.49	95.06	0.21	65.19	14.50	0.04
15.24	87.49	88.94	0.34	89.60	0.20	63.13	22.70	0.09
15.29	80.38	81.91	0.44	84.65	2.00	60.42	0.00	0.00
15.36	71.29	72.87	0.63	94.97	2.00	56.55	0.00	0.00
15.45	59.01	60.49	0.95	107.25	2.00	50.41	0.00	0.00
15.50	48.60	49.96	1.38	100.28	2.00	44.09	0.00	0.00
15.56	39.21	40.33	1.89	99.14	2.00	37.03	0.00	0.00
15.62	33.05	33.95	2.45	91.43	2.00	31.34	0.00	0.00
15.70	28.17	28.83	3.08	27.23	2.00	25.94	0.00	0.00
15.75	25.10	25.60	3.56	25.77	2.00	22.03	0.00	0.00
15.81	23.39	23.75	3.80	22.99	2.00	19.55	0.00	0.00
15.89	21.70	21.91	4.05	21.92	2.00	16.88	0.00	0.00
15.95	20.16	20.24	4.26	20.58	2.00	14.27	0.00	0.00
16.05	18.64	18.59	4.58	18.22	2.00	11.46	0.00	0.00
16.09	18.24	18.14	4.76	17.30	2.00	10.65	0.00	0.00
16.14	21.37	21.34	4.29	19.29	1.74	16.01	0.00	0.00
16.23	25.51	25.50	3.80	27.47	2.00	21.90	0.00	0.00
16.29	28.10	28.09	3.57	29.54	2.00	25.09	0.00	0.00
16.37	27.05	26.97	3.75	26.92	2.00	23.74	0.00	0.00
16.43	25.76	25.62	3.89	24.30	2.00	22.05	0.00	0.00
16.48	30.58	30.42	3.16	25.68	2.00	27.72	0.00	0.00
16.57	40.37	40.13	2.28	100.98	2.00	36.87	0.00	0.00
16.63	53.16	52.74	1.61	110.15	2.00	45.88	0.00	0.00
16.68	64.46	63.76	1.14	112.77	2.00	52.15	0.00	0.00
16.74	73.34	72.25	0.78	107.51	2.00	56.27	0.00	0.00
16.82	79.39	77.91	0.56	90.37	2.00	58.76	0.00	0.00
16.88	83.09	81.40	0.50	84.01	2.00	60.21	0.00	0.00
16.96	85.95	84.13	0.53	88.45	0.19	61.30	22.70	0.09
17.02	88.23	86.33	0.57	92.08	0.20	62.15	22.70	0.06
17.06	89.18	87.25	0.63	95.37	0.21	62.50	22.70	0.05
17.15	89.66	87.62	0.68	99.30	0.21	62.64	22.70	0.09
17.21	90.60	88.49	0.72	103.37	0.22	62.96	22.70	0.06
17.27	92.39	90.14	0.71	102.17	0.22	63.57	22.70	0.07
17.36	94.59	92.12	0.67	100.09	0.21	64.29	22.70	0.09
17.39	100.05	97.33	0.62	96.12	0.21	66.11	14.50	0.02
17.46	108.33	105.25	0.60	105.74	0.23	68.69	14.50	0.05
17.53	120.68	117.11	0.59	116.39	0.26	72.21	14.50	0.05

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
17.59	135.72	131.54	0.57	130.22	0.31	76.05	10.00	0.03
17.65	152.65	147.75	0.54	148.65	0.44	79.89	10.00	0.03
17.73	168.78	163.08	0.50	164.59	0.67	83.14	7.44	0.03
17.79	182.48	176.08	0.47	176.01	0.98	85.67	3.36	0.01
17.85	193.42	186.40	0.44	187.41	1.57	87.55	1.45	0.00
17.94	202.44	194.82	0.43	195.39	2.00	89.01	0.00	0.00
17.99	210.52	202.44	0.43	201.32	2.00	90.28	0.00	0.00
18.07	217.39	208.82	0.44	209.96	2.00	91.30	0.00	0.00
18.13	223.22	214.23	0.44	214.53	2.00	92.15	0.00	0.00
18.18	227.06	217.77	0.43	217.49	2.00	92.69	0.00	0.00
18.26	229.82	220.17	0.43	220.50	2.00	93.05	0.00	0.00
18.33	232.42	222.42	0.41	221.97	2.00	93.38	0.00	0.00
18.38	234.60	224.35	0.41	224.46	2.00	93.67	0.00	0.00
18.45	237.23	226.66	0.40	226.33	2.00	94.01	0.00	0.00
18.52	239.62	228.71	0.40	229.05	2.00	94.31	0.00	0.00
18.57	241.47	230.33	0.40	230.86	2.00	94.54	0.00	0.00
18.64	242.24	230.86	0.40	231.20	2.00	94.62	0.00	0.00
18.72	242.34	230.73	0.40	230.85	2.00	94.60	0.00	0.00
18.77	241.47	229.75	0.40	230.75	2.00	94.46	0.00	0.00
18.84	240.56	228.68	0.40	228.33	2.00	94.30	0.00	0.00
18.91	239.45	227.38	0.37	227.90	2.00	94.11	0.00	0.00
18.98	238.44	226.14	0.30	227.20	2.00	93.93	0.00	0.00
19.03	237.19	224.73	0.24	225.09	2.00	93.73	0.00	0.00
19.10	236.05	223.46	0.21	224.02	2.00	93.54	0.00	0.00
19.18	235.95	223.18	0.22	223.59	2.00	93.50	0.00	0.00
19.24	236.66	223.74	0.24	224.44	2.00	93.58	0.00	0.00
19.30	231.47	218.71	0.27	225.67	2.00	92.83	0.00	0.00
19.38	229.62	216.76	0.29	208.51	2.00	92.53	0.00	0.00
19.44	227.90	215.00	0.32	218.81	2.00	92.27	0.00	0.00
19.50	232.11	218.83	0.33	220.41	2.00	92.85	0.00	0.00
19.56	232.68	219.23	0.35	220.12	2.00	92.91	0.00	0.00
19.64	232.45	218.80	0.37	220.06	2.00	92.84	0.00	0.00
19.70	231.57	217.82	0.38	219.38	2.00	92.69	0.00	0.00
19.78	230.16	216.26	0.38	217.22	2.00	92.46	0.00	0.00
19.83	228.58	214.62	0.39	215.69	2.00	92.21	0.00	0.00
19.89	226.76	212.75	0.40	214.53	2.00	91.92	0.00	0.00
19.95	214.24	200.77	0.42	211.74	2.00	90.01	0.00	0.00
20.02	211.24	197.77	0.42	179.85	1.10	89.51	2.73	0.00
20.08	207.84	194.40	0.42	205.67	2.00	88.94	0.00	0.00
20.16	214.74	200.70	0.40	201.71	2.00	89.99	0.00	0.00
20.21	211.28	197.30	0.40	199.03	2.00	89.43	0.00	0.00
20.28	207.74	193.82	0.41	195.49	2.00	88.84	0.00	0.00
20.35	204.28	190.38	0.41	191.36	1.84	88.25	1.09	0.00
20.41	201.11	187.26	0.42	188.87	1.62	87.71	1.36	0.00
20.47	200.27	186.29	0.43	186.17	1.43	87.53	1.71	0.00
20.55	199.32	185.19	0.45	188.60	1.60	87.34	1.40	0.00
20.61	200.23	185.86	0.48	185.82	1.41	87.46	1.76	0.00
20.68	201.51	186.87	0.51	188.38	1.58	87.64	1.43	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
20.75	204.85	189.79	0.51	191.85	1.87	88.15	1.06	0.00
20.81	208.01	192.69	0.45	194.90	2.00	88.65	0.00	0.00
20.87	210.40	194.86	0.38	196.98	2.00	89.02	0.00	0.00
20.95	212.19	196.40	0.34	198.26	2.00	89.28	0.00	0.00
21.01	214.48	198.36	0.37	199.58	2.00	89.61	0.00	0.00
21.09	216.93	200.39	0.40	203.05	2.00	89.94	0.00	0.00
21.14	218.70	201.86	0.43	204.86	2.00	90.18	0.00	0.00
21.22	218.00	200.95	0.46	204.20	2.00	90.03	0.00	0.00
21.27	217.63	200.41	0.49	200.72	2.00	89.95	0.00	0.00
21.34	218.65	201.13	0.51	203.44	2.00	90.06	0.00	0.00
21.42	221.85	203.86	0.53	206.73	2.00	90.51	0.00	0.00
21.46	224.71	206.39	0.53	209.40	2.00	90.92	0.00	0.00
21.54	225.92	207.32	0.52	211.17	2.00	91.06	0.00	0.00
21.60	225.18	206.49	0.51	209.81	2.00	90.93	0.00	0.00
21.66	222.62	204.01	0.48	206.94	2.00	90.53	0.00	0.00
21.72	220.47	201.92	0.45	203.59	2.00	90.19	0.00	0.00
21.80	219.31	200.69	0.43	203.35	2.00	89.99	0.00	0.00
21.86	219.28	200.60	0.40	203.31	2.00	89.98	0.00	0.00
21.93	219.31	200.49	0.39	203.13	2.00	89.96	0.00	0.00
22.00	219.29	200.30	0.39	203.09	2.00	89.93	0.00	0.00
22.05	218.82	199.73	0.39	202.90	2.00	89.83	0.00	0.00
22.12	217.64	198.45	0.39	201.44	2.00	89.62	0.00	0.00
22.19	215.69	196.48	0.40	199.43	2.00	89.29	0.00	0.00
22.25	213.80	194.59	0.40	197.05	2.00	88.97	0.00	0.00
22.32	212.96	193.65	0.40	195.78	2.00	88.81	0.00	0.00
22.38	212.63	193.22	0.39	196.72	2.00	88.74	0.00	0.00
22.46	212.97	193.35	0.38	195.72	2.00	88.76	0.00	0.00
22.51	213.30	193.58	0.38	196.40	2.00	88.80	0.00	0.00
22.59	214.45	194.47	0.37	197.30	2.00	88.95	0.00	0.00
22.66	215.12	195.00	0.35	198.61	2.00	89.04	0.00	0.00
22.71	215.19	195.12	0.31	197.95	2.00	89.06	0.00	0.00
22.77	215.00	195.03	0.27	197.18	2.00	89.05	0.00	0.00
22.86	214.67	194.69	0.23	197.74	2.00	88.99	0.00	0.00
22.91	214.94	194.82	0.24	196.67	2.00	89.01	0.00	0.00
22.98	215.26	194.92	0.25	197.61	2.00	89.03	0.00	0.00
23.05	215.76	195.13	0.27	198.34	2.00	89.07	0.00	0.00
23.11	214.41	193.62	0.29	197.75	2.00	88.81	0.00	0.00
23.18	214.08	193.03	0.32	193.47	1.96	88.71	0.97	0.00
23.23	215.56	194.13	0.35	197.09	2.00	88.89	0.00	0.00
23.32	219.43	197.33	0.38	201.58	2.00	89.43	0.00	0.00
23.38	223.37	200.66	0.41	204.03	2.00	89.99	0.00	0.00
23.43	226.87	203.62	0.43	207.83	2.00	90.47	0.00	0.00
23.51	230.10	206.28	0.45	211.11	2.00	90.90	0.00	0.00
23.56	232.73	208.48	0.47	212.83	2.00	91.25	0.00	0.00
23.63	236.16	211.43	0.47	214.90	2.00	91.71	0.00	0.00
23.71	240.10	214.78	0.47	220.45	2.00	92.23	0.00	0.00
23.77	244.31	218.47	0.47	223.59	2.00	92.79	0.00	0.00
23.82	247.14	220.89	0.48	226.44	2.00	93.16	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
23.91	248.96	222.32	0.47	228.09	2.00	93.37	0.00	0.00
23.97	249.90	223.04	0.47	228.37	2.00	93.48	0.00	0.00
24.06	250.47	223.32	0.47	228.68	2.00	93.52	0.00	0.00
24.10	251.04	223.69	0.47	229.36	2.00	93.57	0.00	0.00
24.16	251.44	223.87	0.48	229.64	2.00	93.60	0.00	0.00
24.23	252.15	224.26	0.48	229.50	2.00	93.66	0.00	0.00
24.30	253.46	225.23	0.49	230.99	2.00	93.80	0.00	0.00
24.36	255.72	227.12	0.49	232.99	2.00	94.08	0.00	0.00
24.42	257.88	228.87	0.49	235.55	2.00	94.33	0.00	0.00
24.50	259.76	230.29	0.50	236.74	2.00	94.53	0.00	0.00
24.55	261.31	231.66	0.48	237.99	2.00	94.73	0.00	0.00
24.63	263.10	233.39	0.44	239.56	2.00	94.97	0.00	0.00
24.69	264.48	234.77	0.40	241.45	2.00	95.17	0.00	0.00
24.74	264.91	235.04	0.39	241.55	2.00	95.21	0.00	0.00
24.81	264.14	233.75	0.45	240.48	2.00	95.02	0.00	0.00
24.89	261.95	231.05	0.52	238.89	2.00	94.64	0.00	0.00
24.94	257.94	226.71	0.61	234.99	2.00	94.02	0.00	0.00
25.02	254.68	223.02	0.70	228.72	2.00	93.47	0.00	0.00
25.07	251.51	219.55	0.79	229.29	2.00	92.96	0.00	0.00
25.14	249.09	216.83	0.87	225.64	2.00	92.55	0.00	0.00
25.21	243.94	211.72	0.94	221.52	2.00	91.76	0.00	0.00
25.26	236.80	204.98	1.00	214.38	2.00	90.69	0.00	0.00
25.33	228.12	196.91	1.05	205.14	2.00	89.36	0.00	0.00
25.39	217.35	187.09	1.08	196.70	2.00	87.68	0.00	0.00
25.47	207.38	178.05	1.09	183.73	1.22	86.04	2.29	0.00
25.53	197.96	169.63	1.08	176.89	0.92	84.44	3.80	0.00
25.61	190.85	163.25	1.05	170.03	0.72	83.18	6.30	0.00
25.68	184.29	157.38	1.02	163.68	0.59	81.97	9.53	0.00
25.73	177.89	151.69	1.00	158.51	0.51	80.75	10.00	0.00
25.79	168.26	143.10	1.00	153.38	0.45	78.83	10.00	0.00
25.87	156.68	132.76	1.02	142.61	0.36	76.35	10.00	0.00
25.93	143.25	120.87	1.04	141.57	0.35	73.26	14.50	0.00
25.99	128.71	108.02	1.08	142.72	0.36	69.55	14.50	0.00
26.06	114.54	95.55	1.12	134.47	0.31	65.50	14.50	0.00
26.12	100.36	83.19	1.15	132.92	0.30	60.93	22.70	0.00
26.19	89.59	74.01	1.01	120.43	0.25	57.07	22.70	0.00
26.27	80.40	66.39	0.73	103.99	0.21	53.48	34.10	0.00
26.33	73.70	60.93	0.49	86.97	2.00	50.65	0.00	0.00
26.38	67.10	55.12	0.52	92.31	2.00	47.34	0.00	0.00
26.47	59.53	48.28	0.72	97.39	2.00	42.97	0.00	0.00
26.53	51.24	41.01	0.92	96.12	2.00	37.58	0.00	0.00
26.58	44.40	35.13	1.04	92.20	2.00	32.47	0.00	0.00
26.66	39.65	31.00	1.23	89.48	2.00	28.34	0.00	0.00
26.72	35.78	27.61	1.57	89.28	2.00	24.52	0.00	0.00
26.78	33.02	25.18	2.03	86.11	2.00	21.48	0.00	0.00
26.86	31.10	23.47	2.46	26.11	2.00	19.16	0.00	0.00
26.91	29.69	22.23	2.81	26.28	2.00	17.37	0.00	0.00
26.99	27.80	20.63	3.07	23.80	2.00	14.90	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
27.04	24.71	18.07	3.39	21.17	2.00	10.53	0.00	0.00
27.12	21.58	15.57	3.87	18.20	2.00	5.61	0.00	0.00
27.18	19.12	13.63	4.58	15.68	1.01	1.22	0.00	0.00
27.24	17.91	12.66	5.29	14.80	0.94	0.00	19.71	0.00
27.31	17.74	12.51	5.55	15.04	0.92	0.00	22.56	0.00
27.36	17.81	12.55	5.41	15.21	0.93	0.00	21.97	0.00
27.44	17.27	12.11	5.33	14.93	0.89	0.00	30.17	0.00
27.50	16.70	11.65	5.40	13.64	0.86	0.00	38.74	0.00
27.57	17.07	11.92	5.28	13.71	0.88	0.00	33.88	0.00
27.64	18.31	12.85	4.85	15.85	0.95	0.00	16.67	0.00
27.69	19.86	14.03	4.21	16.78	1.03	2.18	0.00	0.00
27.77	20.63	14.61	3.79	17.63	1.08	3.50	0.00	0.00
27.84	21.31	15.10	3.49	17.79	1.11	4.60	0.00	0.00
27.89	21.61	15.31	3.34	18.46	1.13	5.06	0.00	0.00
27.95	20.36	14.33	3.17	18.37	1.05	2.88	0.00	0.00
28.04	18.14	12.61	2.83	14.57	0.93	0.00	21.72	0.00
28.10	15.25	10.38	2.66	12.77	0.76	0.00	51.20	0.00
28.15	12.89	8.56	3.10	10.97	0.63	0.00	51.20	0.00
28.24	11.95	7.83	4.01	8.58	0.58	0.00	51.20	0.00
28.30	10.77	6.92	5.31	10.36	0.51	0.00	51.20	0.00
28.36	14.21	9.52	4.67	7.98	0.70	0.00	51.20	0.00
28.45	17.61	12.08	4.15	17.25	0.89	0.00	31.86	0.00
28.51	22.59	15.85	3.43	18.95	2.00	6.20	0.00	0.00
28.55	26.97	19.29	2.83	20.56	2.00	12.69	0.00	0.00
28.64	33.67	24.69	2.18	28.36	2.00	20.83	0.00	0.00
28.70	42.45	31.88	1.65	94.49	2.00	29.26	0.00	0.00
28.75	51.40	39.27	1.35	99.81	2.00	36.15	0.00	0.00
28.81	58.19	44.86	1.23	107.49	2.00	40.54	0.00	0.00
28.89	62.02	47.93	1.23	109.00	2.00	42.73	0.00	0.00
28.95	61.85	47.64	1.35	109.46	2.00	42.53	0.00	0.00
29.01	59.69	45.67	1.55	109.12	2.00	41.13	0.00	0.00
29.09	56.43	42.77	1.84	107.67	2.00	38.97	0.00	0.00
29.14	51.28	38.39	2.26	105.67	2.00	35.40	0.00	0.00
29.21	44.15	32.48	2.80	99.01	2.00	29.88	0.00	0.00
29.28	36.17	26.00	3.48	29.47	2.00	22.53	0.00	0.00
29.34	28.49	19.93	4.18	23.88	2.00	13.77	0.00	0.00
29.43	22.97	15.78	4.78	17.90	2.00	6.06	0.00	0.00
29.48	18.73	12.61	5.32	15.43	0.92	0.00	23.10	0.00
29.53	16.48	10.92	5.59	13.15	0.80	0.00	51.20	0.00
29.60	15.00	9.81	5.76	12.21	0.72	0.00	51.20	0.00
29.67	18.26	12.21	4.49	11.70	0.89	0.00	30.51	0.00
29.74	27.99	19.56	2.74	21.29	2.00	13.15	0.00	0.00
29.80	42.44	31.18	1.62	95.44	2.00	28.54	0.00	0.00
29.86	54.12	40.69	1.28	105.42	2.00	37.32	0.00	0.00
29.93	59.61	44.99	1.35	108.03	2.00	40.64	0.00	0.00
29.99	62.84	47.31	1.64	109.01	0.21	42.29	51.20	0.00
30.06	72.16	54.63	1.75	115.06	0.23	47.04	34.10	0.00
30.12	89.09	68.21	1.71	134.24	0.30	54.37	34.10	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
30.21	109.68	84.88	1.63	151.58	0.42	61.59	22.70	0.00
30.26	128.32	100.04	1.58	163.33	0.57	67.01	14.50	0.00
30.33	142.85	111.83	1.56	173.54	0.79	70.69	6.37	0.00
30.40	153.40	120.31	1.56	179.83	1.00	73.10	3.24	0.00
30.45	159.95	125.53	1.57	183.39	1.15	74.51	2.14	0.00
30.52	162.93	127.80	1.58	186.45	1.31	75.10	1.83	0.00
30.58	162.44	127.17	1.61	187.56	1.38	74.93	1.27	0.00
30.65	157.83	123.13	1.67	186.97	1.34	73.87	1.37	0.00
30.71	150.04	116.50	1.74	182.93	1.13	72.04	2.27	0.00
30.79	141.35	109.15	1.81	176.96	0.89	69.89	4.49	0.00
30.84	132.12	101.50	1.86	173.10	0.77	67.49	6.71	0.00
30.91	121.48	92.74	1.92	165.62	0.61	64.51	22.70	0.00
30.99	107.80	81.58	1.99	154.26	0.44	60.28	22.70	0.00
31.05	93.69	70.22	2.06	139.87	0.33	55.33	22.70	0.00
31.11	80.23	59.51	2.07	129.65	0.28	49.87	34.10	0.00
31.18	68.78	50.51	2.00	117.82	0.23	44.46	51.20	0.00
31.26	59.42	43.24	1.85	107.59	0.21	39.33	51.20	0.00
31.32	53.23	38.46	1.70	102.18	0.20	35.46	51.20	0.00
31.36	49.06	35.27	1.58	99.43	0.19	32.60	51.20	0.00
31.44	46.06	32.93	1.52	95.21	0.19	30.34	51.20	0.00
31.52	44.68	31.85	1.47	93.20	0.18	29.23	51.20	0.00
31.57	44.24	31.48	1.48	95.48	0.19	28.85	51.20	0.00
31.64	44.95	31.98	1.48	93.79	0.18	29.37	51.20	0.00
31.70	45.59	32.46	1.45	95.11	0.19	29.86	51.20	0.00
31.76	48.15	34.58	1.21	95.02	0.19	31.95	51.20	0.00
31.84	51.14	37.07	0.99	96.78	0.19	34.25	51.20	0.00
31.91	54.58	39.96	0.80	95.90	0.19	36.72	51.20	0.00
31.96	58.18	42.81	0.78	97.16	0.19	39.00	51.20	0.00
32.04	61.85	45.66	0.79	100.54	0.19	41.12	51.20	0.00
32.10	60.67	44.50	0.91	106.60	0.21	40.28	51.20	0.00
32.17	62.72	45.98	0.98	94.97	0.18	41.35	51.20	0.00
32.23	64.47	47.21	1.05	110.75	0.22	42.23	51.20	0.00
32.30	70.66	52.05	1.05	110.60	0.21	45.45	34.10	0.00
32.35	72.86	53.63	1.12	112.92	0.22	46.43	34.10	0.00
32.42	75.28	55.38	1.18	115.71	0.23	47.50	34.10	0.00
32.50	77.91	57.30	1.23	118.62	0.24	48.62	34.10	0.00
32.57	80.16	58.94	1.27	121.14	0.24	49.55	34.10	0.00
32.61	82.65	60.80	1.30	122.26	0.25	50.58	34.10	0.00
32.69	85.14	62.65	1.32	125.43	0.26	51.57	34.10	0.00
32.74	88.68	65.36	1.33	127.01	0.26	52.96	34.10	0.00
32.83	92.05	67.91	1.33	130.65	0.28	54.23	34.10	0.00
32.88	95.92	70.90	1.32	132.35	0.29	55.65	22.70	0.00
32.95	99.39	73.55	1.31	135.09	0.30	56.86	22.70	0.00
33.01	103.22	76.54	1.30	136.73	0.31	58.18	22.70	0.00
33.08	107.19	79.61	1.28	138.91	0.32	59.47	22.70	0.00
33.15	111.43	82.91	1.26	141.07	0.33	60.81	22.70	0.00
33.22	115.47	86.05	1.24	142.75	0.34	62.04	22.70	0.00
33.28	119.14	88.92	1.22	143.94	0.35	63.12	22.70	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
33.34	123.35	92.22	1.20	144.32	0.35	64.33	22.70	0.00
33.42	127.36	95.32	1.18	147.19	0.37	65.42	14.50	0.00
33.47	131.20	98.33	1.17	147.15	0.37	66.44	14.50	0.00
33.54	134.19	100.64	1.16	147.64	0.38	67.21	14.50	0.00
33.61	136.65	102.50	1.15	148.95	0.39	67.81	14.50	0.00
33.68	138.33	103.73	1.14	149.03	0.39	68.21	14.50	0.00
33.73	139.21	104.33	1.15	149.25	0.39	68.40	14.50	0.00
33.81	139.78	104.62	1.16	150.17	0.40	68.49	14.50	0.00
33.87	140.32	105.05	1.13	148.39	0.38	68.63	14.50	0.00
33.92	140.72	106.34	0.86	126.70	0.26	69.03	14.50	0.00
34.02	140.99	108.20	0.53	114.08	0.22	69.60	14.50	0.00
34.07	141.29	110.72	0.25	114.02	0.22	70.36	14.50	0.00
34.12	141.63	111.12	0.23	114.42	0.22	70.48	14.50	0.00
34.21	142.24	110.74	0.31	114.76	0.22	70.37	14.50	0.00
34.26	142.66	110.13	0.41	115.41	0.23	70.18	14.50	0.00
34.33	142.90	109.40	0.53	115.29	0.23	69.97	14.50	0.00
34.40	144.79	110.09	0.64	115.19	0.23	70.17	14.50	0.00
34.47	148.10	112.08	0.74	121.36	0.24	70.76	14.50	0.00
34.52	153.02	115.51	0.82	127.33	0.26	71.76	14.50	0.00
34.59	156.52	117.74	0.91	136.06	0.30	72.39	14.50	0.00
34.67	158.68	118.96	0.98	142.47	0.34	72.73	14.50	0.00
34.73	159.45	119.22	1.03	146.65	0.37	72.80	14.50	0.00
34.79	159.96	119.45	1.05	148.19	0.38	72.86	14.50	0.00
34.85	161.17	120.23	1.06	149.23	0.39	73.08	14.50	0.00
34.95	162.85	121.32	1.08	151.49	0.41	73.38	14.50	0.00
34.99	165.24	123.04	1.10	153.72	0.43	73.84	14.50	0.00
35.04	168.37	125.29	1.12	156.48	0.46	74.44	14.50	0.00
35.13	171.13	127.16	1.15	161.38	0.53	74.93	14.50	0.00
35.18	172.38	127.90	1.18	164.07	0.57	75.12	10.43	0.00
35.24	170.56	126.17	1.22	167.00	0.62	74.67	12.69	0.00
35.33	167.29	123.24	1.27	168.11	0.64	73.90	11.49	0.00
35.38	163.62	120.10	1.31	169.70	0.68	73.05	9.93	0.00
35.44	160.39	117.66	1.27	165.75	0.60	72.37	14.19	0.00
35.53	158.40	116.43	1.15	155.30	0.45	72.02	14.50	0.00
35.59	158.14	116.82	1.00	142.89	0.34	72.13	14.50	0.00
35.64	160.29	119.08	0.88	133.26	0.29	72.76	14.50	0.00
35.72	163.46	121.86	0.81	132.50	0.28	73.52	14.50	0.00
35.78	166.29	124.22	0.77	134.68	0.29	74.16	14.50	0.00
35.83	168.64	126.00	0.77	135.64	0.30	74.63	14.50	0.00
35.92	171.17	127.86	0.77	137.72	0.31	75.11	10.00	0.00
35.97	173.79	129.89	0.77	141.05	0.33	75.63	10.00	0.00
36.03	175.62	131.12	0.78	142.32	0.34	75.94	10.00	0.00
36.11	176.46	131.38	0.82	142.37	0.34	76.01	10.00	0.00
36.17	177.50	131.79	0.87	143.47	0.34	76.11	10.00	0.00
36.23	180.30	133.59	0.91	146.02	0.36	76.56	10.00	0.00
36.32	183.83	135.93	0.95	151.45	0.41	77.13	10.00	0.00
36.37	187.67	138.59	1.00	155.04	0.44	77.77	10.00	0.00
36.42	189.75	139.82	1.04	159.70	0.50	78.06	10.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
36.51	190.22	139.65	1.10	163.83	0.56	78.02	10.66	0.00
36.57	189.18	138.37	1.16	168.00	0.64	77.72	8.20	0.00
36.62	186.92	136.21	1.22	172.90	0.75	77.20	5.87	0.00
36.70	184.33	133.79	1.27	175.03	0.81	76.61	5.03	0.00
36.76	180.20	130.24	1.32	178.95	0.93	75.72	3.71	0.00
36.85	175.62	126.33	1.36	178.58	0.92	74.72	4.07	0.00
36.91	170.17	121.89	1.40	179.17	0.94	73.53	3.82	0.00
36.95	164.01	117.00	1.43	178.31	0.91	72.18	4.20	0.00
37.02	156.37	111.02	1.45	174.32	0.79	70.45	6.41	0.00
37.10	147.98	104.46	1.48	169.40	0.67	68.44	10.36	0.00
37.15	137.78	96.56	1.53	167.15	0.62	65.85	12.71	0.00
37.24	128.09	88.99	1.59	157.80	0.48	63.15	22.70	0.00
37.30	118.76	81.82	1.66	153.87	0.43	60.38	22.70	0.00
37.34	112.80	77.31	1.69	149.04	0.39	58.51	22.70	0.00
37.44	110.45	75.53	1.65	145.24	0.36	57.74	22.70	0.00
37.47	113.95	78.37	1.52	145.04	0.36	58.96	22.70	0.00
37.53	122.53	85.12	1.35	149.30	0.39	61.68	22.70	0.00
37.60	132.02	92.66	1.19	150.61	0.40	64.49	22.70	0.00
37.67	141.65	100.75	0.98	136.47	0.30	67.25	14.50	0.00
37.76	149.56	107.88	0.76	122.48	0.25	69.50	14.50	0.00
37.81	157.61	115.20	0.60	123.83	0.25	71.67	14.50	0.00
37.87	163.60	120.11	0.57	129.13	0.27	73.05	14.50	0.00
37.93	171.04	125.41	0.63	133.74	0.29	74.47	14.50	0.00
38.01	179.02	130.98	0.69	143.14	0.34	75.91	10.00	0.00
38.06	189.09	138.05	0.77	149.96	0.39	77.64	10.00	0.00
38.15	198.68	144.80	0.84	160.29	0.51	79.22	10.00	0.00
38.19	208.95	152.14	0.91	168.68	0.65	80.85	7.91	0.00
38.26	217.02	157.80	0.96	177.47	0.88	82.06	4.22	0.00
38.32	222.78	161.59	1.03	182.04	1.05	82.84	2.91	0.00
38.40	225.14	162.75	1.09	184.59	1.17	83.08	2.34	0.00
38.46	225.65	162.58	1.14	185.50	1.21	83.04	2.16	0.00
38.53	225.54	162.05	1.18	186.67	1.27	82.93	1.94	0.00
38.58	225.78	161.92	1.20	188.52	1.39	82.91	1.63	0.00
38.68	226.18	161.92	1.22	189.63	1.46	82.91	1.47	0.00
38.72	226.22	161.80	1.22	190.16	1.50	82.88	1.39	0.00
38.80	225.81	161.25	1.23	190.13	1.49	82.77	1.40	0.00
38.86	224.74	160.25	1.24	190.40	1.51	82.57	1.36	0.00
38.92	222.92	158.66	1.24	189.84	1.47	82.24	1.44	0.00
39.00	220.93	156.93	1.25	188.66	1.39	81.87	1.62	0.00
39.05	219.22	155.49	1.26	188.80	1.40	81.57	1.59	0.00
39.11	218.11	154.46	1.26	188.73	1.40	81.35	1.61	0.00
39.19	217.26	153.60	1.27	188.97	1.41	81.17	1.57	0.00
39.24	216.56	152.89	1.28	189.62	1.46	81.01	1.47	0.00
39.31	215.79	152.12	1.28	189.66	1.46	80.85	1.47	0.00
39.39	214.51	150.97	1.28	189.51	1.45	80.60	1.49	0.00
39.44	211.88	148.87	1.29	189.29	1.43	80.13	1.53	0.00
39.51	207.67	146.07	1.21	180.10	0.97	79.51	3.44	0.00
39.58	201.95	142.77	1.04	164.46	0.57	78.75	10.39	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
39.65	196.53	139.87	0.87	154.82	0.44	78.07	10.00	0.00
39.70	192.12	137.23	0.78	151.14	0.40	77.45	10.00	0.00
39.80	190.23	135.67	0.77	148.51	0.38	77.07	10.00	0.00
39.85	190.81	136.38	0.73	149.43	0.39	77.24	10.00	0.00
39.90	192.36	138.60	0.62	152.49	0.42	77.77	10.00	0.00
39.98	195.69	143.03	0.46	152.48	0.42	78.81	10.00	0.00
40.04	198.82	148.81	0.26	158.16	0.48	80.12	10.00	0.00
40.09	202.49	153.81	0.17	160.62	0.51	81.21	10.00	0.00
40.19	204.38	155.84	0.15	162.06	0.53	81.64	10.00	0.00
40.23	205.51	154.63	0.24	163.01	0.55	81.39	10.00	0.00
40.30	206.38	153.17	0.33	163.41	0.55	81.07	10.00	0.00
40.37	206.75	151.29	0.46	164.19	0.56	80.66	10.60	0.00
40.44	206.74	149.56	0.57	163.74	0.56	80.29	10.00	0.00
40.49	205.93	147.62	0.67	163.12	0.55	79.85	10.00	0.00
40.56	204.92	145.86	0.75	161.76	0.53	79.46	10.00	0.00
40.63	203.71	144.14	0.81	160.77	0.51	79.07	10.00	0.00
40.70	202.83	142.81	0.87	159.60	0.50	78.76	10.00	0.00
40.77	202.66	142.13	0.92	159.32	0.49	78.60	10.00	0.00
40.82	203.94	142.60	0.97	160.90	0.51	78.71	10.00	0.00
40.91	205.86	143.54	1.00	164.53	0.57	78.93	10.40	0.00
40.96	207.55	144.36	1.05	167.40	0.62	79.12	8.69	0.00
41.02	207.88	144.16	1.09	170.34	0.68	79.07	7.16	0.00
41.11	207.34	143.25	1.13	173.17	0.75	78.86	5.88	0.00
41.16	206.00	142.12	1.14	173.10	0.75	78.60	5.91	0.00
41.21	203.84	141.24	1.03	164.18	0.56	78.40	10.63	0.00
41.27	201.45	140.31	0.91	157.61	0.47	78.18	10.00	0.00
41.34	199.10	139.22	0.82	155.66	0.45	77.92	10.00	0.00
41.41	197.45	137.70	0.84	153.89	0.43	77.56	10.00	0.00
41.49	196.34	136.43	0.87	152.84	0.42	77.25	10.00	0.00
41.55	195.15	135.03	0.92	153.53	0.43	76.91	10.00	0.00
41.61	193.56	133.30	0.97	154.42	0.43	76.49	10.00	0.00
41.67	192.52	131.98	1.03	156.81	0.46	76.16	10.00	0.00
41.74	192.87	131.70	1.09	163.02	0.54	76.09	10.00	0.00
41.80	194.52	132.42	1.14	168.71	0.65	76.27	8.00	0.00
41.87	195.94	133.05	1.18	173.07	0.74	76.42	5.94	0.00
41.95	196.64	133.27	1.20	175.37	0.81	76.48	5.03	0.00
42.00	196.68	133.16	1.21	175.82	0.82	76.45	4.86	0.00
42.09	196.11	132.58	1.20	175.53	0.81	76.31	4.97	0.00
42.14	195.40	132.02	1.20	174.17	0.77	76.17	5.49	0.00
42.20	194.69	131.49	1.18	172.92	0.74	76.04	6.01	0.00
42.27	194.36	131.24	1.16	170.92	0.69	75.97	6.91	0.00
42.33	194.19	131.17	1.14	168.87	0.65	75.95	7.93	0.00
42.39	194.19	131.32	1.10	165.26	0.58	75.99	9.98	0.00
42.48	194.46	131.68	1.06	160.95	0.51	76.08	10.00	0.00
42.52	195.47	132.89	0.99	155.57	0.45	76.39	10.00	0.00
42.63	196.68	134.05	0.93	154.09	0.43	76.67	10.00	0.00
42.65	198.26	135.63	0.88	153.06	0.42	77.06	10.00	0.00
42.72	200.52	137.39	0.86	154.42	0.43	77.48	10.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
42.81	204.06	140.08	0.84	158.01	0.47	78.12	10.00	0.00
42.86	208.47	143.32	0.83	161.89	0.53	78.88	10.00	0.00
42.92	211.93	145.80	0.83	165.86	0.59	79.45	9.63	0.00
43.00	213.65	146.92	0.83	167.02	0.61	79.70	8.95	0.00
43.05	213.68	146.77	0.84	166.23	0.60	79.67	9.41	0.00
43.12	212.20	145.18	0.87	165.70	0.59	79.30	9.73	0.00
43.22	209.81	142.71	0.93	163.00	2.00	78.74	0.00	0.00
43.27	206.18	139.44	0.98	161.70	2.00	77.97	0.00	0.00
43.31	200.12	134.45	1.04	163.70	2.00	76.77	0.00	0.00
43.38	193.99	129.43	1.10	162.75	2.00	75.51	0.00	0.00
43.44	185.68	122.79	1.17	171.77	2.00	73.78	0.00	0.00
43.52	177.87	116.61	1.25	172.32	2.00	72.07	0.00	0.00
43.60	169.72	110.27	1.33	173.10	2.00	70.23	0.00	0.00
43.64	161.61	104.15	1.40	175.81	2.00	68.34	0.00	0.00
43.70	154.20	98.61	1.46	170.39	2.00	66.54	0.00	0.00
43.78	146.16	92.63	1.53	168.70	2.00	64.47	0.00	0.00
43.84	139.19	87.40	1.63	166.55	2.00	62.56	0.00	0.00
43.92	132.29	82.12	1.78	163.52	2.00	60.50	0.00	0.00
43.98	124.65	76.28	2.00	161.46	2.00	58.06	0.00	0.00
44.04	115.36	69.42	2.29	156.28	2.00	54.95	0.00	0.00
44.11	105.19	62.16	2.59	146.46	2.00	51.31	0.00	0.00
44.17	94.42	54.73	2.89	139.36	2.00	47.10	0.00	0.00
44.23	87.39	50.08	2.98	129.23	2.00	44.18	0.00	0.00
44.32	85.74	49.09	2.86	127.75	2.00	43.52	0.00	0.00
44.36	92.06	53.53	2.50	132.87	2.00	46.38	0.00	0.00
44.42	104.86	62.32	2.17	142.89	2.00	51.39	0.00	0.00
44.50	116.41	70.20	1.99	158.32	2.00	55.32	0.00	0.00
44.57	123.44	74.95	1.92	159.51	2.00	57.48	0.00	0.00
44.64	124.15	75.36	1.91	158.84	0.48	57.66	22.70	0.00
44.70	123.58	75.00	1.88	157.65	0.47	57.50	22.70	0.00
44.75	123.07	74.80	1.80	156.08	0.45	57.42	22.70	0.00
44.83	122.83	74.88	1.68	154.22	0.43	57.45	22.70	0.00
44.91	122.80	75.12	1.57	152.20	0.41	57.56	22.70	0.00
44.96	123.47	75.81	1.47	150.07	0.39	57.86	22.70	0.00
45.03	124.48	76.57	1.42	150.67	0.40	58.19	22.70	0.00
45.09	125.12	77.06	1.39	150.61	2.00	58.40	0.00	0.00
45.15	119.47	73.03	1.43	152.29	2.00	56.63	0.00	0.00
45.21	114.49	69.48	1.47	137.45	2.00	54.98	0.00	0.00
45.29	107.89	64.79	1.55	143.54	2.00	52.67	0.00	0.00
45.34	103.34	61.55	1.62	139.43	2.00	50.98	0.00	0.00
45.43	95.09	55.74	1.77	131.78	2.00	47.71	0.00	0.00
45.49	85.60	49.13	2.01	126.90	2.00	43.54	0.00	0.00
45.54	73.58	40.99	2.38	120.41	2.00	37.56	0.00	0.00
45.63	60.89	32.67	2.87	104.73	2.00	30.08	0.00	0.00
45.69	48.64	25.00	3.42	34.27	2.00	21.24	0.00	0.00
45.75	39.11	19.54	3.83	28.03	2.00	13.12	0.00	0.00
45.84	30.73	15.01	4.31	20.64	2.00	4.41	0.00	0.00
45.88	24.17	11.48	4.92	15.85	0.84	0.00	44.14	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
45.93	20.94	9.73	5.44	13.77	0.71	0.00	51.20	0.00
46.02	19.73	9.07	5.68	13.69	0.66	0.00	51.20	0.00
46.08	19.66	9.02	5.60	13.25	0.66	0.00	51.20	0.00
46.14	21.07	9.77	5.30	13.60	0.71	0.00	51.20	0.00
46.23	24.48	11.57	4.82	16.67	0.84	0.00	42.47	0.00
46.27	29.46	14.22	4.37	20.49	2.00	2.62	0.00	0.00
46.33	37.44	18.46	3.57	24.26	2.00	11.23	0.00	0.00
46.42	49.06	25.28	2.72	34.02	2.00	21.61	0.00	0.00
46.48	64.34	35.11	1.98	107.83	2.00	32.45	0.00	0.00
46.52	80.53	45.78	1.62	119.30	2.00	41.21	0.00	0.00
46.62	92.96	53.95	1.49	131.53	2.00	46.63	0.00	0.00
46.67	95.55	55.33	1.61	137.15	0.31	47.46	34.10	0.00
46.73	99.66	57.89	1.62	123.10	0.25	48.96	34.10	0.00
46.79	103.73	60.44	1.63	143.07	0.34	50.38	34.10	0.00
46.87	113.29	66.77	1.56	144.69	0.35	53.67	34.10	0.00
46.93	116.75	68.91	1.58	147.41	0.37	54.71	34.10	0.00
46.99	119.85	70.84	1.59	149.11	0.38	55.62	22.70	0.00
47.07	122.17	72.27	1.59	152.25	0.41	56.28	22.70	0.00
47.13	123.52	73.11	1.58	152.71	0.42	56.66	22.70	0.00
47.18	122.58	72.37	1.60	152.64	0.42	56.33	22.70	0.00
47.26	120.49	70.82	1.63	150.45	0.40	55.61	22.70	0.00
47.32	117.76	68.89	1.67	149.00	0.38	54.70	34.10	0.00
47.38	115.81	67.50	1.69	147.14	0.37	54.03	34.10	0.00
47.46	114.87	66.79	1.70	146.60	0.36	53.68	34.10	0.00
47.52	115.27	67.01	1.69	146.89	0.37	53.79	34.10	0.00
47.58	116.35	67.71	1.66	147.84	0.37	54.13	34.10	0.00
47.67	117.73	68.66	1.61	147.92	0.37	54.59	34.10	0.00
47.72	119.41	70.01	1.51	147.31	0.37	55.23	22.70	0.00
47.77	119.55	70.42	1.40	147.44	0.37	55.42	22.70	0.00
47.86	117.16	69.04	1.32	142.98	2.00	54.77	0.00	0.00
47.91	109.92	64.24	1.33	139.28	2.00	52.39	0.00	0.00
48.00	101.04	58.14	1.42	131.15	2.00	49.10	0.00	0.00
48.05	90.57	51.01	1.58	127.14	2.00	44.78	0.00	0.00
48.10	78.88	43.18	1.84	120.32	2.00	39.28	0.00	0.00
48.16	64.95	34.12	2.26	108.43	2.00	31.51	0.00	0.00
48.24	51.31	25.63	2.81	34.60	2.00	22.07	0.00	0.00
48.30	40.07	19.16	3.33	27.31	2.00	12.47	0.00	0.00
48.37	32.22	15.10	3.53	21.16	2.00	4.60	0.00	0.00
48.43	26.20	11.98	3.72	17.67	0.88	0.00	34.34	0.00
48.50	22.36	9.99	3.87	14.49	0.73	0.00	51.20	0.00
48.57	20.01	8.76	4.11	13.08	0.64	0.00	51.20	0.00
48.63	18.56	8.02	3.97	12.73	0.59	0.00	51.20	0.00
48.70	16.35	6.87	3.95	11.48	0.50	0.00	51.20	0.00
48.77	14.56	5.94	3.92	8.53	0.44	0.00	51.20	0.00
48.82	13.15	5.22	4.03	9.07	0.38	0.00	51.20	0.00
48.89	13.08	5.18	3.96	8.59	0.38	0.00	51.20	0.00
48.96	12.72	4.98	3.99	8.38	0.37	0.00	51.20	0.00
49.03	12.58	4.91	3.93	8.31	0.36	0.00	51.20	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
49.08	12.62	4.92	3.78	8.30	0.36	0.00	51.20	0.00
49.15	12.69	4.95	3.66	8.44	0.36	0.00	51.20	0.00
49.22	12.76	4.98	3.62	8.43	0.37	0.00	51.20	0.00
49.28	12.80	4.99	3.74	8.43	0.37	0.00	51.20	0.00
49.36	12.97	5.07	3.95	8.49	0.37	0.00	51.20	0.00
49.45	13.20	5.18	4.17	8.76	0.38	0.00	51.20	0.00
49.49	13.61	5.39	4.34	8.89	0.40	0.00	51.20	0.00
49.55	14.18	5.67	4.42	9.29	0.42	0.00	51.20	0.00
49.62	14.96	6.06	4.50	9.90	0.45	0.00	51.20	0.00
49.68	16.04	6.60	4.77	10.44	0.49	0.00	51.20	0.00
49.74	17.18	7.17	5.52	11.46	0.53	0.00	51.20	0.00
49.82	18.50	7.83	6.29	12.20	0.57	0.00	51.20	0.00
49.87	20.08	8.62	6.70	13.09	0.63	0.00	51.20	0.00
49.94	21.23	9.19	6.80	14.68	0.67	0.00	51.20	0.00
50.01	24.55	10.85	6.12	14.52	0.80	0.00	51.20	0.00
50.08	27.15	12.15	5.62	19.91	0.89	0.00	31.19	0.00
50.13	29.99	13.57	5.05	20.04	0.99	1.07	5.26	0.00
50.21	30.39	13.75	4.82	20.38	1.01	1.52	0.00	0.00
50.27	31.10	14.10	4.46	20.72	1.03	2.33	0.00	0.00
50.33	32.24	14.66	3.61	21.49	1.07	3.62	0.00	0.00
50.42	33.46	15.24	2.84	22.73	1.11	4.92	0.00	0.00
50.48	34.34	15.67	2.39	23.20	1.15	5.83	0.00	0.00
50.53	34.57	15.78	2.59	23.27	1.15	6.05	0.00	0.00
50.59	34.34	15.64	2.97	23.20	1.14	5.77	0.00	0.00
50.67	34.36	15.64	3.26	22.69	1.14	5.75	0.00	0.00
50.74	34.47	15.67	3.48	23.29	1.15	5.83	0.00	0.00
50.79	34.35	15.60	3.68	23.39	1.14	5.67	0.00	0.00
50.88	33.42	15.11	3.89	22.39	1.11	4.63	0.00	0.00
50.93	32.95	14.87	3.99	21.32	1.09	4.09	0.00	0.00
51.02	32.41	14.58	4.11	22.37	1.07	3.44	0.00	0.00
51.08	32.92	14.82	4.20	21.22	1.09	3.97	0.00	0.00
51.13	34.61	15.64	4.29	22.35	2.00	5.76	0.00	0.00
51.21	38.35	17.47	4.17	25.89	2.00	9.42	0.00	0.00
51.27	43.60	20.06	3.95	29.09	2.00	13.97	0.00	0.00
51.32	51.61	24.01	3.68	33.50	2.00	19.92	0.00	0.00
51.40	63.77	30.85	3.31	43.23	2.00	28.19	0.00	0.00
51.44	84.07	42.69	2.88	121.20	2.00	38.91	0.00	0.00
51.52	109.48	58.08	2.48	147.70	2.00	49.06	0.00	0.00
51.58	135.03	73.93	2.23	172.16	2.00	57.03	0.00	0.00
51.66	153.27	85.50	2.07	185.37	2.00	61.83	0.00	0.00
51.71	165.28	93.41	1.93	189.58	2.00	64.75	0.00	0.00
51.78	173.39	98.92	1.80	195.36	2.00	66.64	0.00	0.00
51.86	178.94	102.72	1.72	197.32	2.00	67.89	0.00	0.00
51.91	180.01	103.38	1.71	197.68	2.00	68.10	0.00	0.00
51.97	176.07	100.64	1.74	196.13	1.95	67.21	0.47	0.00
52.05	167.85	95.41	1.72	188.21	1.33	65.45	1.40	0.00
52.12	157.69	89.36	1.63	176.25	0.82	63.29	8.42	0.00
52.18	148.16	83.92	1.49	165.80	0.59	61.21	22.70	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
52.24	139.17	78.52	1.41	158.98	0.49	59.02	22.70	0.00
52.32	131.26	73.36	1.43	151.79	0.41	56.77	22.70	0.00
52.38	123.82	68.41	1.50	149.09	0.38	54.47	34.10	0.00
52.44	114.29	62.03	1.65	147.43	0.37	51.24	34.10	0.00
52.51	108.34	58.01	1.77	133.46	0.29	49.03	34.10	0.00
52.57	102.78	54.35	1.88	140.12	0.32	46.87	34.10	0.00
52.65	102.25	53.93	1.90	135.43	0.30	46.62	34.10	0.00
52.71	99.82	52.37	1.92	134.60	0.29	45.65	34.10	0.00
52.76	96.93	50.60	1.93	134.11	0.29	44.52	51.20	0.00
52.85	92.82	48.01	1.98	128.80	0.27	42.78	51.20	0.00
52.91	88.14	45.11	2.05	124.87	0.25	40.73	51.20	0.00
52.96	84.94	43.07	2.14	123.04	0.25	39.20	51.20	0.00
53.05	83.79	42.26	2.18	121.55	0.24	38.57	51.20	0.00
53.10	84.13	42.40	2.19	122.64	0.25	38.68	51.20	0.00
53.16	84.06	42.33	2.19	124.29	0.25	38.62	51.20	0.00
53.22	82.10	41.19	2.17	121.50	2.00	37.72	0.00	0.00
53.28	77.86	38.71	2.18	117.63	2.00	35.67	0.00	0.00
53.35	73.01	35.86	2.23	113.40	2.00	33.15	0.00	0.00
53.41	67.59	32.70	2.30	109.62	2.00	30.10	0.00	0.00
53.50	62.61	29.81	2.38	104.42	2.00	27.05	0.00	0.00
53.54	57.69	27.03	2.43	39.09	2.00	23.83	0.00	0.00
53.61	53.28	24.54	2.52	35.75	2.00	20.63	0.00	0.00
53.69	48.33	21.73	2.70	32.37	2.00	16.62	0.00	0.00
53.74	42.78	18.83	3.02	28.53	2.00	11.89	0.00	0.00
53.81	36.48	15.81	3.51	24.04	2.00	6.13	0.00	0.00
53.89	30.16	12.78	4.22	19.26	0.94	0.00	17.58	0.00
53.95	25.11	10.37	5.07	15.51	0.77	0.00	51.20	0.00
54.01	22.25	9.00	5.88	13.75	0.67	0.00	51.20	0.00
54.08	21.14	8.47	6.34	13.48	0.63	0.00	51.20	0.00
54.15	20.71	8.25	6.62	13.27	0.61	0.00	51.20	0.00
54.21	21.85	8.79	6.34	12.87	0.65	0.00	51.20	0.00
54.27	32.53	13.83	4.26	15.74	1.02	1.71	0.00	0.00
54.34	52.54	23.68	2.74	35.22	2.00	19.46	0.00	0.00
54.41	78.97	39.06	1.93	118.11	2.00	35.97	0.00	0.00
54.46	103.75	54.10	1.60	134.51	2.00	46.72	0.00	0.00
54.53	122.73	65.95	1.44	150.90	2.00	53.26	0.00	0.00
54.60	135.09	73.78	1.35	155.20	2.00	56.96	0.00	0.00
54.68	139.76	76.73	1.32	156.42	0.46	58.26	22.70	0.00
54.74	140.46	77.15	1.31	156.13	0.45	58.44	22.70	0.00
54.79	138.14	75.61	1.32	155.31	2.00	57.77	0.00	0.00
54.87	133.05	72.23	1.35	152.70	2.00	56.26	0.00	0.00
54.94	125.21	67.13	1.42	148.49	2.00	53.84	0.00	0.00
55.02	116.39	61.47	1.49	141.90	2.00	50.94	0.00	0.00
55.06	107.30	55.73	1.59	137.01	2.00	47.70	0.00	0.00
55.12	96.36	48.78	1.79	132.29	2.00	43.30	0.00	0.00
55.20	84.98	41.63	2.11	120.40	2.00	38.08	0.00	0.00
55.26	73.03	34.36	2.57	114.09	2.00	31.74	0.00	0.00
55.33	61.45	27.66	3.10	42.14	2.00	24.58	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
55.41	50.82	22.07	3.71	31.68	2.00	17.13	0.00	0.00
55.46	42.03	17.97	4.33	26.99	2.00	10.35	0.00	0.00
55.51	36.55	15.41	4.72	23.59	2.00	5.27	0.00	0.00
55.60	32.88	13.69	4.92	20.35	1.01	1.36	0.00	0.00
55.65	30.80	12.71	4.87	19.46	0.94	0.00	18.03	0.00
55.71	31.85	13.18	4.39	19.31	0.98	0.12	9.19	0.00
55.80	34.07	14.19	3.88	22.43	1.05	2.56	0.00	0.00
55.85	36.13	15.14	3.48	23.92	1.12	4.68	0.00	0.00
55.91	35.19	14.69	3.14	23.43	1.09	3.69	0.00	0.00
55.99	32.60	13.47	3.07	20.48	1.00	0.84	3.85	0.00
56.05	29.47	12.02	3.25	18.65	0.89	0.00	30.58	0.00
56.10	27.01	10.87	3.96	17.10	0.81	0.00	51.20	0.00
56.19	25.23	10.04	4.57	15.55	0.75	0.00	51.20	0.00
56.25	23.38	9.18	5.18	15.08	0.68	0.00	51.20	0.00
56.32	22.88	8.94	5.35	13.42	0.67	0.00	51.20	0.00
56.37	22.41	8.72	5.42	14.54	0.65	0.00	51.20	0.00
56.44	22.58	8.78	5.26	14.14	0.65	0.00	51.20	0.00
56.52	21.90	8.46	5.22	13.73	0.63	0.00	51.20	0.00
56.58	21.20	8.13	5.12	13.20	0.61	0.00	51.20	0.00
56.63	19.92	7.54	5.17	12.74	0.56	0.00	51.20	0.00
56.71	18.44	6.85	5.38	11.24	0.51	0.00	51.20	0.00
56.76	16.82	6.11	5.75	10.32	0.46	0.00	51.20	0.00
56.83	15.67	5.58	6.21	9.61	0.42	0.00	51.20	0.00
56.91	15.10	5.31	6.55	9.03	0.40	0.00	51.20	0.00
56.96	15.88	5.66	6.45	9.22	0.42	0.00	51.20	0.00
57.05	17.70	6.48	5.99	11.08	0.48	0.00	51.20	0.00
57.11	20.06	7.54	5.50	12.50	0.56	0.00	51.20	0.00
57.17	22.24	8.53	5.10	13.74	0.64	0.00	51.20	0.00
57.24	24.39	9.50	4.72	15.30	0.71	0.00	51.20	0.00
57.30	26.45	10.42	4.39	16.68	0.78	0.00	51.20	0.00
57.36	28.10	11.16	4.10	17.74	0.83	0.00	45.80	0.00
57.44	29.17	11.63	3.88	18.53	0.87	0.00	37.06	0.00
57.50	29.67	11.85	3.78	18.79	0.88	0.00	33.02	0.00
57.55	29.64	11.83	3.75	18.71	0.88	0.00	33.45	0.00
57.61	29.07	11.56	3.96	18.44	0.86	0.00	38.41	0.00
57.70	28.06	11.08	4.35	17.62	0.83	0.00	47.02	0.00
57.75	26.94	10.57	5.08	16.69	0.79	0.00	51.20	0.00
57.84	26.17	10.21	5.33	16.22	0.76	0.00	51.20	0.00
57.90	26.38	10.29	4.78	16.08	0.77	0.00	51.20	0.00
57.95	27.36	10.73	4.17	17.06	0.80	0.00	51.20	0.00
58.01	28.30	11.14	4.07	18.11	0.83	0.00	45.88	0.00
58.09	28.37	11.16	4.60	17.91	0.83	0.00	45.48	0.00
58.14	26.83	10.46	5.17	17.17	0.78	0.00	51.20	0.00
58.23	24.49	9.39	5.72	15.06	0.70	0.00	51.20	0.00
58.27	22.05	8.29	6.22	13.29	0.62	0.00	51.20	0.00
58.35	20.25	7.48	6.46	12.38	0.56	0.00	51.20	0.00
58.41	18.91	6.87	6.47	11.54	0.51	0.00	51.20	0.00
58.47	17.43	6.20	6.40	10.70	0.47	0.00	51.20	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
58.55	16.09	5.60	6.24	9.55	0.42	0.00	51.20	0.00
58.60	15.02	5.11	5.98	8.97	0.38	0.00	51.20	0.00
58.69	14.46	4.86	5.79	8.66	0.36	0.00	51.20	0.00
58.75	14.28	4.77	5.69	8.47	0.36	0.00	51.20	0.00
58.80	14.39	4.81	5.76	8.59	0.36	0.00	51.20	0.00
58.86	15.44	5.28	5.65	8.83	0.40	0.00	51.20	0.00
58.95	17.14	6.02	5.35	10.41	0.45	0.00	51.20	0.00
59.00	19.31	6.98	4.97	11.75	0.52	0.00	51.20	0.00
59.09	20.70	7.59	4.78	12.89	0.57	0.00	51.20	0.00
59.14	21.24	7.83	4.81	13.02	0.59	0.00	51.20	0.00
59.20	20.81	7.63	4.99	12.75	0.57	0.00	51.20	0.00
59.28	19.91	7.22	5.19	12.04	0.54	0.00	51.20	0.00
59.34	18.84	6.74	5.33	11.27	0.51	0.00	51.20	0.00
59.39	17.64	6.20	5.42	10.69	0.47	0.00	51.20	0.00
59.45	16.57	5.72	5.08	9.74	0.43	0.00	51.20	0.00
59.52	15.67	5.32	4.03	9.23	0.40	0.00	51.20	0.00
59.59	15.31	5.16	3.00	8.98	0.39	0.00	51.20	0.00
59.66	15.13	5.07	2.45	9.04	0.38	0.00	51.20	0.00
59.72	15.11	5.06	2.66	8.84	0.38	0.00	51.20	0.00
59.78	15.23	5.11	2.78	8.90	0.38	0.00	51.20	0.00
59.85	15.33	5.14	2.69	9.21	0.39	0.00	51.20	0.00
59.91	15.25	5.10	2.58	8.92	0.38	0.00	51.20	0.00
60.01	15.18	5.07	2.53	8.64	2.00	0.00	0.00	0.00
60.06	15.51	5.20	2.40	8.95	2.00	0.00	0.00	0.00
60.11	16.62	5.69	2.46	9.45	2.00	0.00	0.00	0.00
60.20	18.13	6.34	2.55	10.64	2.00	0.00	0.00	0.00
60.25	18.41	6.46	3.18	11.71	2.00	0.00	0.00	0.00
60.30	19.99	7.15	3.93	9.69	2.00	0.00	0.00	0.00
60.40	21.72	7.89	4.75	13.29	2.00	0.00	0.00	0.00
60.45	26.29	9.89	5.10	14.70	2.00	0.00	0.00	0.00
60.53	30.71	11.80	5.13	18.33	2.00	0.00	0.00	0.00
60.57	40.07	15.88	4.48	21.83	2.00	6.26	0.00	0.00
60.64	55.68	22.67	3.39	33.34	2.00	18.01	0.00	0.00
60.74	72.31	31.20	2.66	116.18	2.00	28.55	0.00	0.00
60.76	87.27	39.61	2.14	121.04	2.00	36.43	0.00	0.00
60.84	94.55	43.84	1.94	130.74	2.00	39.79	0.00	0.00
60.90	98.20	45.99	1.83	130.99	2.00	41.36	0.00	0.00
60.96	97.32	45.59	1.79	128.45	2.00	41.07	0.00	0.00
61.03	95.91	45.07	1.66	126.31	2.00	40.70	0.00	0.00
61.10	95.46	45.24	1.48	124.68	2.00	40.82	0.00	0.00
61.17	94.78	45.13	1.36	124.04	2.00	40.74	0.00	0.00
61.23	93.09	44.22	1.35	122.09	2.00	40.07	0.00	0.00
61.30	90.12	42.39	1.40	120.19	2.00	38.67	0.00	0.00
61.35	85.94	39.80	1.51	118.68	2.00	36.59	0.00	0.00
61.42	80.66	36.57	1.68	115.16	2.00	33.80	0.00	0.00
61.49	74.87	33.11	1.88	110.83	2.00	30.52	0.00	0.00
61.56	69.11	29.87	2.06	107.61	2.00	27.11	0.00	0.00
61.64	65.07	27.64	2.17	103.09	2.00	24.56	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
61.69	62.42	26.21	2.25	39.85	2.00	22.80	0.00	0.00
61.75	60.86	25.31	2.34	39.29	2.00	21.65	0.00	0.00
61.83	59.56	24.51	2.48	37.55	2.00	20.58	0.00	0.00
61.88	56.35	22.65	2.81	37.17	2.00	17.99	0.00	0.00
61.95	52.37	20.82	3.20	32.69	2.00	15.21	0.00	0.00
62.03	47.93	18.90	3.55	29.46	2.00	12.01	0.00	0.00
62.07	45.23	17.73	3.53	28.10	2.00	9.91	0.00	0.00
62.15	43.95	17.17	3.32	27.20	2.00	8.84	0.00	0.00
62.21	42.21	16.41	3.21	26.85	2.00	7.34	0.00	0.00
62.29	40.53	15.67	3.29	24.57	2.00	5.83	0.00	0.00
62.34	38.24	14.69	3.49	23.84	2.00	3.69	0.00	0.00
62.41	35.52	13.51	3.75	22.32	2.00	0.94	0.00	0.00
62.49	32.19	12.08	4.05	19.23	2.00	0.00	0.00	0.00
62.55	29.12	10.77	4.22	17.34	2.00	0.00	0.00	0.00
62.61	27.41	10.03	4.07	16.37	2.00	0.00	0.00	0.00
62.68	26.04	9.44	3.87	15.91	2.00	0.00	0.00	0.00
62.74	24.40	8.73	3.91	14.70	2.00	0.00	0.00	0.00
62.81	22.52	7.93	4.23	13.24	2.00	0.00	0.00	0.00
62.88	21.65	7.55	4.75	12.35	2.00	0.00	0.00	0.00
62.94	20.04	6.86	5.60	13.03	2.00	0.00	0.00	0.00
63.00	20.32	6.98	5.98	10.23	2.00	0.00	0.00	0.00
63.09	25.56	9.18	4.93	12.83	2.00	0.00	0.00	0.00
63.14	42.14	16.17	3.06	22.96	2.00	6.87	0.00	0.00
63.19	75.79	32.91	1.79	103.14	2.00	30.31	0.00	0.00
63.27	111.39	53.13	1.31	144.53	2.00	46.13	0.00	0.00
63.33	142.53	71.73	1.10	149.85	2.00	56.03	0.00	0.00
63.39	159.21	81.79	1.04	154.77	2.00	60.37	0.00	0.00
63.47	170.92	88.90	1.01	157.44	2.00	63.12	0.00	0.00
63.52	180.14	94.47	1.00	157.04	2.00	65.12	0.00	0.00
63.60	186.71	98.20	1.01	162.01	2.00	66.40	0.00	0.00
63.66	192.02	100.89	1.05	166.79	2.00	67.29	0.00	0.00
63.72	195.63	102.70	1.08	170.37	2.00	67.88	0.00	0.00
63.81	198.39	104.16	1.09	172.72	2.00	68.35	0.00	0.00
63.86	200.51	105.52	1.07	171.36	2.00	68.77	0.00	0.00
63.92	202.27	106.39	1.08	172.45	2.00	69.04	0.00	0.00
64.02	202.78	106.28	1.11	177.33	2.00	69.01	0.00	0.00
64.04	205.51	107.56	1.14	176.67	2.00	69.41	0.00	0.00
64.12	205.78	107.28	1.18	187.42	2.00	69.32	0.00	0.00
64.18	210.36	109.76	1.20	181.46	2.00	70.07	0.00	0.00
64.24	212.89	110.91	1.23	192.97	2.00	70.42	0.00	0.00
64.32	216.69	112.81	1.25	194.72	2.00	70.98	0.00	0.00
64.37	215.65	111.57	1.31	199.07	2.00	70.61	0.00	0.00
64.45	213.44	109.64	1.37	200.63	2.00	70.04	0.00	0.00
64.51	211.57	108.07	1.42	202.64	2.00	69.56	0.00	0.00
64.58	210.94	107.47	1.44	203.88	2.00	69.38	0.00	0.00
64.66	210.91	107.35	1.44	203.83	2.00	69.34	0.00	0.00
64.71	210.86	107.31	1.43	203.39	2.00	69.33	0.00	0.00
64.77	210.17	106.86	1.42	203.30	2.00	69.19	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
64.85	208.14	105.54	1.43	202.47	2.00	68.78	0.00	0.00
64.90	202.75	102.24	1.45	201.45	2.00	67.73	0.00	0.00
64.99	195.82	98.00	1.47	194.64	2.00	66.33	0.00	0.00
65.05	188.01	93.32	1.50	191.69	2.00	64.72	0.00	0.00
65.10	180.57	88.86	1.53	188.43	2.00	63.10	0.00	0.00
65.16	172.19	83.77	1.59	183.24	2.00	61.16	0.00	0.00
65.24	163.91	78.75	1.66	177.38	2.00	59.12	0.00	0.00
65.29	156.03	74.17	1.70	173.63	2.00	57.14	0.00	0.00
65.39	149.80	70.56	1.74	167.48	2.00	55.49	0.00	0.00
65.44	144.72	67.63	1.77	164.50	2.00	54.09	0.00	0.00
65.49	140.75	65.27	1.82	162.98	2.00	52.92	0.00	0.00
65.58	137.48	63.23	1.88	159.69	2.00	51.87	0.00	0.00
65.63	133.62	60.84	1.97	158.91	2.00	50.60	0.00	0.00
65.70	131.43	59.32	2.07	155.40	2.00	49.76	0.00	0.00
65.77	129.49	57.92	2.19	157.02	2.00	48.98	0.00	0.00
65.82	126.83	56.13	2.33	156.70	2.00	47.94	0.00	0.00
65.92	122.66	53.56	2.48	151.15	2.00	46.39	0.00	0.00
65.95	115.41	49.39	2.72	148.98	2.00	43.71	0.00	0.00
66.02	105.01	43.73	3.02	140.19	2.00	39.70	0.00	0.00
66.08	89.22	35.58	3.49	58.56	2.00	32.89	0.00	0.00
66.16	72.06	27.54	4.11	44.21	2.00	24.44	0.00	0.00
66.21	55.46	20.81	4.82	34.03	2.00	15.19	0.00	0.00
66.28	42.36	15.49	5.43	24.38	2.00	5.45	0.00	0.00
66.36	32.29	11.41	5.92	18.21	2.00	0.00	0.00	0.00
66.41	25.67	8.73	6.04	14.58	2.00	0.00	0.00	0.00
66.48	21.95	7.22	5.72	11.93	2.00	0.00	0.00	0.00
66.55	20.00	6.42	4.75	11.32	2.00	0.00	0.00	0.00
66.64	19.45	6.20	3.73	10.96	2.00	0.00	0.00	0.00
66.67	19.05	6.03	2.98	10.89	2.00	0.00	0.00	0.00
66.75	18.68	5.88	2.68	10.52	2.00	0.00	0.00	0.00
66.80	18.36	5.74	2.48	10.22	2.00	0.00	0.00	0.00
66.87	18.24	5.69	2.34	10.21	2.00	0.00	0.00	0.00
66.94	18.31	5.71	2.21	10.21	2.00	0.00	0.00	0.00
67.02	18.42	5.75	2.14	10.20	2.00	0.00	0.00	0.00
67.08	18.62	5.83	2.11	10.27	2.00	0.00	0.00	0.00
67.13	18.90	5.94	2.09	10.44	2.00	0.00	0.00	0.00
67.22	19.18	6.04	2.07	10.61	2.00	0.00	0.00	0.00
67.27	19.43	6.13	2.06	10.67	2.00	0.00	0.00	0.00
67.33	19.57	6.19	1.98	10.79	2.00	0.00	0.00	0.00
67.40	19.76	6.26	1.79	10.78	2.00	0.00	0.00	0.00
67.47	19.91	6.31	1.63	10.90	2.00	0.00	0.00	0.00
67.52	20.12	6.39	1.57	10.96	2.00	0.00	0.00	0.00
67.59	20.37	6.48	1.65	11.07	2.00	0.00	0.00	0.00
67.67	20.61	6.58	1.73	11.25	2.00	0.00	0.00	0.00
67.72	20.72	6.61	1.84	11.30	2.00	0.00	0.00	0.00
67.80	20.71	6.60	1.98	11.06	2.00	0.00	0.00	0.00
67.87	20.54	6.53	2.18	11.00	2.00	0.00	0.00	0.00
67.94	20.38	6.46	2.38	10.75	2.00	0.00	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
67.99	20.21	6.39	2.60	10.63	2.00	0.00	0.00	0.00
68.05	20.24	6.39	2.76	10.62	2.00	0.00	0.00	0.00
68.14	20.44	6.47	2.82	10.79	2.00	0.00	0.00	0.00
68.18	20.62	6.53	2.84	11.04	2.00	0.00	0.00	0.00
68.24	20.60	6.52	2.84	11.03	2.00	0.00	0.00	0.00
68.32	20.32	6.40	2.92	10.78	2.00	0.00	0.00	0.00
68.38	20.04	6.29	3.05	10.60	2.00	0.00	0.00	0.00
68.45	19.89	6.22	3.20	10.48	2.00	0.00	0.00	0.00
68.52	19.90	6.22	3.34	10.47	2.00	0.00	0.00	0.00
68.58	20.05	6.27	3.49	10.47	2.00	0.00	0.00	0.00
68.64	20.50	6.45	3.69	10.64	2.00	0.00	0.00	0.00
68.72	21.19	6.71	3.92	11.24	2.00	0.00	0.00	0.00
68.78	22.84	7.36	3.99	11.65	2.00	0.00	0.00	0.00
68.83	26.31	8.71	3.74	13.52	2.00	0.00	0.00	0.00
68.92	29.84	10.09	3.51	17.37	2.00	0.00	0.00	0.00
68.97	32.18	11.01	3.53	18.11	2.00	0.00	0.00	0.00
69.05	32.32	11.05	3.91	17.98	2.00	0.00	0.00	0.00
69.11	31.90	10.88	4.50	17.85	2.00	0.00	0.00	0.00
69.17	33.10	11.34	4.89	17.28	2.00	0.00	0.00	0.00
69.25	35.73	12.36	4.95	19.89	2.00	0.00	0.00	0.00
69.29	41.01	14.42	4.61	22.41	2.00	3.08	0.00	0.00
69.37	45.79	16.28	4.17	27.16	2.00	7.08	0.00	0.00
69.42	50.12	17.96	3.88	29.48	2.00	10.32	0.00	0.00
69.51	52.04	18.69	3.83	31.45	2.00	11.64	0.00	0.00
69.56	53.51	19.25	3.92	31.42	2.00	12.61	0.00	0.00
69.65	54.72	19.70	3.95	32.48	2.00	13.37	0.00	0.00
69.70	56.36	20.32	3.91	33.72	2.00	14.40	0.00	0.00
69.77	55.94	20.14	4.03	34.64	2.00	14.11	0.00	0.00
69.82	51.82	18.52	4.44	31.81	2.00	11.34	0.00	0.00
69.92	45.70	16.12	5.06	25.90	2.00	6.75	0.00	0.00
69.96	40.23	13.98	5.66	22.88	2.00	2.06	0.00	0.00
70.02	38.50	13.30	5.68	21.04	2.00	0.40	0.00	0.00
70.09	36.83	12.64	5.61	22.48	2.00	0.00	0.00	0.00
70.16	34.40	11.68	5.56	19.58	2.00	0.00	0.00	0.00
70.22	30.02	9.98	5.74	16.60	2.00	0.00	0.00	0.00
70.29	26.59	8.64	5.66	14.29	2.00	0.00	0.00	0.00
70.35	24.09	7.66	5.39	13.26	2.00	0.00	0.00	0.00
70.41	22.39	7.00	5.07	11.99	2.00	0.00	0.00	0.00
70.50	21.01	6.46	4.93	11.10	2.00	0.00	0.00	0.00
70.55	20.08	6.09	4.89	10.62	2.00	0.00	0.00	0.00
70.60	19.48	5.86	4.99	10.15	2.00	0.00	0.00	0.00
70.68	19.24	5.76	5.08	9.79	2.00	0.00	0.00	0.00
70.74	19.81	5.98	5.14	9.96	2.00	0.00	0.00	0.00
70.82	21.11	6.47	5.18	10.90	2.00	0.00	0.00	0.00
70.88	22.99	7.18	5.27	11.90	2.00	0.00	0.00	0.00
70.94	25.57	8.17	5.33	13.15	2.00	0.00	0.00	0.00
71.03	28.30	9.21	5.36	15.49	2.00	0.00	0.00	0.00
71.08	31.20	10.32	5.25	16.88	2.00	0.00	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
71.13	33.90	11.34	4.69	18.53	2.00	0.00	0.00	0.00
71.20	36.55	12.35	3.63	20.63	2.00	0.00	0.00	0.00
71.28	38.52	13.09	2.84	21.98	2.00	0.00	0.00	0.00
71.33	38.85	13.21	2.52	22.40	2.00	0.18	0.00	0.00
71.43	37.94	12.84	2.78	21.46	2.00	0.00	0.00	0.00
71.47	36.12	12.14	3.08	20.41	2.00	0.00	0.00	0.00
71.53	34.08	11.35	3.61	19.10	2.00	0.00	0.00	0.00
71.61	33.54	11.13	4.16	17.49	2.00	0.00	0.00	0.00
71.66	32.49	10.73	4.86	19.18	2.00	0.00	0.00	0.00
71.72	33.62	11.15	4.95	16.87	2.00	0.00	0.00	0.00
71.80	37.93	12.78	4.32	19.25	2.00	0.00	0.00	0.00
71.86	47.12	16.27	3.31	26.76	2.00	7.06	0.00	0.00
71.93	57.62	20.24	2.61	33.97	2.00	14.28	0.00	0.00
72.00	63.49	22.61	2.39	39.81	2.00	17.92	0.00	0.00
72.05	63.88	22.66	2.49	38.93	2.00	18.01	0.00	0.00
72.14	60.87	21.42	2.78	35.43	2.00	16.14	0.00	0.00
72.19	59.43	20.86	3.01	34.06	2.00	15.27	0.00	0.00
72.25	64.01	22.58	2.89	36.06	2.00	17.88	0.00	0.00
72.33	73.26	26.50	2.64	44.43	2.00	23.17	0.00	0.00
72.39	85.53	32.12	2.48	117.92	2.00	29.52	0.00	0.00
72.47	94.62	36.22	2.46	128.33	2.00	33.48	0.00	0.00
72.53	100.83	39.00	2.47	130.71	2.00	35.92	0.00	0.00
72.58	105.26	41.18	2.38	133.02	2.00	37.72	0.00	0.00
72.64	110.97	44.29	2.17	137.98	2.00	40.12	0.00	0.00
72.71	118.37	48.44	1.91	142.14	2.00	43.08	0.00	0.00
72.77	124.47	52.20	1.65	146.90	2.00	45.54	0.00	0.00
72.85	127.47	54.21	1.49	147.32	2.00	46.79	0.00	0.00
72.91	125.80	53.55	1.44	144.65	2.00	46.39	0.00	0.00
72.97	118.51	49.52	1.53	141.94	2.00	43.80	0.00	0.00
73.05	109.08	44.38	1.68	131.81	2.00	40.19	0.00	0.00
73.10	99.43	38.91	2.03	127.12	2.00	35.85	0.00	0.00
73.19	91.88	34.46	2.54	123.92	2.00	31.84	0.00	0.00
73.25	85.26	30.66	3.24	52.27	2.00	27.98	0.00	0.00
73.30	80.84	28.56	3.81	48.20	2.00	25.64	0.00	0.00
73.39	78.95	27.82	4.14	48.38	2.00	24.77	0.00	0.00
73.44	79.13	27.87	4.23	48.37	2.00	24.83	0.00	0.00
73.50	89.89	31.97	3.73	48.43	2.00	29.36	0.00	0.00
73.58	109.16	41.11	3.08	141.50	2.00	37.66	0.00	0.00
73.64	134.90	53.91	2.55	162.12	2.00	46.61	0.00	0.00
73.69	154.42	63.81	2.31	178.17	2.00	52.17	0.00	0.00
73.78	165.89	69.55	2.22	189.65	2.00	55.02	0.00	0.00
73.83	170.05	71.53	2.22	190.47	2.00	55.94	0.00	0.00
73.89	167.39	69.87	2.30	189.31	2.00	55.17	0.00	0.00
73.97	161.83	66.60	2.45	183.80	2.00	53.58	0.00	0.00
74.04	154.16	62.23	2.67	178.65	2.00	51.34	0.00	0.00
74.09	143.93	56.51	3.02	172.57	2.00	48.16	0.00	0.00
74.17	133.39	50.82	3.45	159.82	2.00	44.66	0.00	0.00
74.23	122.69	45.31	3.94	153.57	2.00	40.87	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
74.28	113.10	40.69	4.32	73.08	2.00	37.32	0.00	0.00
74.37	105.86	37.40	4.50	64.48	2.00	34.54	0.00	0.00
74.43	104.09	36.81	4.31	63.63	2.00	34.01	0.00	0.00
74.50	109.39	39.52	3.86	68.82	2.00	36.36	0.00	0.00
74.56	117.27	43.42	3.46	148.09	2.00	39.46	0.00	0.00
74.62	126.53	47.88	3.20	153.08	2.00	42.69	0.00	0.00
74.69	132.81	50.90	3.05	163.42	2.00	44.71	0.00	0.00
74.76	135.89	52.51	2.92	163.38	2.00	45.74	0.00	0.00
74.81	131.68	50.72	2.85	160.55	2.00	44.59	0.00	0.00
74.89	124.30	47.28	2.88	151.02	2.00	42.27	0.00	0.00
74.95	114.17	42.37	3.09	143.99	2.00	38.66	0.00	0.00
75.01	104.64	37.74	3.42	134.66	2.00	34.83	0.00	0.00
75.09	97.57	34.39	3.67	58.88	2.00	31.77	0.00	0.00
75.14	91.68	31.81	3.83	57.92	2.00	29.19	0.00	0.00
75.22	86.83	30.00	3.93	52.52	2.00	27.27	0.00	0.00
75.27	80.45	27.66	4.07	48.77	2.00	24.58	0.00	0.00
75.33	74.92	25.62	4.15	44.72	2.00	22.06	0.00	0.00
75.40	68.39	23.22	4.28	41.28	2.00	18.81	0.00	0.00
75.47	60.51	20.34	4.61	35.72	2.00	14.43	0.00	0.00
75.53	52.33	17.35	5.24	29.34	2.00	9.18	0.00	0.00
75.59	48.14	15.81	5.74	25.54	2.00	6.12	0.00	0.00
75.66	56.24	18.74	4.97	27.65	2.00	11.72	0.00	0.00
75.73	76.38	26.02	3.67	44.97	2.00	22.56	0.00	0.00
75.80	102.83	37.53	2.71	134.13	2.00	34.65	0.00	0.00
75.85	126.17	49.14	2.17	150.81	2.00	43.55	0.00	0.00
75.94	140.74	56.73	1.90	163.98	2.00	48.29	0.00	0.00
76.00	146.95	60.19	1.76	165.04	2.00	50.24	0.00	0.00
76.06	145.81	59.80	1.70	161.92	2.00	50.03	0.00	0.00
76.13	141.47	57.71	1.69	158.16	2.00	48.86	0.00	0.00
76.19	134.27	53.99	1.75	154.39	2.00	46.65	0.00	0.00
76.26	123.50	48.30	1.93	146.75	2.00	42.98	0.00	0.00
76.31	108.42	40.51	2.26	136.03	2.00	37.18	0.00	0.00
76.38	89.66	31.49	2.76	122.15	2.00	28.86	0.00	0.00
76.45	70.57	23.69	3.38	40.33	2.00	19.47	0.00	0.00
76.53	55.22	18.15	4.06	29.99	2.00	10.68	0.00	0.00
76.58	44.62	14.34	4.65	25.30	2.00	2.89	0.00	0.00
76.66	37.75	11.86	5.11	20.39	2.00	0.00	0.00	0.00
76.73	32.34	9.91	5.50	17.45	2.00	0.00	0.00	0.00
76.77	28.96	8.69	5.60	15.56	2.00	0.00	0.00	0.00
76.84	26.65	7.86	5.51	14.39	2.00	0.00	0.00	0.00
76.92	25.06	7.28	5.20	13.39	2.00	0.00	0.00	0.00
76.97	23.94	6.88	4.72	12.76	2.00	0.00	0.00	0.00
77.07	23.40	6.68	4.31	12.40	2.00	0.00	0.00	0.00
77.11	23.10	6.57	4.04	12.40	2.00	0.00	0.00	0.00
77.19	22.77	6.44	4.12	12.17	2.00	0.00	0.00	0.00
77.25	22.28	6.26	4.33	11.76	2.00	0.00	0.00	0.00
77.30	22.35	6.28	4.71	11.48	2.00	0.00	0.00	0.00
77.37	23.41	6.65	5.20	11.70	2.00	0.00	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
77.46	25.43	7.36	5.30	12.89	2.00	0.00	0.00	0.00
77.51	28.62	8.49	4.85	14.21	2.00	0.00	0.00	0.00
77.57	33.64	10.27	3.94	16.95	2.00	0.00	0.00	0.00
77.63	42.55	13.43	3.03	21.46	2.00	0.73	0.00	0.00
77.71	50.71	16.31	2.64	30.05	2.00	7.15	0.00	0.00
77.77	54.39	17.60	2.68	32.09	2.00	9.66	0.00	0.00
77.83	51.15	16.44	3.19	28.80	2.00	7.42	0.00	0.00
77.91	45.53	14.44	3.94	24.79	2.00	3.12	0.00	0.00
77.96	41.05	12.84	4.66	21.98	2.00	0.00	0.00	0.00
78.05	40.36	12.58	4.82	20.58	2.00	0.00	0.00	0.00
78.10	44.96	14.20	4.36	23.30	2.00	2.57	0.00	0.00
78.16	56.44	18.24	3.48	29.99	2.00	10.85	0.00	0.00
78.23	67.91	22.27	2.99	41.83	2.00	17.43	0.00	0.00
78.30	74.19	24.47	2.82	45.04	2.00	20.54	0.00	0.00
78.36	69.93	22.95	3.13	42.40	2.00	18.42	0.00	0.00
78.45	61.33	19.90	3.67	33.95	2.00	13.71	0.00	0.00
78.50	51.85	16.55	4.38	28.79	2.00	7.63	0.00	0.00
78.55	44.45	13.94	4.99	24.51	2.00	1.97	0.00	0.00
78.61	38.53	11.85	5.47	20.32	2.00	0.00	0.00	0.00
78.69	34.34	10.37	5.76	18.00	2.00	0.00	0.00	0.00
78.74	31.17	9.25	5.85	16.94	2.00	0.00	0.00	0.00
78.84	28.82	8.42	5.89	14.61	2.00	0.00	0.00	0.00
78.89	27.13	7.82	5.76	13.69	2.00	0.00	0.00	0.00
78.94	27.02	7.77	5.19	13.68	2.00	0.00	0.00	0.00
79.01	27.86	8.06	4.68	14.08	2.00	0.00	0.00	0.00
79.08	29.42	8.60	4.35	14.82	2.00	0.00	0.00	0.00
79.14	31.72	9.39	4.39	16.08	2.00	0.00	0.00	0.00
79.23	33.92	10.15	4.37	17.82	2.00	0.00	0.00	0.00
79.27	36.20	10.94	4.37	18.47	2.00	0.00	0.00	0.00
79.35	37.20	11.28	4.43	20.23	2.00	0.00	0.00	0.00
79.41	37.18	11.26	4.59	19.87	2.00	0.00	0.00	0.00
79.47	35.68	10.73	4.87	18.74	2.00	0.00	0.00	0.00
79.56	34.15	10.19	5.12	17.61	2.00	0.00	0.00	0.00
79.61	33.30	9.89	5.29	17.08	2.00	0.00	0.00	0.00
79.67	33.07	9.80	5.43	17.07	2.00	0.00	0.00	0.00
79.73	33.51	9.95	5.48	17.07	2.00	0.00	0.00	0.00
79.80	34.55	10.30	5.35	17.70	2.00	0.00	0.00	0.00
79.89	35.03	10.45	5.15	18.75	2.00	0.00	0.00	0.00
79.94	33.88	10.05	5.17	17.92	2.00	0.00	0.00	0.00
80.00	32.93	9.71	5.21	15.83	2.00	0.00	0.00	0.00
80.05	32.08	9.41	5.32	17.21	2.00	0.00	0.00	0.00
80.13	32.32	9.48	5.20	16.45	2.00	0.00	0.00	0.00
80.21	32.20	9.43	5.02	16.20	2.00	0.00	0.00	0.00
80.27	33.97	10.04	4.52	16.90	2.00	0.00	0.00	0.00
80.32	39.14	11.81	3.95	19.35	2.00	0.00	0.00	0.00
80.38	50.11	15.59	3.44	25.06	2.00	5.65	0.00	0.00
80.48	59.25	18.72	3.30	36.91	2.00	11.69	0.00	0.00
80.52	62.29	19.76	3.47	36.45	2.00	13.48	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
80.58	55.62	17.45	4.04	31.31	2.00	9.37	0.00	0.00
80.66	47.48	14.63	4.82	24.93	2.00	3.56	0.00	0.00
80.71	41.24	12.48	5.54	21.55	2.00	0.00	0.00	0.00
80.79	39.39	11.83	5.76	20.11	2.00	0.00	0.00	0.00
80.85	36.96	10.99	6.07	21.71	2.00	0.00	0.00	0.00
80.91	38.10	11.37	5.82	17.35	2.00	0.00	0.00	0.00
80.99	43.95	13.36	5.00	21.86	2.00	0.56	0.00	0.00
81.05	63.01	19.88	3.44	31.91	2.00	13.68	0.00	0.00
81.14	81.84	26.47	2.60	52.71	2.00	23.13	0.00	0.00
81.19	96.94	33.32	2.14	123.58	2.00	30.73	0.00	0.00
81.24	104.01	36.62	1.98	127.33	2.00	33.84	0.00	0.00
81.30	111.65	40.25	1.85	133.34	2.00	36.96	0.00	0.00
81.38	119.03	43.71	1.75	140.08	2.00	39.68	0.00	0.00
81.44	125.29	46.65	1.69	143.25	2.00	41.83	0.00	0.00
81.50	129.85	48.78	1.66	146.85	2.00	43.31	0.00	0.00
81.58	133.52	50.52	1.62	149.46	2.00	44.46	0.00	0.00
81.64	135.94	51.74	1.58	150.68	2.00	45.25	0.00	0.00
81.71	136.51	52.04	1.56	151.42	2.00	45.44	0.00	0.00
81.76	135.12	51.30	1.58	150.23	2.00	44.97	0.00	0.00
81.83	129.30	48.18	1.70	149.02	2.00	42.90	0.00	0.00
81.92	120.91	43.91	1.85	140.06	2.00	39.84	0.00	0.00
81.97	110.45	38.92	2.00	133.47	2.00	35.85	0.00	0.00
82.03	100.46	34.52	2.07	125.99	2.00	31.90	0.00	0.00
82.10	91.32	30.48	2.19	117.92	2.00	27.79	0.00	0.00
82.16	83.22	27.04	2.28	113.01	2.00	23.83	0.00	0.00
82.22	75.74	23.90	2.70	43.88	2.00	19.76	0.00	0.00
82.29	70.48	22.10	3.28	38.18	2.00	17.18	0.00	0.00
82.36	67.50	21.08	3.98	38.10	2.00	15.62	0.00	0.00
82.43	67.45	21.04	4.15	38.09	2.00	15.56	0.00	0.00
82.49	80.53	25.44	3.51	37.85	2.00	21.82	0.00	0.00
82.56	120.29	41.94	2.34	129.66	2.00	38.32	0.00	0.00
82.63	176.72	69.27	1.68	193.48	2.00	54.88	0.00	0.00
82.69	230.64	97.16	1.39	220.35	2.00	66.05	0.00	0.00
82.75	267.60	116.33	1.31	232.29	2.00	71.99	0.00	0.00
82.84	294.67	130.36	1.29	245.16	2.00	75.75	0.00	0.00
82.89	314.58	140.62	1.28	254.24	2.00	78.25	0.00	0.00
82.96	326.49	146.16	1.31	260.70	2.00	79.53	0.00	0.00
83.01	330.76	146.94	1.40	271.70	2.00	79.70	0.00	0.00
83.10	329.99	144.93	1.50	279.29	2.00	79.25	0.00	0.00
83.15	323.93	140.23	1.63	286.59	2.00	78.16	0.00	0.00
83.21	315.29	134.60	1.73	286.85	2.00	76.81	0.00	0.00
83.28	303.74	127.75	1.83	286.15	2.00	75.08	0.00	0.00
83.35	291.22	120.73	1.93	280.96	2.00	73.22	0.00	0.00
83.43	279.03	114.13	2.01	274.11	2.00	71.36	0.00	0.00
83.49	268.49	108.54	2.07	269.61	2.00	69.70	0.00	0.00
83.54	258.59	103.39	2.14	265.13	2.00	68.10	0.00	0.00
83.62	249.30	98.61	2.20	257.29	2.00	66.54	0.00	0.00
83.67	240.62	94.27	2.25	252.02	2.00	65.05	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
83.73	232.71	90.36	2.29	245.79	2.00	63.66	0.00	0.00
83.80	225.27	86.70	2.33	236.93	2.00	62.29	0.00	0.00
83.86	217.90	83.10	2.38	231.76	2.00	60.89	0.00	0.00
83.94	212.18	80.36	2.40	225.48	2.00	59.78	0.00	0.00
83.99	207.16	78.20	2.37	220.92	2.00	58.88	0.00	0.00
84.08	203.93	76.94	2.32	216.20	2.00	58.35	0.00	0.00
84.13	201.71	76.11	2.27	214.63	2.00	57.99	0.00	0.00
84.20	200.53	75.49	2.28	213.26	2.00	57.72	0.00	0.00
84.26	199.49	74.79	2.32	212.88	2.00	57.41	0.00	0.00
84.32	198.62	74.15	2.36	212.62	2.00	57.13	0.00	0.00
84.40	197.45	73.35	2.41	212.21	2.00	56.77	0.00	0.00
84.47	196.52	72.71	2.45	210.78	2.00	56.48	0.00	0.00
84.54	196.51	72.51	2.47	210.93	2.00	56.39	0.00	0.00
84.59	195.13	71.68	2.52	213.51	2.00	56.01	0.00	0.00
84.66	194.09	71.02	2.55	207.52	2.00	55.70	0.00	0.00
84.73	191.60	69.69	2.60	209.23	2.00	55.08	0.00	0.00
84.78	190.79	69.21	2.62	206.72	2.00	54.85	0.00	0.00
84.85	189.92	68.73	2.64	206.01	2.00	54.62	0.00	0.00
84.91	189.58	68.57	2.62	206.69	2.00	54.54	0.00	0.00
84.97	189.79	68.70	2.59	205.41	2.00	54.61	0.00	0.00
85.05	189.76	68.67	2.58	206.14	2.00	54.59	0.00	0.00
85.11	189.79	68.64	2.58	206.04	2.00	54.58	0.00	0.00
85.18	189.43	68.33	2.60	205.49	2.00	54.43	0.00	0.00
85.24	187.88	67.50	2.63	205.46	2.00	54.03	0.00	0.00
85.31	186.84	66.89	2.66	201.95	2.00	53.73	0.00	0.00
85.37	185.44	66.14	2.69	203.16	2.00	53.36	0.00	0.00
85.44	184.68	65.67	2.71	201.75	2.00	53.12	0.00	0.00
85.50	182.39	64.53	2.75	200.48	2.00	52.54	0.00	0.00
85.58	180.34	63.58	2.76	196.74	2.00	52.05	0.00	0.00
85.63	178.36	62.75	2.74	195.97	2.00	51.62	0.00	0.00
85.70	176.51	62.01	2.71	194.44	2.00	51.23	0.00	0.00
85.78	173.61	60.77	2.70	191.14	2.00	50.56	0.00	0.00
85.83	169.98	59.20	2.71	187.41	2.00	49.70	0.00	0.00
85.90	163.69	56.31	2.77	184.59	2.00	48.04	0.00	0.00
85.97	157.02	53.41	2.82	173.86	2.00	46.30	0.00	0.00
86.04	149.27	50.02	2.91	169.85	2.00	44.13	0.00	0.00
86.09	141.48	46.60	3.03	164.14	2.00	41.80	0.00	0.00
86.16	133.64	43.19	3.19	154.06	2.00	39.29	0.00	0.00
86.23	139.64	45.77	3.04	148.09	2.00	41.20	0.00	0.00
86.32	154.97	52.53	2.74	179.67	2.00	45.75	0.00	0.00
86.36	174.14	61.27	2.47	193.06	2.00	50.83	0.00	0.00
86.42	198.40	72.72	2.18	193.59	2.00	56.49	0.00	0.00
86.49	226.64	86.52	1.92	238.54	2.00	62.22	0.00	0.00
86.56	262.71	105.05	1.65	252.51	2.00	68.63	0.00	0.00
86.64	286.43	119.14	1.38	256.50	2.00	72.78	0.00	0.00
86.69	305.24	134.53	0.99	208.78	2.00	76.79	0.00	0.00
86.76	316.41	147.81	0.67	215.03	2.00	79.90	0.00	0.00
86.82	326.07	158.96	0.50	221.55	2.00	82.30	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
86.88	333.28	161.31	0.54	229.63	2.00	82.78	0.00	0.00
86.94	332.80	159.44	0.58	235.81	2.00	82.40	0.00	0.00
87.01	339.60	162.68	0.60	219.99	2.00	83.06	0.00	0.00
87.08	343.94	165.71	0.58	249.71	2.00	83.67	0.00	0.00
87.15	357.27	172.93	0.59	248.62	2.00	85.08	0.00	0.00
87.22	357.62	171.78	0.62	258.19	2.00	84.86	0.00	0.00
87.28	354.60	168.99	0.65	250.62	2.00	84.32	0.00	0.00
87.34	344.76	163.37	0.65	239.40	2.00	83.20	0.00	0.00
87.41	337.99	159.35	0.65	229.77	2.00	82.38	0.00	0.00
87.50	330.42	154.11	0.68	230.15	2.00	81.27	0.00	0.00
87.55	324.49	148.89	0.75	217.02	2.00	80.14	0.00	0.00
87.61	318.09	143.31	0.83	212.42	2.00	78.88	0.00	0.00
87.67	319.97	142.73	0.89	211.57	2.00	78.74	0.00	0.00
87.74	324.47	144.51	0.91	222.36	2.00	79.15	0.00	0.00
87.80	324.68	144.54	0.91	225.33	2.00	79.16	0.00	0.00
87.88	319.20	141.54	0.91	212.15	2.00	78.47	0.00	0.00
87.93	310.60	136.86	0.92	207.58	2.00	77.36	0.00	0.00
87.99	306.16	134.53	0.91	202.22	2.00	76.79	0.00	0.00
88.08	304.02	133.63	0.90	200.52	2.00	76.57	0.00	0.00
88.14	303.42	133.70	0.88	200.82	2.00	76.59	0.00	0.00
88.20	303.09	133.79	0.86	198.29	2.00	76.61	0.00	0.00
88.26	308.65	138.59	0.77	197.44	2.00	77.77	0.00	0.00
88.34	320.61	148.51	0.64	215.61	2.00	80.05	0.00	0.00
88.40	337.61	161.77	0.53	232.58	2.00	82.88	0.00	0.00
88.46	355.42	174.87	0.46	247.11	2.00	85.45	0.00	0.00
88.53	374.16	188.64	0.41	264.51	2.00	87.95	0.00	0.00
88.60	389.44	200.68	0.36	278.87	2.00	89.99	0.00	0.00
88.65	409.65	215.23	0.33	281.83	2.00	92.30	0.00	0.00
88.72	427.65	226.43	0.33	307.24	2.00	93.97	0.00	0.00
88.78	450.28	241.08	0.33	316.89	2.00	96.04	0.00	0.00
88.85	452.78	239.76	0.36	329.66	2.00	95.86	0.00	0.00
88.92	450.76	234.51	0.41	312.42	2.00	95.13	0.00	0.00
88.99	442.72	225.54	0.47	312.43	2.00	93.85	0.00	0.00
89.06	441.52	222.67	0.50	312.44	2.00	93.42	0.00	0.00
89.11	439.96	219.81	0.53	309.68	2.00	93.00	0.00	0.00
89.18	432.79	212.10	0.60	308.98	2.00	91.82	0.00	0.00
89.26	425.02	203.74	0.68	297.09	2.00	90.49	0.00	0.00
89.32	414.86	194.40	0.77	293.05	2.00	88.94	0.00	0.00
89.37	409.25	189.09	0.83	287.31	2.00	88.03	0.00	0.00
89.45	404.48	185.09	0.87	285.03	2.00	87.32	0.00	0.00
89.50	406.08	185.76	0.87	282.78	2.00	87.44	0.00	0.00
89.59	408.41	187.38	0.86	290.47	2.00	87.73	0.00	0.00
89.65	413.67	191.27	0.82	289.78	2.00	88.40	0.00	0.00
89.71	415.62	193.78	0.78	293.71	2.00	88.83	0.00	0.00
89.78	417.00	196.39	0.72	294.43	2.00	89.28	0.00	0.00
89.84	418.54	199.18	0.67	292.53	2.00	89.74	0.00	0.00
89.90	421.46	205.63	0.57	296.82	2.00	90.79	0.00	0.00
89.99	424.51	212.63	0.47	300.44	2.00	91.90	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
90.03	429.10	219.93	0.40	298.77	2.00	93.01	0.00	0.00
90.09	433.90	218.21	0.46	306.33	2.00	92.75	0.00	0.00
90.18	440.94	217.07	0.55	310.37	2.00	92.58	0.00	0.00
90.23	447.30	217.89	0.60	313.45	2.00	92.71	0.00	0.00
90.29	456.55	223.21	0.60	319.57	2.00	93.50	0.00	0.00
90.36	469.77	229.83	0.62	329.74	2.00	94.47	0.00	0.00
90.43	475.17	230.80	0.65	341.18	2.00	94.61	0.00	0.00
90.49	476.29	229.32	0.69	330.78	2.00	94.39	0.00	0.00
90.56	466.47	222.63	0.71	331.89	2.00	93.42	0.00	0.00
90.62	473.90	227.15	0.70	320.27	2.00	94.08	0.00	0.00
90.69	490.40	238.42	0.66	346.23	2.00	95.68	0.00	0.00
90.75	500.96	246.96	0.62	366.52	2.00	96.84	0.00	0.00
90.83	494.69	244.50	0.59	342.33	2.00	96.51	0.00	0.00
90.88	479.04	236.41	0.57	332.86	2.00	95.40	0.00	0.00
90.96	473.56	234.54	0.55	333.34	2.00	95.14	0.00	0.00
91.02	471.67	234.20	0.53	330.60	2.00	95.09	0.00	0.00
91.09	467.40	232.15	0.52	328.69	2.00	94.80	0.00	0.00
91.16	462.21	230.82	0.49	324.17	2.00	94.61	0.00	0.00
91.22	456.69	231.48	0.43	319.50	2.00	94.70	0.00	0.00
91.27	453.86	232.94	0.39	316.91	2.00	94.91	0.00	0.00
91.36	452.55	232.70	0.38	318.04	2.00	94.88	0.00	0.00
91.42	451.74	230.59	0.40	316.57	2.00	94.58	0.00	0.00
91.47	449.19	226.61	0.43	315.04	2.00	94.00	0.00	0.00
91.54	435.97	215.76	0.48	312.51	2.00	92.38	0.00	0.00
91.61	426.11	206.60	0.53	288.61	2.00	90.95	0.00	0.00
91.67	416.56	198.71	0.58	294.14	2.00	89.66	0.00	0.00
91.74	419.12	198.71	0.61	292.25	2.00	89.67	0.00	0.00
91.81	420.54	198.40	0.63	293.82	2.00	89.61	0.00	0.00
91.87	423.54	198.06	0.67	296.95	2.00	89.56	0.00	0.00
91.96	423.01	195.58	0.72	298.36	2.00	89.14	0.00	0.00
92.00	422.04	193.45	0.76	292.53	2.00	88.78	0.00	0.00
92.06	420.44	191.76	0.78	294.74	2.00	88.49	0.00	0.00
92.14	422.70	192.76	0.78	294.82	2.00	88.66	0.00	0.00
92.20	424.08	193.47	0.78	297.09	2.00	88.78	0.00	0.00
92.26	426.27	194.77	0.77	297.47	2.00	89.00	0.00	0.00
92.33	424.73	193.54	0.78	299.24	2.00	88.79	0.00	0.00
92.40	421.50	190.99	0.80	293.68	2.00	88.36	0.00	0.00
92.47	415.17	186.31	0.83	290.51	2.00	87.54	0.00	0.00
92.54	412.23	183.84	0.85	285.80	2.00	87.10	0.00	0.00
92.59	408.43	180.63	0.89	287.38	2.00	86.52	0.00	0.00
92.67	405.00	177.31	0.94	282.37	2.00	85.90	0.00	0.00
92.73	401.39	173.48	1.00	278.45	2.00	85.18	0.00	0.00
92.79	390.73	165.78	1.09	280.06	2.00	83.69	0.00	0.00
92.85	386.57	161.88	1.17	263.53	2.00	82.90	0.00	0.00
92.92	380.66	157.16	1.25	281.93	2.00	81.92	0.00	0.00
92.99	381.90	156.62	1.30	284.57	2.00	81.81	0.00	0.00
93.06	379.21	154.25	1.36	286.22	2.00	81.31	0.00	0.00
93.11	377.12	152.51	1.39	292.56	2.00	80.93	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
93.19	375.47	151.21	1.42	294.39	2.00	80.65	0.00	0.00
93.25	372.38	149.24	1.44	293.88	2.00	80.21	0.00	0.00
93.32	368.54	146.91	1.46	296.17	2.00	79.70	0.00	0.00
93.39	364.73	144.64	1.49	296.84	2.00	79.18	0.00	0.00
93.45	361.03	142.64	1.50	295.08	2.00	78.72	0.00	0.00
93.51	357.55	140.96	1.50	294.65	2.00	78.33	0.00	0.00
93.58	353.62	139.11	1.49	293.22	2.00	77.89	0.00	0.00
93.65	348.94	136.83	1.49	289.62	2.00	77.35	0.00	0.00
93.71	343.79	134.32	1.50	288.46	2.00	76.74	0.00	0.00
93.77	340.28	132.64	1.49	285.92	2.00	76.32	0.00	0.00
93.83	337.02	131.17	1.48	284.95	2.00	75.96	0.00	0.00
93.91	330.28	127.88	1.49	284.99	2.00	75.12	0.00	0.00
93.97	324.66	125.14	1.50	275.62	2.00	74.40	0.00	0.00
94.03	319.58	122.47	1.52	279.80	2.00	73.69	0.00	0.00
94.10	319.48	122.13	1.53	279.33	2.00	73.60	0.00	0.00
94.16	318.34	121.17	1.56	281.39	2.00	73.34	0.00	0.00
94.24	315.61	119.42	1.60	282.80	2.00	72.86	0.00	0.00
94.31	311.94	117.32	1.63	280.13	2.00	72.27	0.00	0.00
94.37	309.48	115.96	1.64	279.24	2.00	71.89	0.00	0.00
94.44	309.07	117.83	1.46	271.03	2.00	72.42	0.00	0.00
94.50	302.98	120.40	1.09	233.44	2.00	73.13	0.00	0.00
94.56	300.19	126.29	0.72	179.64	2.00	74.70	0.00	0.00
94.63	297.70	128.77	0.58	190.86	2.00	75.35	0.00	0.00
94.69	303.42	128.86	0.68	191.27	2.00	75.37	0.00	0.00
94.76	303.32	126.01	0.79	195.75	2.00	74.63	0.00	0.00
94.82	302.94	123.19	0.91	198.54	2.00	73.88	0.00	0.00
94.89	301.92	120.33	1.03	216.83	2.00	73.11	0.00	0.00
94.95	303.02	118.61	1.16	239.21	2.00	72.63	0.00	0.00
95.01	304.67	117.43	1.29	255.56	2.00	72.30	0.00	0.00
95.08	305.61	116.17	1.40	265.20	2.00	71.95	0.00	0.00
95.15	306.19	115.06	1.51	271.96	2.00	71.63	0.00	0.00
95.21	306.19	113.92	1.60	276.52	2.00	71.30	0.00	0.00
95.28	305.74	112.62	1.69	280.45	2.00	70.92	0.00	0.00
95.34	305.52	111.57	1.77	283.28	2.00	70.61	0.00	0.00
95.41	305.09	110.66	1.83	285.95	2.00	70.34	0.00	0.00
95.47	305.14	110.13	1.88	286.64	2.00	70.18	0.00	0.00
95.54	304.69	109.55	1.91	288.35	2.00	70.01	0.00	0.00
95.61	304.66	109.27	1.93	287.96	2.00	69.93	0.00	0.00
95.67	299.88	106.92	1.96	289.77	2.00	69.21	0.00	0.00
95.73	296.35	105.26	1.97	279.43	2.00	68.69	0.00	0.00
95.81	291.23	102.83	1.99	283.01	2.00	67.92	0.00	0.00
95.87	290.33	102.39	1.99	279.28	2.00	67.78	0.00	0.00
95.95	288.51	101.44	2.00	279.13	2.00	67.47	0.00	0.00
96.00	286.96	100.63	2.01	279.60	2.00	67.21	0.00	0.00
96.08	285.17	99.64	2.03	277.12	2.00	66.88	0.00	0.00
96.13	283.05	98.52	2.05	276.63	2.00	66.51	0.00	0.00
96.21	281.67	97.72	2.07	276.23	2.00	66.24	0.00	0.00
96.27	280.16	96.87	2.09	275.57	2.00	65.95	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
96.34	276.25	96.43	1.93	271.11	2.00	65.80	0.00	0.00
96.40	271.34	99.08	1.41	245.27	2.00	66.69	0.00	0.00
96.46	264.94	102.47	0.93	192.11	2.00	67.80	0.00	0.00
96.53	259.08	104.21	0.68	154.28	2.00	68.36	0.00	0.00
96.60	253.49	98.41	0.84	174.18	2.00	66.47	0.00	0.00
96.66	250.17	94.42	1.00	194.99	2.00	65.11	0.00	0.00
96.72	247.88	90.97	1.18	215.76	2.00	63.88	0.00	0.00
96.80	248.17	89.05	1.37	224.25	2.00	63.17	0.00	0.00
96.86	250.24	88.13	1.55	237.13	2.00	62.83	0.00	0.00
96.92	255.81	89.25	1.69	247.42	2.00	63.24	0.00	0.00
97.00	261.23	90.61	1.78	256.72	2.00	63.75	0.00	0.00
97.07	266.04	92.08	1.84	260.25	2.00	64.28	0.00	0.00
97.12	269.94	93.77	1.82	262.45	2.00	64.88	0.00	0.00
97.19	272.97	96.70	1.62	259.54	2.00	65.89	0.00	0.00
97.25	274.32	99.83	1.37	246.89	2.00	66.95	0.00	0.00
97.31	272.91	103.78	1.02	209.29	2.00	68.22	0.00	0.00
97.39	272.18	105.76	0.87	182.58	2.00	68.85	0.00	0.00
97.44	273.97	106.29	0.89	186.40	2.00	69.01	0.00	0.00
97.53	279.56	105.57	1.08	219.66	2.00	68.79	0.00	0.00
97.58	284.20	104.59	1.30	249.83	2.00	68.48	0.00	0.00
97.65	287.00	103.57	1.49	260.94	2.00	68.16	0.00	0.00
97.71	287.78	101.74	1.69	269.64	2.00	67.57	0.00	0.00
97.78	288.43	100.45	1.84	275.46	2.00	67.15	0.00	0.00
97.84	288.71	99.44	1.96	278.36	2.00	66.82	0.00	0.00
97.92	288.21	98.53	2.04	279.95	2.00	66.51	0.00	0.00
97.97	288.41	98.18	2.09	279.96	2.00	66.39	0.00	0.00
98.03	289.79	98.49	2.11	281.76	2.00	66.50	0.00	0.00
98.11	291.55	98.99	2.12	284.60	2.00	66.66	0.00	0.00
98.17	292.39	98.98	2.16	285.15	2.00	66.66	0.00	0.00
98.23	291.76	98.55	2.17	284.79	2.00	66.52	0.00	0.00
98.31	291.02	99.12	2.04	281.41	2.00	66.71	0.00	0.00
98.37	289.94	102.19	1.65	270.03	2.00	67.72	0.00	0.00
98.43	289.10	107.65	1.16	233.92	2.00	69.43	0.00	0.00
98.52	277.48	107.16	0.86	194.81	2.00	69.28	0.00	0.00
98.56	273.24	105.48	0.84	164.45	2.00	68.76	0.00	0.00
98.64	269.27	101.24	0.97	207.94	2.00	67.41	0.00	0.00
98.69	273.27	100.74	1.12	226.19	2.00	67.24	0.00	0.00
98.79	264.14	94.33	1.31	238.54	2.00	65.07	0.00	0.00
98.83	258.32	89.83	1.50	230.92	2.00	63.46	0.00	0.00
98.89	256.72	87.72	1.65	249.61	2.00	62.67	0.00	0.00
98.95	260.93	88.35	1.78	256.73	2.00	62.91	0.00	0.00
99.02	262.35	87.84	1.91	257.96	2.00	62.72	0.00	0.00
99.11	262.89	87.31	1.99	261.17	2.00	62.52	0.00	0.00
99.16	264.20	87.40	2.05	263.01	2.00	62.56	0.00	0.00
99.22	264.84	87.47	2.06	263.78	2.00	62.58	0.00	0.00
99.29	266.32	88.02	2.06	263.38	2.00	62.79	0.00	0.00
99.36	268.75	89.02	2.04	265.95	2.00	63.16	0.00	0.00
99.41	273.87	91.15	2.02	267.77	2.00	63.94	0.00	0.00

:: Lateral displacement index calculation ::

Depth (ft)	q_t (tsf)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (in)
99.48	278.96	93.14	2.01	273.59	2.00	64.65	0.00	0.00
99.55	283.64	94.89	2.02	276.10	2.00	65.27	0.00	0.00
99.61	284.32	94.84	2.05	278.54	2.00	65.25	0.00	0.00
99.67	285.57	95.04	2.07	275.54	2.00	65.32	0.00	0.00
99.76	286.21	95.05	2.09	280.36	2.00	65.32	0.00	0.00
99.81	288.97	102.80	1.39	257.10	2.00	67.91	0.00	0.00
99.87	291.36	115.60	0.69	175.42	2.00	71.78	0.00	0.00
99.95	294.56	80.37	0.00	201.76	2.00	59.79	0.00	0.00
100.02	295.31	80.55	0.00	203.75	2.00	59.86	0.00	0.00
100.07	296.69	80.92	0.00	200.28	2.00	60.01	0.00	0.00
100.16	297.23	81.05	0.00	204.55	2.00	60.06	0.00	0.00
100.20	299.45	81.65	0.00	204.82	2.00	60.31	0.00	0.00

Total estimated displacement: 5.99

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

Ninyo & Moore

A SOCOTEC COMPANY

475 Goddard, Suite 200 | Irvine, California 92618 | p. 949.753.7070

www.ninyoandmoore.com

ATTACHMENT D

APPENDIX B

TRAFFIC CONTROL PLANS

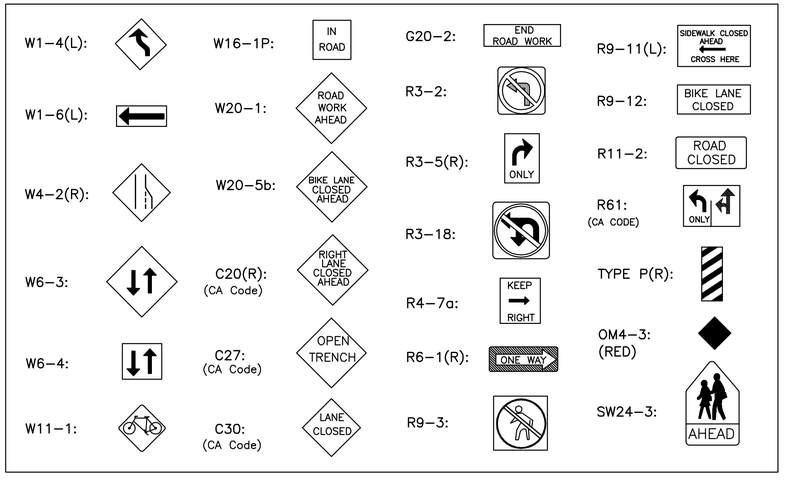
TRAFFIC CONTROL NOTES

1. Temporary traffic control during construction shall conform to the latest edition of the CA MUTCD (California Manual for Traffic Control Devices) and the requirements of the City/Caltrans Traffic Engineer.
2. A traffic control plan shall be submitted for approval prior to construction for work affecting arterial streets. The plan shall detail lane lines, islands and medians, street intersections and driveways. A licensed civil or traffic engineer may be required to sign the plans as directed by the City/Caltrans Traffic Engineer.
3. The contractor shall be responsible for protection of traffic signal detector loops. Notify Caltrans & the City of Garden Grove Traffic Engineering Division at (714) 741–5189 5 working days in advance prior to excavating within 600 feet of a signalized intersection.
4. All traffic control devices shall remain in effect during construction.
5. A Caltrans Type I flashing arrow board is required for each lane closure on an arterial street.
6. All damaged raised pavement markers, traffic striping, legends, or traffic loops shall be replaced to the satisfaction of the City/Caltrans Traffic Engineer.
7. Working hours where a lane closure involves an arterial type street will be limited to the hours between 9:00 a.m. and 3:30 p.m. or as modified by the City/Caltrans Traffic Engineer.
8. Maximum spacing of delineators in a taper area shall be 25 feet. Maximum spacing of delineators in a tangent area shall be 35 feet.
9. All businesses and property owners affected by work shall be notified at least 24 hours prior to start of construction. Access to businesses and residences shall be maintained at all times.
10. Failure to adhere to working hours or traffic control requirements shall result in suspension of work until adequate arrangements can be made to ensure public safety and convenience meeting the approval of the City/Caltrans Traffic Engineer.
11. All traffic control devices shall be removed from the street when not in use or upon completion of daily construction.
12. Access to all driveways, streets, and left turns shall be accessible during non–work hours and areas where there is no active construction activity. The contractor shall accommodate all business and residential driveways during construction whenever possible.
13. Contractor shall provide minimum one thru–lane and one left turn lane at all times. Any exception shall be approved by the City/Caltrans Traffic Engineer.
14. Flaggers to direct and assist pedestrians around work area.
15. Contractor shall notify school administration at least 72 hours prior to start of construction at 714–663–6185.
16. Orange County Transportation Authority (OCTA) bus stop impacted notification is required at 714–560–6282 at least 36 hours prior to construction and must be acknowledged by OCTA dispatch.
17. Contractor shall cover existing signs that conflict with temporary traffic control and remove covers when temporary traffic control is removed.
18. No parking signs will go out a minimum of 72 hours in advance to comply with city rules and regulations.
19. Contractor shall replace/repair all damaged striping with temporary striping or raised pavement markers at end of each working day.
20. Contractor shall comply with the requirements of the American Disability Act Accessibility Guidelines and with the California Accessibility Guidelines as related to pedestrian access and shall maintain pedestrian access at all times per ADA requirements. Sidewalk closure/detour shall comply with the CA MUTCD standards.
21. Contractor shall post "symbol" UNEVEN LANES" (W8–11), "STEEL PLATES AHEAD" (W8–24) or "Bump" (W8–1) signs, for pavement surface disruptions of 1/2 in. or greater. Pavement disruptions of 1 in. or greater shall have beveled edge of four(4) horizontal to one(1) vertical along the shoulder and min. ten (10) horizontal to one (1) vertical within vehicular travel way. All ramp transition shall be approved by City/Caltrans Traffic Engineer.
22. Contractor shall install "CAUTION STEEL PLATES AHEAD" (W8–24) and/or "ROUGH ROAD" (W8–8) signs in advance of steel plate bridging.
23. When work requires the use of steel plates, they shall be of the non–skid type, recessed to be flush with the pavement surface, pinned to be secured in place and installed in accordance with Caltrans standards. Advance warning signs shall be implemented for the entire duration of time the steel plates are in place.
24. All signs, delineators, barricades, etc. and their installation shall conform to the State of California Standard Specifications latest edition, the California Manual on Uniform Traffic Control Devices (CA MUTCD) latest edition and the Work Area Traffic Control Handbook (WATCH, latest Edition). All traffic control devices shall be in new or like new condition throughout the life of the project.
25. All traffic control devices, stripes, markings, legends and raised pavement markers shall conform to California MUTCD, Caltrans Standard Plans, and Standard Specifications (most recent edition).
26. All traffic control devices shall be kept in their proper position at all times, and shall be repaired, replaced, or cleaned as necessary to preserve their appearance and continuity.
27. Contractor shall provide flaggers as deemed necessary by Engineer. Flagger's training and operation shall comply with the latest edition of WATCH and CA MUTCD.

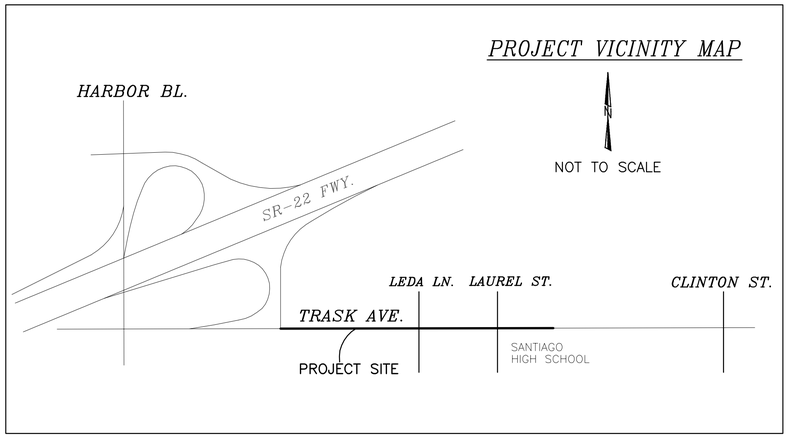
TRAFFIC REQUIREMENTS:

Working Hours : to be approved by City of Garden Grove and Caltrans.
State lane closure hours are Monday through Friday 9PM–5AM

NEW SIGNS:



PROJECT VICINITY MAP



SIGNS: (ALL NEW SIGNS SHALL BE RETROREFLECTORIZED AND OF STANDARD SIZE. WORK AREA WARNING SIGNS SHALL BE ORANGE SIGN FACE.)

C20(L/R)	LEFT/RIGHT LANE CLOSED AHEAD (CA Code)
C20(BIKE)	BIKE LANE CLOSED AHEAD (CA Code)
C27	OPEN TRENCH (CA Code)
C30	LANE CLOSED (CA Code)
W1–4(L/R)	REVERSE CURVE SIGN (LEFT/RIGHT)
W1–6	ONE–DIRECTIONAL LARGE ARROW SIGN
W4–2	LANE ENDS SIGN
W6–3	TWO–WAY TRAFFIC (IN ORANGE)
W6–4	OPPOSING TRAFFIC LANE DIVIDER SIGN (IN ORANGE) (CONE SIGN)
W11–1	BICYCLE SYMBOL SIGN
W16–1P	IN ROAD SIGN
W16–7P	SUPPLEMENTAL ARROW PLAQUE
W20–1	ROAD WORK AHEAD
W20–5b	BIKE LANE CLOSED AHEAD
W74(L/R)	THRU TRAFFIC MERGE LEFT/RIGHT (CA Code)
R1–2	YIELD
R1–5	YIELD HERE TO PED SIGN
R2–1	SPEED LIMIT SIGN
R3–2	NO LEFT TURN
R3–4	NO U–TURN
R3–5(L/R)	MANDATORY MOVEMENT LANE CONTROL (L/R)
R3–7	RIGHT LANE MUST TURN RIGHT
R3–18	NO LEFT/U TURN
R4–7a	KEEP RIGHT
R5–1	DO NOT ENTER
R5–1a	WRONG WAY
R6–1	ONE WAY
R9–3	NO PEDESTRIAN CROSSING SIGN
R9–11	SIDEWALK CLOSED AHEAD CROSS HERE
R9–12	BIKE LANE CLOSED
R11–12	ROAD CLOSED
R49	NO PED CROSSING, USE CROSSWALK (CA Code)
R61	LANE–USE CONTROL SIGN (CA Code)
S1–1	ADVANCE SCHOOL SYMBOL SIGN
S5–2	END SCHOOL ZONE
SW24–3	SCHOOL XING WITH CROSSWALK LINES WHEN CHILDREN ARE PRESENT
Assembly C	SCHOOL SPEED LIMIT(25)
OM4–3	OBJECT MARKERS
OM–3L	TYPE 3 OBJECT MARKER
G20–2	END ROAD WORK

REGISTERED PROFESSIONAL ENGINEER
DAVID KUAN
NO. 1429
Exp. 12–31–26
TRAFFIC
STATE OF CALIFORNIA

TRASK AVE/TRASK AVE MICRO TUNNELING

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447–6077

DAVID KUAN, P.E. #1429 5/26/2026
DAVID KUAN, P.E. R.T.E. No. DATE

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

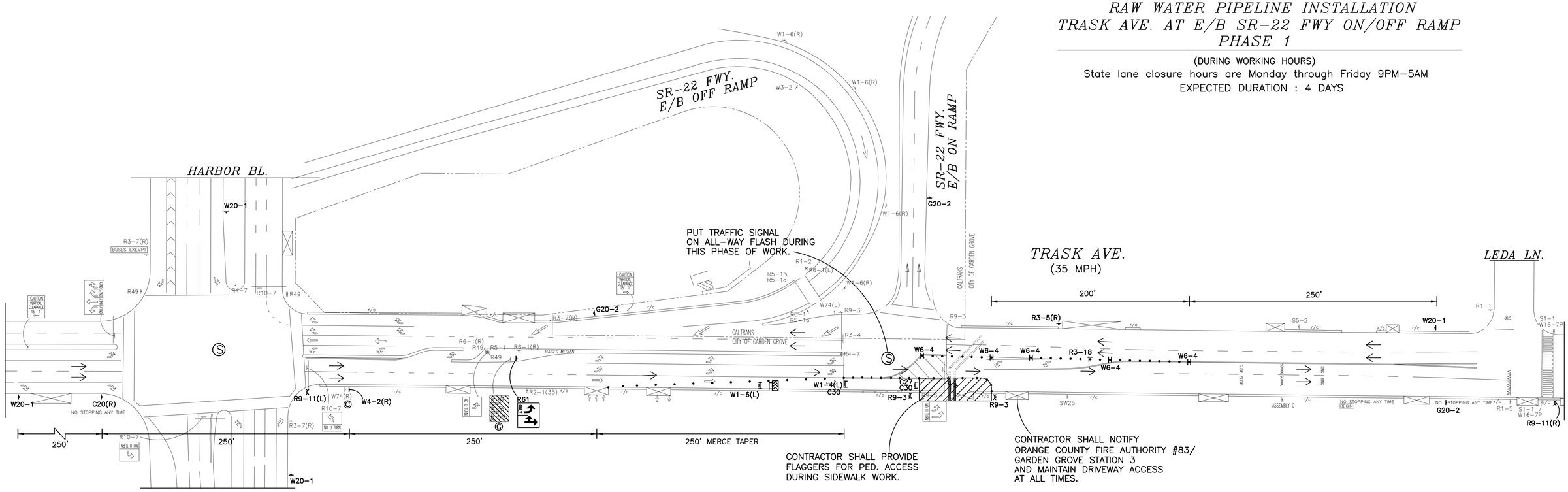
TRAFFIC CONTROL PLAN

WELL 26
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP

DATE:	MARCH 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2026-1
DRAWING NUMBER:	TC001

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP
PHASE 1

(DURING WORKING HOURS)
State lane closure hours are Monday through Friday 9PM–5AM
EXPECTED DURATION : 4 DAYS



CONTRACTOR SHALL PROVIDE FLAGGERS FOR PED. ACCESS DURING SIDEWALK WORK.

CONTRACTOR SHALL NOTIFY ORANGE COUNTY FIRE AUTHORITY #83/ GARDEN GROVE STATION 3 AND MAINTAIN DRIVEWAY ACCESS AT ALL TIMES.

ORANGE COUNTY FIRE AUTHORITY #83
GARDEN GROVE STATION 3

The signal at Trask Ave and SR-22 EB on ramp is owned, operated, and maintained by the State. All controller-related actions must be handled by Caltrans District Maintenance or Electrical Traffic Operations staff. The applicant is required to contact Caltrans in advance to arrange and perform any all-way flash operation or signal modification. Caltrans District Maintenance or Electrical Traffic Operations staff shall be contacted for the all-way flash operation.

NEW SIGNS:

W1-4(L): W1-6(L): W4-2(R): W6-3: W6-4: W11-1:
W16-1P: IN ROAD
W20-1: ROAD WORK AHEAD
W20-5b: BIKE LANE CLOSED AHEAD
C20(R): (CA Code) RIGHT LANE CLOSED AHEAD
C27: (CA Code) OPEN TRENCH
C30: (CA Code) LANE CLOSED
G20-2: END ROAD WORK
R3-2:
R3-5(R): ONLY
R3-18:
R4-7a: KEEP RIGHT
R6-1(R): ONE WAY
R9-3:
R9-11(L): SIDEWALK CLOSED AHEAD CROSS HERE
R9-12: BIKE LANE CLOSED
R11-2: ROAD CLOSED
R61: (CA CODE) ONLY
TYPE P(R):
OM4-3: (RED)
SW24-3: AHEAD

LEGEND:

- : EXISTING SIGN
- : NEW SIGN
- : TYPE TWO BARRICADE
- : TYPE THREE BARRICADE
- : DELINEATOR/CONE WITH REFLECTIVE TAPE
- : ARROW BOARD
- (S) : SIGNALIZED INTERSECTION
- : DIRECTION OF TRAVEL
- (B) : CLOSE BUS STOP
- (C) : COVER EX. CONFLICTING SIGN DURING CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
DAVID KUAN
NO. 1429
Exp. 12-31-26
TRAFFIC
STATE OF CALIFORNIA

GRAPHIC SCALE 1" = 50'

TRASK AVE/TRASK AVE MICRO TUNNELING

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447-6077

DAVID KUAN, P.E. #1429 R.T.E. No. 5/26/2026 DATE

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

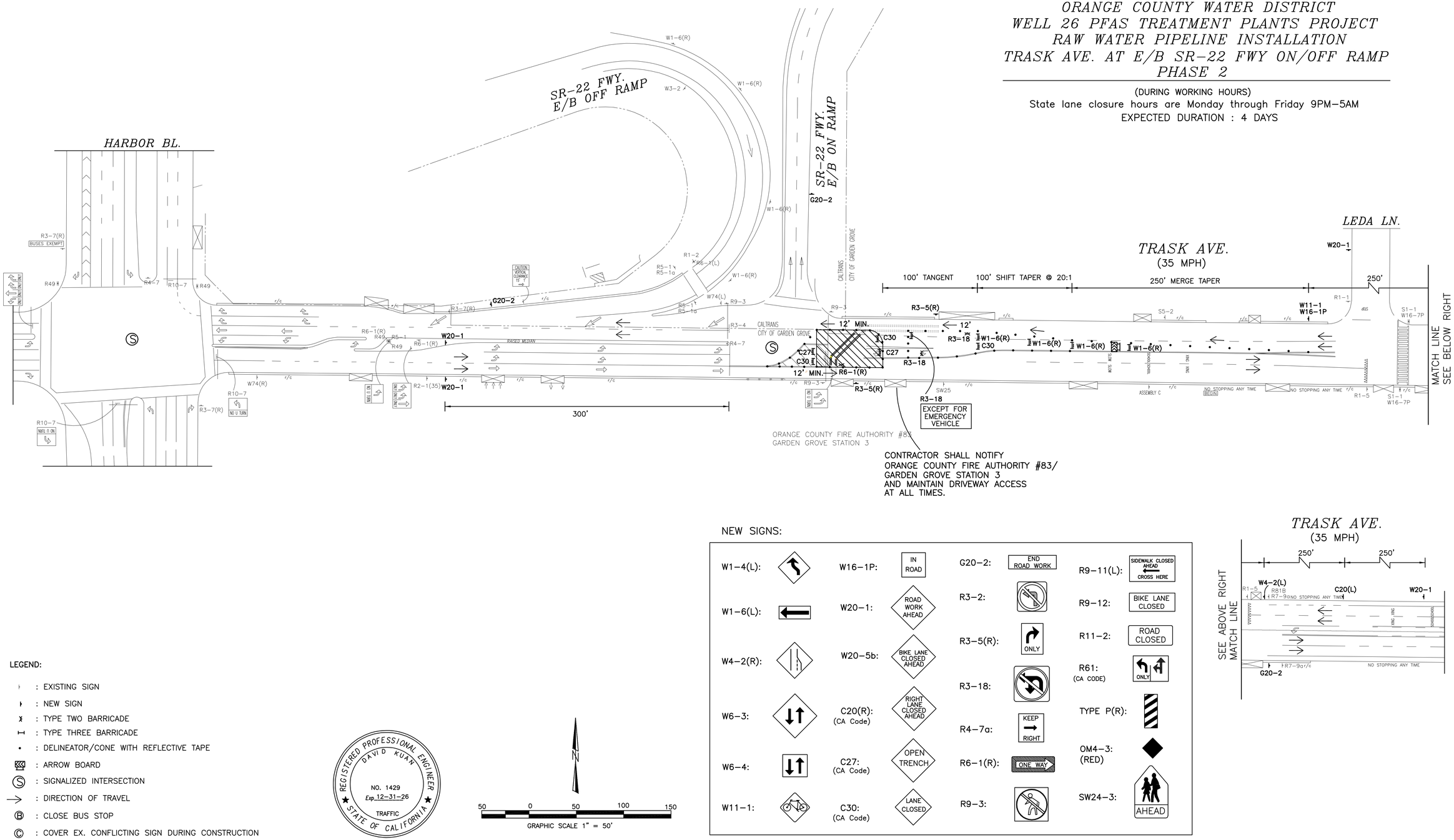
TRAFFIC CONTROL PLAN

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP

DATE: MARCH 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2026-1
DRAWING NUMBER: TC002

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP
PHASE 2

(DURING WORKING HOURS)
State lane closure hours are Monday through Friday 9PM–5AM
EXPECTED DURATION : 4 DAYS



LEGEND:

- : EXISTING SIGN
- : NEW SIGN
- : TYPE TWO BARRICADE
- : TYPE THREE BARRICADE
- : DELINEATOR/CONE WITH REFLECTIVE TAPE
- : ARROW BOARD
- Ⓢ : SIGNALIZED INTERSECTION
- → : DIRECTION OF TRAVEL
- Ⓑ : CLOSE BUS STOP
- Ⓒ : COVER EX. CONFLICTING SIGN DURING CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
DAVID KUAN
NO. 1429
Exp. 12-31-26
TRAFFIC
STATE OF CALIFORNIA

N

50 0 50 100 150
GRAPHIC SCALE 1" = 50'

NEW SIGNS:

W1-4(L):	W16-1P: IN ROAD	G20-2: END ROAD WORK	R9-11(L): SIDEWALK CLOSED AHEAD ← CROSS HERE		
W1-6(L):	W20-1: ROAD WORK AHEAD	R3-2:	R9-12: BIKE LANE CLOSED		
W4-2(R):	W20-5b: BIKE LANE CLOSED AHEAD	R3-5(R): ONLY	R11-2: ROAD CLOSED		
W6-3:	C20(R): (CA Code) RIGHT LANE CLOSED AHEAD	R3-18:	R61: (CA CODE) ONLY		
W6-4:	C27: (CA Code) OPEN TRENCH	R4-7a: KEEP → RIGHT	TYPE P(R):		
W11-1:	C30: (CA Code) LANE CLOSED	R6-1(R): ONE WAY	OM4-3: (RED)		
		R9-3:	SW24-3: AHEAD		

TRASK AVE/TRASK AVE MICRO TUNNELING

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447-6077

DAVID KUAN, P.E. #1429 5/26/2026
R.T.E. No. DATE

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

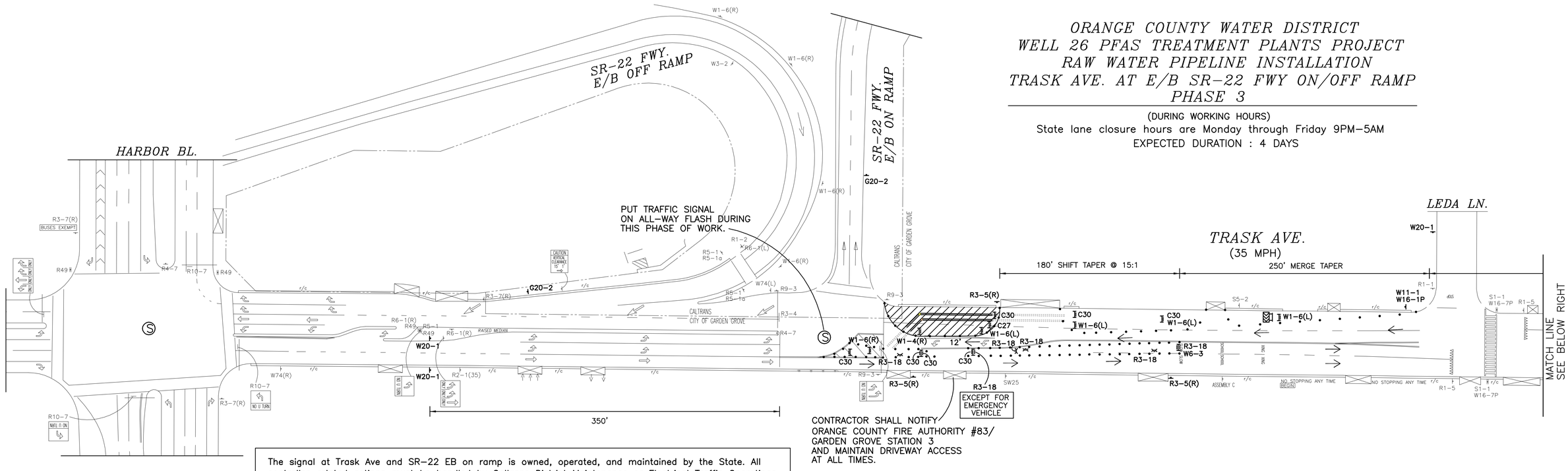
TRAFFIC CONTROL PLAN

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP

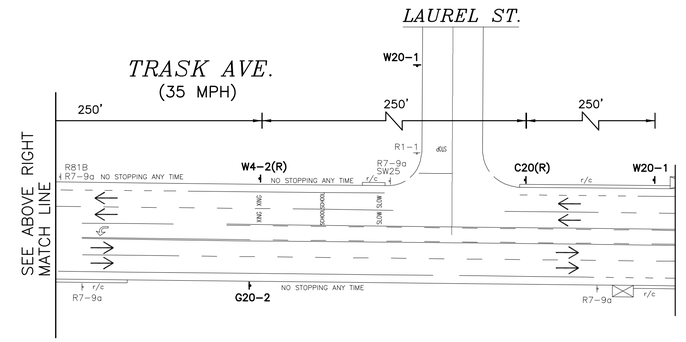
DATE:	MARCH 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2026-1
DRAWING NUMBER:	TC003

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP
PHASE 3

(DURING WORKING HOURS)
State lane closure hours are Monday through Friday 9PM–5AM
EXPECTED DURATION : 4 DAYS



The signal at Trask Ave and SR–22 EB on ramp is owned, operated, and maintained by the State. All controller–related actions must be handled by Caltrans District Maintenance or Electrical Traffic Operations staff. The applicant is required to contact Caltrans in advance to arrange and perform any all–way flash operation or signal modification. Caltrans District Maintenance or Electrical Traffic Operations staff shall be contacted for the all–way flash operation.



NEW SIGNS:

W1–4(L):	W16–1P: IN ROAD	G20–2: END ROAD WORK	R9–11(L): SIDEWALK CLOSED AHEAD CROSS HERE		
W1–6(L):	W20–1: ROAD WORK AHEAD	R3–2:	R9–12: BIKE LANE CLOSED		
W4–2(R):	W20–5b: BIKE LANE CLOSED AHEAD	R3–5(R): ONLY	R11–2: ROAD CLOSED		
W6–3:	C20(R): (CA Code) RIGHT LANE CLOSED AHEAD	R3–18:	R61: (CA CODE) ONLY		
W6–4:	C27: (CA Code) OPEN TRENCH	R4–7a: KEEP RIGHT	TYPE P(R):		
W11–1:	C30: (CA Code) LANE CLOSED	R6–1(R): ONE WAY	OM4–3: (RED)		
		R9–3:	SW24–3: AHEAD		

LEGEND:

- : EXISTING SIGN
- : NEW SIGN
- : TYPE TWO BARRICADE
- : TYPE THREE BARRICADE
- : DELINEATOR/CONE WITH REFLECTIVE TAPE
- : ARROW BOARD
- Ⓢ : SIGNALIZED INTERSECTION
- → : DIRECTION OF TRAVEL
- Ⓑ : CLOSE BUS STOP
- Ⓒ : COVER EX. CONFLICTING SIGN DURING CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER — DAVID KUAN — NO. 1429 — Exp 12-31-26 — TRAFFIC — STATE OF CALIFORNIA

GRAPHIC SCALE 1" = 50'

TRASK AVE/TRASK AVE MICRO TUNNELING

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447–6077

DAVID KUAN, P.E. #1429 R.T.E. No. 5/26/2026 DATE

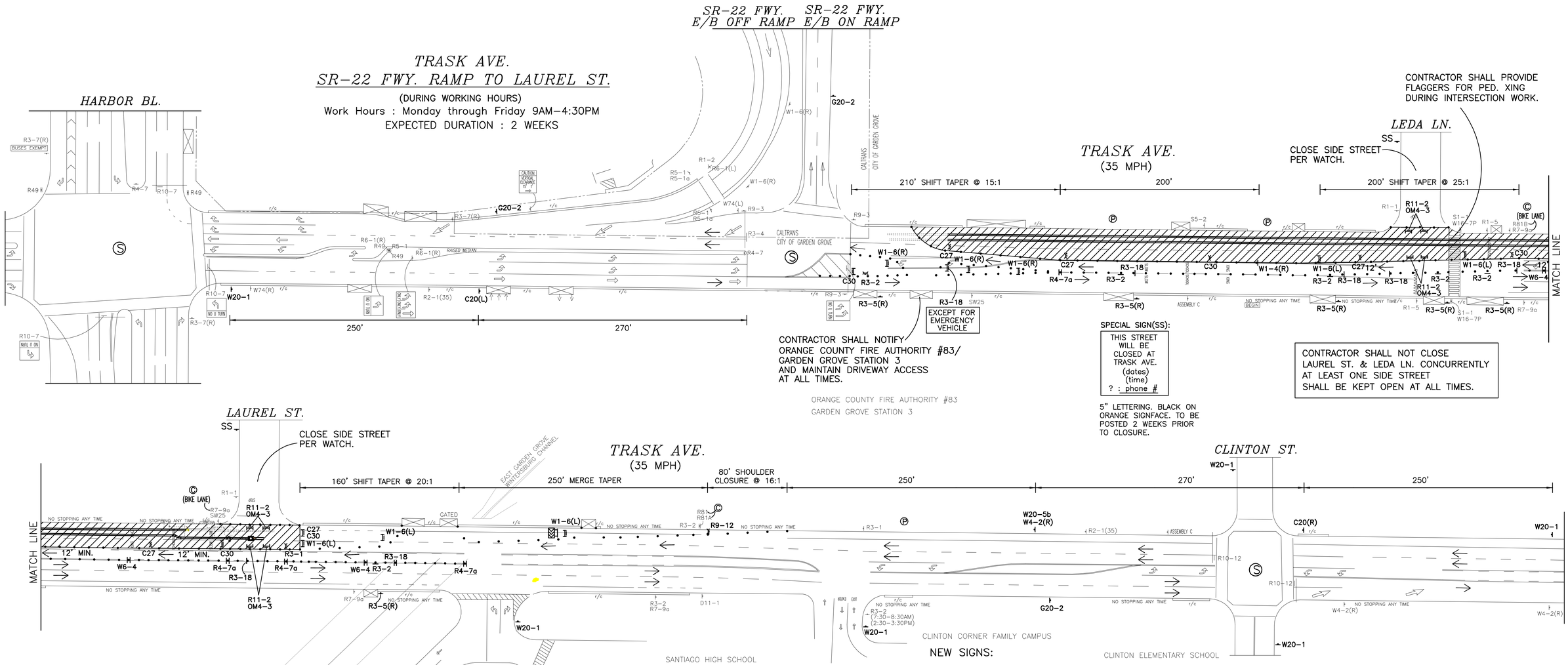
ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

TRAFFIC CONTROL PLAN

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
RAW WATER PIPELINE INSTALLATION
TRASK AVE. AT E/B SR-22 FWY ON/OFF RAMP

DATE:	MARCH 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2026-1
DRAWING NUMBER:	TC004



REGISTERED PROFESSIONAL ENGINEER
DAVID KUAN
NO. 1429
Exp. 12-31-26
TRAFFIC
STATE OF CALIFORNIA

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0, 1/2", 1")

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447-6077

DAVID KUAN, P.E. #1429 R.T.E. No. 5/26/2026 DATE

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

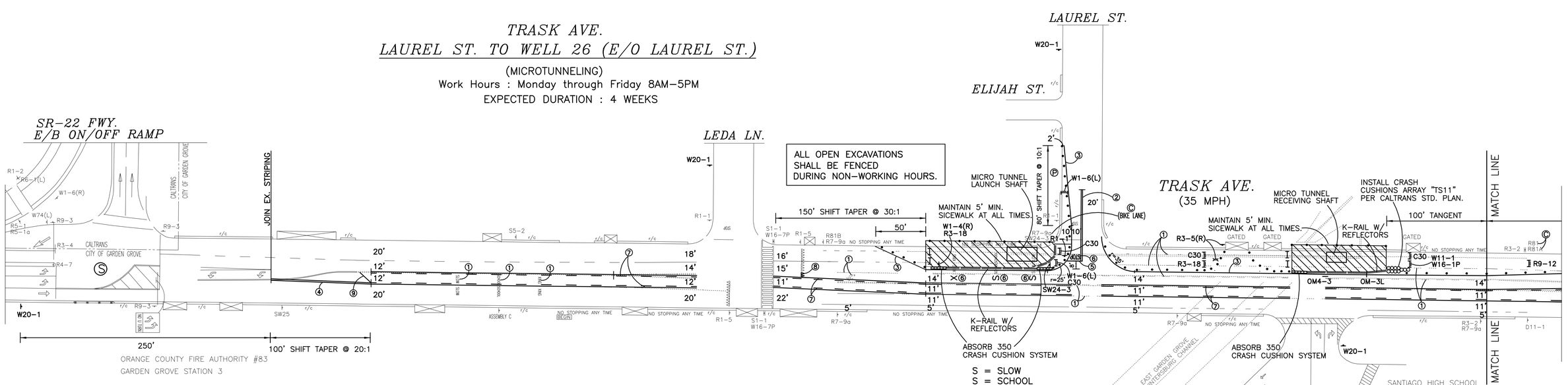
TRAFFIC CONTROL PLAN

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
TRASK AVE.
SR-22 FWY. RAMP TO LAUREL ST.

DATE:	MARCH 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2026-1
DRAWING NUMBER:	TC005

TRASK AVE.
LAUREL ST. TO WELL 26 (E/O LAUREL ST.)

(MICROTUNNELING)
Work Hours : Monday through Friday 8AM–5PM
EXPECTED DURATION : 4 WEEKS



NEW SIGNS:

W1–4(L):		W16–1P:	IN ROAD	G20–2:	END ROAD WORK	R9–11(L):	SIDEWALK CLOSED AHEAD ← CROSS HERE
W1–6(L):		W20–1:	ROAD WORK AHEAD	R3–2:		R9–12:	BIKE LANE CLOSED
W4–2(R):		W20–5b:	BIKE LANE CLOSED AHEAD	R3–5(R):	ONLY	R11–2:	ROAD CLOSED
W6–3:		C20(R): (CA Code)	RIGHT LANE CLOSED AHEAD	R3–18:		R61: (CA CODE)	ONLY
W6–4:		C27: (CA Code)	OPEN TRENCH	R4–7a:	KEEP → RIGHT	TYPE P(R):	
W11–1:		C30: (CA Code)	LANE CLOSED	R6–1(R):	ONE WAY	OM4–3: (RED)	
				R9–3:		SW24–3:	AHEAD

LEGEND:

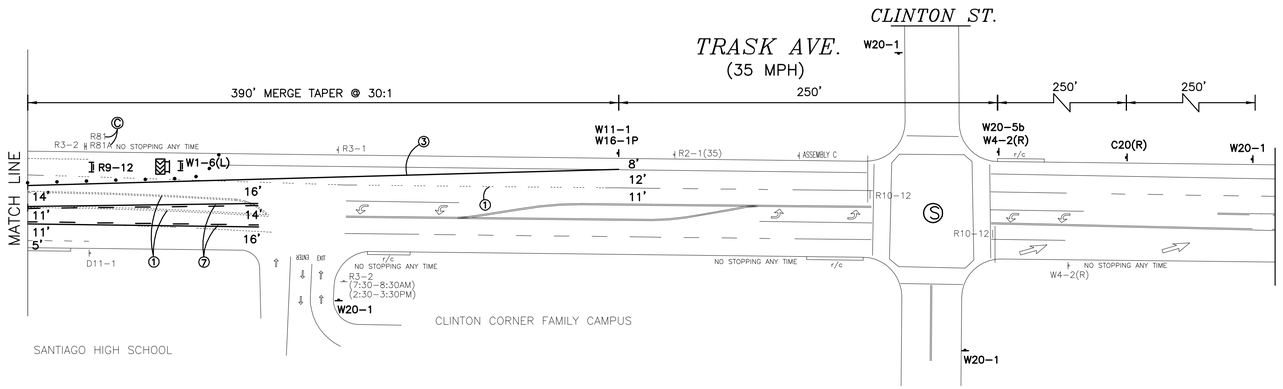
- : EXISTING SIGN
- : NEW SIGN
- : TYPE TWO BARRICADE
- : TYPE THREE BARRICADE
- : DELINEATOR/CONE WITH REFLECTIVE TAPE
- : ARROW BOARD
- Ⓢ : SIGNALIZED INTERSECTION
- : DIRECTION OF TRAVEL
- Ⓑ : CLOSE BUS STOP
- Ⓒ : COVER EX. CONFLICTING SIGN DURING CONSTRUCTION
- Ⓟ : POST NO STOPPING SIGNS
- : K–RAIL W/REFLECTORS
- : EXISTING STRIPING TO REMAIN
- : EXISTING STRIPING TO BE REMOVED.
- : PROPOSED STRIPING

CONSTRUCTION NOTES:

1. Remove existing conflicting striping.
2. Stripe double 6" yellow lines per Cal. Det. 22.
3. Stripe 6" white edge line per Cal. Det. 27B.
4. Stripe median island per Cal. Det. 29.
5. Stripe 12" white STOP bar per Cal. Std. Dwg. A–24.
6. Stripe pavement marking per Cal. Std. Dwg. A–24.
7. Stripe two–way left turn lane per Cal. Det. 32.
8. Stripe YIELD LINE pavement marking per Cal. Std. Plan A–24.
9. Stripe 12" yellow diagonal per Cal. Std. Plan A–24.

CONTRACTOR SHALL NOTIFY :
- o ORANGE COUNTY FIRE AUTHORITY #83/ GARDEN GROVE STATION 3
- o SANTIAGO HIGH SCHOOL,
- o CLINTON CORNER FAMILY CAMPUS,
- o CLINTON ELEMENTARY SCHOOL.

AT LEAST 2 WEEKS PRIOR TO CONSTRUCTION.



REGISTERED PROFESSIONAL ENGINEER
DAVID KUAN
NO. 1429
Exp. 12–31–26
TRAFFIC
STATE OF CALIFORNIA

GRAPHIC SCALE 1" = 50'

TRASK AVE/TRASK AVE MICRO TUNNELING

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	D. KUAN
DESIGNED BY:	D. K.
DRAWN BY:	F. L.
CHECKED BY:	D. K.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

Submitted By:
TRAFFIC CONTROL ENGINEERING, INC.
2687 SATURN ST.
BREA, CA 92821
(714) 447–6077

DAVID KUAN, P.E. #1429 R.T.E. No. 5/26/2026 DATE

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

TRAFFIC CONTROL PLAN

ORANGE COUNTY WATER DISTRICT
WELL 26 PFAS TREATMENT PLANTS PROJECT
TRASK AVE.
LAUREL ST. TO WELL 26 (E/O LAUREL ST.)

DATE:	MARCH 2026
HAZEN NO.:	20232–002
CONTRACT NO.:	GG–2026–1
DRAWING NUMBER:	TC006

ATTACHMENT E

GENERAL AND PIPELINE NOTES

1. THE CONTRACTOR SHALL NOTIFY THE WATER SERVICES DIVISION AT (714) 741-5349 AT LEAST TWO WORKING DAYS PRIOR TO CONSTRUCTION FOR WATERLINE INSPECTION.
2. NO TAPS TO EXISTING CITY WATER MAINS SHALL BE MADE WITHOUT THE PRESENCE OF AN AUTHORIZED CITY WATER INSPECTOR. IF ANY SUCH TAPS ARE MADE, THEY WILL BE EXCAVATED AND ANY ADJUSTMENTS AS WELL AS ALL COSTS OF EXCAVATION AND RE-SURFACING SHALL BE BORNE BY THE CONTRACTOR. CONTACT WATER SERVICES DIVISION AT (714) 741-5349 AT LEAST TWO WORKING DAYS PRIOR TO INSTALLATION.
3. TUNNELING OF CURBS, GUTTER SIDEWALKS, CROSS-GUTTERS AND OTHER STRUCTURES WHERE AN AIR VOID MAY BE CREATED WILL NOT BE PERMITTED. JACKING, PUSHING AND BORING ARE ACCEPTABLE. CONCRETE REPLACEMENT SHALL BE TO NEAREST CONSTRUCTION JOINT WITH SAW CUTTING (4 FEET MINIMUM & 10 FEET MAXIMUM LENGTH IN ANY SIDE OF CONCRETE PANEL).
4. ALL EXISTING HARDSCAPES AND LANDSCAPES (PUBLIC OR PRIVATE) SHALL BE PROTECTED IN PLACE, UNLESS OTHERWISE SPECIFIED. ANY DAMAGED HARDSCAPES AND LANDSCAPES DURING CONTRACTION, CONTRACTOR SHALL BE REMOVED AND REPLACED TO ORIGINAL OR BETTER CONDITION AT THE CONTRACTORS EXPENSE.
5. CONSTRUCTION WATER MAY BE TAKEN ONLY AT LOCATIONS APPROVED BY THE WATER SERVICES DIVISION. A CONSTRUCTION METER AND EDDY VALVE MUST BE INSTALLED AT THESE LOCATIONS BY THE CITY AT CONTRACTOR'S EXPENSE. THIS VALVE SHALL BE OPERATED WHEN TAKING CONSTRUCTION WATER WITH THE FIRE HYDRANT REMAINING OPEN DURING THE DAY. CONTRACTOR WILL BE CHARGED FOR CONSTRUCTION WATER ON AN AS-USED BASIS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BRINGING VALVE CANS TO GRADE AFTER FINAL PAVEMENT IS PLACED PER DETAILS B-752 AND B-753.
7. ALL WATERLINES SHALL BE REQUIRED TO PASS PRESSURE, LEAKAGE, AND BACTERIOLOGICAL TESTS PER THE STANDARD SPECIFICATIONS OF THE WATER SERVICES DIVISION PRIOR TO ACCEPTANCE. A TEMPORARY CONNECTION WILL BE REQUIRED TO FACILITATE THIS TESTING.
8. DISINFECTING OF ALL WATERLINES SHALL BE BY LIQUID CHLORINATING ONLY. METHOD FOR PRESSURE/LEAKAGE TESTING AND CHLORINATING NEW WATERLINE SHALL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE CITY WATER ENGINEER.
9. ALL WATERLINE TIE-INS SHALL BE MADE IN THE PRESENCE OF AN AUTHORIZED CITY WATER INSPECTOR. ALL CONNECTING PARTS SHALL BE SWABBED WITH A 5% CHLORINE SOLUTION. (NSF APPROVED).
10. ALL GATE VALVES SHALL BE AN APPROVED RESILIENT WEDGE (RW) TYPE, EPOXY LINED AND COATED.
11. THE LOCATION OF UTILITIES SHOWN HEREON IS APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION OF ALL UTILITIES (EXISTING AND ABANDONED) IN THE FIELD TWO WEEKS PRIOR TO CONSTRUCTION AND COORDINATE ALL PHASE OF CONSTRUCTION WITH THE VARIOUS UTILITY COMPANIES INVOLVED.
12. THE LOCATION OF EXISTING WATER SERVICES SHOWN HEREON IS APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION/DEPTH/SIZE/MATERIAL OF WATER SERVICES AT EXISTING/ABANDONED WATER MAINS AND EXISTING WATER METER BOXES IN THE FIELD ONE WEEK PRIOR TO CONSTRUCTION.
13. THE CONTRACTOR SHALL PROTECT ALL EXISTING AND ABANDONED UTILITIES IN PLACE, UNLESS OTHERWISE NOTED.
14. NO MECHANICAL EXCAVATION WITHIN TWO FEET (LATERALLY) OF A WATER MAIN WILL BE ALLOWED.
15. CONTRACTOR SHALL SCHEDULE WATER SHUT DOWN WITH THE CITY AND ALLOW A MINIMUM OF SEVEN (7) WORKING DAYS FOR THE CITY APPROVAL. A MINIMUM OF FORTY-EIGHT (48) HOURS NOTICE TO THE CUSTOMERS IS REQUIRED UPON CITY APPROVAL. WATER SHUT OFF TIME SHALL BE RESTRICTED BETWEEN 9:00 A.M. TO 3:00 P.M. FROM MONDAY TO THURSDAY ONLY AND SHALL NOT BE MORE TWO DAYS WITHIN SEVEN (7) CONSECUTIVE CALENDAR DAYS FOR THE SAME SHUT DOWN AREA. OTHER WATER SHUT OFF TIME SHALL BE REQUESTED AND APPROVED BY THE CITY WATER ENGINEER.
16. CONNECTIONS BETWEEN DIFFERENT PIPE CLASSES SHALL BE MADE WITH A CONNECTION RATED FOR THE HIGHER PRESSURE CLASS.
17. PIPE JOINTS SHALL BE FULLY RESTRAINED AS INDICATED ON DRAWINGS WITH MECHANICAL JOINT RESTRAINTS (MEGALUGS), BELL HARNESS ASSEMBLIES, OR APPROVED EQUAL. THRUST BLOCKS SHALL ONLY BE USED WHERE SHOWN ON DRAWINGS AND/OR WITH APPROVAL FROM THE ENGINEER.
18. HYDROTESTING OF INSTALLED PIPE SHALL BE PERFORMED IN ACCORDANCE WITH THE INDUSTRY STANDARDS, IN PARTICULAR, ASTM F2164 AND AWWA C605 FOR PVC PIPE, AND ASTM A530/530M FOR CARBON STEEL PIPE.
19. THE CONTRACTOR SHALL NOTIFY ENGINEER ABOUT THE TESTING SCHEDULE.
20. HYDROSTATIC PRESSURE TESTING WATER SHALL BE DISPOSED OF VIA DISCHARGE TO SURFACE DRAINAGE. HYDROSTATIC TEST PRESSURE SHALL BE CALCULATED FOR EACH SECTION OF PIPE BEING TESTED BASED ON 1.5X OPERATING PRESSURE AS SHOWN ON SPECIFIC PIPE SCHEDULES.
21. HORIZONTAL AND VERTICAL DEFLECTIONS OF THE PIPE SHALL BE OBTAINED BY DEFLECTION OF JOINTS, FABRICATED FITTINGS, OR A COMBINATION OF BOTH. JOINT DEFLECTIONS SHALL BE LIMITED TO 75% OF THE MANUFACTURER'S MAXIMUM ALLOWABLE DEFLECTION UNLESS APPROVED BY THE ENGINEER.
22. ALL BURIED CARBON STEEL PIPE SHALL CONFORM TO ASTM A530/A530M, PVC PROCESS PIPING 4-INCH AND GREATER SHALL CONFORM TO AWWA C900/C905.
23. PVC PIPE SHALL BE INSTALLED PER AWWA C605, MANUFACTURERS RECOMMENDATIONS, AND APPLICABLE DETAILS.
24. FITTINGS FOR BURIED AWWA C900/C905 PVC PIPING SHALL BE DUCTILE IRON CONFORMING TO AWWA 110 OR AWWA 153.
25. BURIED DUCTILE IRON FITTINGS SHALL BE CEMENT MORTAR LINED OR FUSION BONDED EPOXY LINED PER AWWA C116 (ANSI/NSF 61 APPROVED). EXTERIOR OF FITTINGS SHALL RECEIVE A BONDED DIELECTRIC COATING IN ACCORDANCE WITH SPECIFICATION 09 97 00 AND BE PROTECTED WITH POLYETHYLENE ENCASEMENT CONFORMING TO AWWA/ANSI C105/A21.5, CLASS A OR C.
26. MINIMUM DEPTH OF COVER FOR PIPELINES LARGER THAN 2 1/2 INCHES SHALL BE 3.0 FEET UNDER PAVED ROADWAYS AND NON-TRAFFIC AREAS, AND 3.5 FEET FOR UNPAVED DRIVEWAYS AND ROADWAYS.
27. MINIMUM DEPTH OF COVER FOR PIPELINES 2 1/2 INCHES AND SMALLER SHALL BE 2 FEET. WHERE REQUIRED THAT COVER BE LESS THAN 2 FEET FOR APPURTENANCE PIPING AND OTHER SPECIAL FIELD CONDITIONS, CONTRACTOR SHALL OBTAIN ENGINEER APPROVAL, AND INCORPORATE ANY SPECIAL PROTECTIVE MEASURES DETERMINED BY ENGINEER.
28. FIELD VERIFY EXISTING PIPING AT CONNECTIONS TO NEW PIPING AND AT CROSSINGS WITH NEW PIPING PRIOR TO SUBMITTING PIPE SHOP DRAWINGS. VERIFICATION WILL INCLUDE ELEVATION, DIAMETER, MATERIAL, AND HORIZONTAL COORDINATES.

CITY OF GARDEN GROVE WATER AND GRADING NOTES

1. THE FOLLOWING AGENCIES SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY DETOUR AND/OR CONSTRUCTION ACTIVITIES:
   CITY OF GARDEN GROVE FIELD ENGINEER/INSPECTION (714) 741-5395;
   CITY OF GARDEN GROVE PUBLIC WORKS DEPARTMENT (714) 741-5375;
   CITY OF GARDEN GROVE POLICE DEPARTMENT DISPATCH (714) 741-5704, GIVE LOCATION AND DURATION;
   ORANGE COUNTY FIRE AUTHORITY (714) 573-6000;
   ORANGE COUNTY TRANSPORTATION AUTHORITY (714) 265-4331;
   CITY OF GARDEN GROVE STREETS DIVISION (714) 741-5278
2. CONTRACTOR SHALL CONTACT ORANGE COUNTY TRANSPORTATION AUTHORITY AT (714) 265-4331 AND THE CITY OF GARDEN GROVE STREETS DIVISION AT (714) 741-5278 AT LEAST 48 HOURS PRIOR TO ANY BUS STOP CLOSURES AND/OR RELOCATIONS DURING CONSTRUCTION ACTIVITIES.
3. CITY INSPECTOR AND OFFICIALS MAY DISCONTINUE OPERATIONS AT ANY TIME IF THE INSPECTOR DETERMINES THAT THE WORK CREATES AN UNDUE SAFETY RISK OR SEVERE TRAFFIC CONGESTION.
4. CONTRACTOR SHALL NOTIFY ANY FIRE STATION, POLICE STATION, SCHOOL, AND HOSPITAL AFFECTED BY CONSTRUCTION ACTIVITIES.
5. ALL WORK SHALL CONFORM TO THE CITY OF GARDEN GROVE LATEST ORDINANCE NO. 2835 STANDARD PLANS AND SPECIFICATIONS, THE 2013 STANDARD SPECIFICATIONS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION, THE CITY OF GARDEN GROVE ORDINANCE NO. 2590, THE 2019 CALIFORNIA BUILDING CODE, CALIFORNIA GREEN BUILDINGS STANDARD CODE, AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK) 2012 EDITION.
6. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY THE CITY OF GARDEN GROVE WATER DEPARTMENT AND ALL OTHER UTILITY COMPANIES A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL PHASES OF CONSTRUCTION WITH THE VARIOUS UTILITY COMPANIES INVOLVED.
7. NO FILL SHALL BE PLACED UNTIL THE BUILDING OFFICIAL AND THE SOILS ENGINEER APPROVE PREPARATION OF THE GROUND.
8. FILLS SHALL BE COMPACTED THROUGHOUT TO 90% DENSITY AS DETERMINED BY A.S.T.M. D1557, A.S.T.M. D1556 (SAND CONE), AND/OR A.S.T.M. D2922, (NUCLEAR). SAND CONE METHOD MUST REPRESENT NO MORE THAN 20% OF TESTING. DRIVE TUBE TESTING IS NOT PERMITTED.
9. FILL SLOPES SHALL BE NO STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL AND SHALL HAVE NOT LESS THAN 90% COMPACTION OUT TO THE FINISH SURFACE.
10. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE UTILITIES OF EVERY NATURE WHETHER SHOWN HEREON OR NOT AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR TOTAL COST OF REPAIR OR REPLACEMENT OF SAID UTILITIES DAMAGED BY OPERATIONS.
11. THE CONTRACTOR SHALL MAKE PROVISIONS TO HAVE ALL EXISTING ON-SITE SEWER, WATER, GAS, ELECTRIC, IRRIGATION OR TELEPHONE LINES REMOVED, ABANDONED, OR RELOCATED IF THEY ARE INTERFERING WITH THE PROPOSED CONSTRUCTION.
12. ANY BROKEN OR DAMAGED IMPROVEMENTS ON ADJACENT PRIVATE PROPERTY OR PUBLIC RIGHT OF WAY SHALL BE REPLACED OR REPAIRED IN KIND AS DIRECTED BY THE CITY ENGINEER.
13. TEMPORARY TRAFFIC CONTROL AND PEDESTRIAN ACCESS AND PROTECTION DURING CONSTRUCTION SHALL CONFORM TO THE DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT'S LATEST "PUBLIC CONVENIENCE AND TRAFFIC CONTROL SPECIFICATION" SHEET, AND THE "WATCH MANUAL" AS PUBLISHED BY THE APWA, CHAPTER 33 OF THE CALIFORNIA BUILDING CODE AND THE REQUIREMENTS OF THE CITY ENGINEER.
14. ALL TRAFFIC CONTROL DEVICES SHALL BE INSTALLED, RELOCATED, OR REMOVED TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL NOTIFY THE CITY'S PARKS AND RECREATION ENGINEER PRIOR TO THE REMOVAL, PARTIAL REMOVAL OR TRIMMING OF TREES OVERHANGING OR LYING PARTIALLY OR FULLY WITHIN EXISTING RIGHT-OF-WAY.
16. THE SOILS REPORT PREPARED BY NINYO & MOORE, DATED NOVEMBER 2020, AND ALL RECOMMENDATIONS CONTAINED THEREIN, SHALL BE MADE A PART OF THESE PLANS. SOILS REPORTS AND TESTING SHALL BE DONE BY A CIVIL OR GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.
17. PRIOR TO PLACEMENT OF PARKING LOT STRUCTURAL SECTION, CONTRACTOR SHALL COMPACT SUB-GRADE TO 90% MIN. RELATIVE COMPACTION. AGGREGATE BASE SHALL BE CLASS II 3/4" COMPACTED TO 90% RELATIVE COMPACTION. THE CONTRACTOR'S GEOTECHNICAL ENGINEER SHALL SUBMIT COMPACTION TESTS TO THE CITY PER ASTM D1557 (METHOD C FOR AGGREGATE BASE). ASPHALT CONCRETE SHALL BE CLASS C2 DENSE MEDIUM ASPHALT CONCRETE MIX PER TABLE 203-6.4.3(A) (THE "GREENBOOK" 2012 EDITION CONFORMING TO PG 70-10).
18. THE CONTRACTOR SHALL INSTALL AND MAINTAIN A SIX (6) FOOT HIGH CHAIN LINK FENCE TO SECURE THE PROJECT PERIMETER. THE FENCE SHALL BE REMOVED UPON CONSTRUCTION OF PERMANENT PERIMETER FENCING AND/OR COMPLETION OF THE PROJECT.
19. CONCRETE FORM ELEVATIONS FOR CURB AND DRAINAGE GUTTERS ARE TO BE VERIFIED FOR PLAN GRADE BY AN ENGINEER OR INSPECTOR PRIOR TO CONCRETE POUR. ANY DEVIATIONS FROM THESE APPROVED PLANS SHALL REQUIRE APPROVAL BY THE CITY ENGINEER OR CORRECTED PRIOR TO PLACEMENT OF CONCRETE BY SUBMITTAL OF A REQUEST FOR REVISION TO THE APPROVED PLAN.
20. UPON COMPLETION OF ALL WORK, THE REGISTERED CIVIL ENGINEER OF RECORD SHALL CERTIFY IN WRITING THAT THE PROJECT IS IN COMPLIANCE WITH THE LINES, GRADES, AND ELEVATIONS ON THE APPROVED GRADING PLAN. IF THE BUILDING IS IN A FLOOD ZONE HAZARD AREA, THE CIVIL ENGINEER SHALL SUPPLY ADDITIONAL CERTIFICATIONS VERIFYING THAT THE LOWEST FINISH FLOOR ELEVATION(S) COMPLY WITH THE FEMA FLOOD HAZARD ELEVATIONS AS REQUIRED UNDER 1612A OF THE CALIFORNIA BUILDING CODE. (CERTIFICATION FORMS SHALL BE OBTAINED FROM THE CITY AND WET-SIGNED BY THE ENGINEER OF RECORD).
21. ALL CONCRETE FOR CURBS, GUTTERS, AND SIDEWALKS SHALL HAVE A COMPRESSIVE STRENGTH OF 2500 PSI AT 28 DAYS. CATCH BASINS AND TRUCK WELLS SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
22. ALL WORK SHALL BE IN CONFORMANCE WITH THE LATEST NPDES PERMIT AND CITY OF GARDEN GROVE LOCAL IMPLEMENTATION PLAN (LIP) AND ADOPTED LOW IMPACT DEVELOPMENT (LID) REQUIREMENTS. COPIES OF APPROVED EROSION CONTROL PLANS AND STORM WATER POLLUTION PREVENTION PLAN (SWPPP) WHERE REQUIRED, SHALL BE AT THE CONSTRUCTION SITE AT ALL TIMES AND MADE AVAILABLE UPON REQUEST FOR REVIEW AND IMPLEMENTATION.

⚠

23. THE DEVELOPER SHALL SWEEP ALL STREETS IN THE AREA OF THE CONSTRUCTION SITE ON A DAILY BASIS AS REQUIRED BY THE CITY ENGINEER. WASHING DOWN OF ANY STREET SHALL NOT BE PERMITTED UNLESS SPECIFICALLY APPROVED BY THE CITY ENGINEER AFTER ALL DEBRIS AND SILT HAVE BEEN REMOVED. FAILURE TO COMPLY WITH THIS SECTION SHALL BE CAUSE FOR IMMEDIATE SUSPENSION OF ALL WORK ON THE SITE AS WELL AS SUSPENSION OF ALL PERMITTED APPROVED TO DATE.
24. ALL ON-SITE CATCH BASINS SHALL BE STENCILED NOTIFYING THE PUBLIC THAT NO DUMPING IS PERMITTED AND THAT ALL FLOWS DRAIN TO THE OCEAN. THE CONTRACTOR SHALL OBTAIN THE LATEST STENCIL FROM THE CITY STREETS DIVISION AT (714) 741-5278.

TRAFFIC CONTROL GENERAL NOTES

1. CONTRACTOR SHALL PROTECT ALL EXISTING OVERHEAD AND UNDERGROUND ELECTRIC UTILITY FACILITIES IN PLACE AND MAINTAIN PROPER WORKING CLEARANCES PER GO128, GO95, AND GARDEN GROVE STANDARDS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN ALL ELECTRIC FACILITIES INCLUDING, BUT NOT LIMITED TO POLES, STREET LIGHTS, PULL BOXES, PAD MOUNTED EQUIPMENT, VAULTS, UNDERGROUND SECONDARY AND PRIMARY LINES, VENT PIPES, ETC. AND PROTECT IN-PLACE OR RELOCATE PER GARDEN GROVE STANDARDS AND REQUIREMENTS AT THE DEVELOPER'S EXPENSE. IF RELOCATION OR REMOVAL OF EXISTING FACILITIES IS REQUIRED, DEVELOPERS SHALL CONTACT GARDEN GROVE PLANNING SERVICES AT (714) 741-5312 TO PLAN WORK.
2. ALL EXCAVATIONS IN THE IMMEDIATE VICINITY OF EXISTING GARDEN GROVE OR SOUTHERN CALIFORNIA EDISON (SCE) ELECTRIC FACILITIES SHALL BE OBSERVED BY A GARDEN GROVE OR SCE ELECTRIC UTILITY INSPECTOR. CONTRACTOR SHALL CONTACT GARDEN GROVE OR SCE ELECTRIC INSPECTION AT (800) 427-2000 TEN (10) BUSINESS DAYS PRIOR TO BEGINNING WORK. IN THE EVENT OF AN EMERGENCY, THE CONTRACTOR SHALL CONTACT GARDEN GROVE FIELD OPERATIONS AT (714) 741-5395.

UTILITY PURVEYORS

CITY OF GARDEN GROVE	WATER (EMERGENCY)	714-741-5395 714-741-5704
CITY OF GARDEN GROVE SOUTHERN CALIFORNIA EDISON	ELECTRIC (EMERGENCY)	714-741-5395 800-427-2000
SOUTHERN CALIFORNIA EDISON	FIBER OPTIC	800-427-2000
CITY OF GARDEN GROVE	STORM DRAIN/SEWER	714-741-5395
CITY OF GARDEN GROVE	TRAFFIC SIGNAL	714-741-5278
AT&T	COMMUNICATION	510-765-2929
SO. CAL GAS	GAS	714-634-5067
SPECTRUM	COMMUNICATION	657-231-0002
VERIZON	COMMUNICATION	714-751-5261
UNDERGROUND SERVICES ALERT (USA)		811 OR 800-422-4133

CITY OF GARDEN GROVE ELECTRICAL NOTES

1. UNLESS OTHERWISE APPROVED, THE FOLLOWING CLEARANCES SHALL BE MAINTAINED BETWEEN EXISTING WATER FACILITIES AND ANY OTHER PROPOSED IMPROVEMENTS;

1.1. A MINIMUM SEPARATION OF 12-INCHES FOR VERTICAL CROSSINGS.

1.2. A MINIMUM SEPARATION OF 5-FEET FOR HORIZONTAL/PARALLEL INSTALLATIONS, EXCEPT FOR SANITARY SEWERS WHICH REQUIRE A MINIMUM HORIZONTAL SEPARATION OF 10-FEET

1.3. A MINIMUM OF 2-FEET AROUND ANY ABOVE GRADE WATER FACILITY/APPURTENANCE.

2. IF PAVING IS DONE AND VALVES GET COVERED, WATER VALVES WILL NEED TO BE EXPOSED AND ADJUST TO GRADE PER WATER STD. B-754.

CITY OF GARDEN GROVE CONSTRUCTION NOTES

1. MINIMUM 4" DEPTH OF ¾" ROCK BASE/BEDDING IS REQUIRED UNDER ALL VAULTS, PULL BOXES, AND HANDHOLES.
2. VAULTS, PULL BOXES, ETC. SHALL BE INSTALLED FLUSH WITH THE EXISTING SURROUNDING SURFACES.
3. ANY SIDEWALK CLOSURE DURING WORKING HOURS SHALL HAVE A POSTED PEDESTRIAN DETOUR PER CA W.A.T.C.H MANUAL. ALL SIDEWALKS SHALL BE RESTORED AND RE-OPENED BY THE END OF EACH DAY.
4. CONTRACTOR IS REQUIRED TO MAINTAIN ADA COMPLIANT PEDESTRIAN ACCESS AT ALL TIMES DURING CONSTRUCTION.
5. PAVING MIX SHALL CONFORM TO ASTM PS132. NO RECLAIMED ASPHALT PAVEMENT (RAP) IN ASPHALT MIXTURE SHALL BE USED ON THE FINAL AC CAP.

CITY OF GARDEN GROVE MONUMENT PRESERVATION NOTICE:

6. PRIOR TO CONSTRUCTION, ALL SURVEY MONUMENTS THAT MAY BE DISTURBED SHALL BE TIED OUT AND A CORNER RECORD OF EACH MONUMENT SHALL BE SUBMITTED TO THE CITY SURVEYOR FOR APPROVAL, PRIOR TO BEING FILED WITH THE COUNTY SURVEYOR. FOLLOWING CONSTRUCTION ALL SURVEY MONUMENTS THAT WERE DISTURBED SHALL BE RESET IN THEIR ORIGINAL POSITIONS AND A CORNER RECORD OF EACH MONUMENT SHALL BE SUBMITTED TO THE CITY SURVEYOR FOR APPROVAL, PRIOR TO BEING FILED WITH THE COUNTY SURVEYOR. PURSUANT TO THE PROFESSIONAL LAND SURVEYORS ACT SECTION 8771 (d).

GENERAL NOTES FOR IMPROVEMENT PLANS

1. ALL WORK WITHIN THE RIGHT-OF WAY WILL REQUIRE A RIGHT-OF-WAY CONSTRUCTION PERMIT.
2. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT (800) 422-4133 A MINIMUM OF 48 HOURS PRIOR TO START OF CONSTRUCTION WITHIN THE RIGHT-OF-WAY. PRIOR TO START OF WORK CONTRACTOR SHALL SUBMIT TO THE CONSTRUCTION SERVICES INSPECTOR A COPY OF TICKET ISSUED BY UNDERGROUND SERVICE ALERT. NO EXCAVATION, SAW CUTTING POTHOLING ETC. SHALL COMMENCE UNTIL THE INSPECTOR HAS RECEIVED CONFIRMATION FROM DIG ALERT.
3. THE FIELD LOCATION, PROTECTION AND ADJUSTMENT OF ALL UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE GARDEN GROVE PUBLIC WORKS DEPARTMENT (WATER / ELECTRICAL) MUST BE NOTIFIED PRIOR TO ANY ADJUSTMENTS/MODIFICATIONS TO THEIR FACILITIES.
4. CONTRACTOR SHALL REMOVE ALL CONSTRUCTION RELATED MARKINGS PRIOR TO FINAL INSPECTION SIGNOFF.

PUBLIC WORKS GENERAL NOTES

1. TRAFFIC PERMIT SHALL BE OBTAINED PRIOR TO TRAFFIC CONTROL FROM THE PUBLIC WORKS. ALL TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE LATEST PUBLICATION ENTITLED "STATE OF CALIFORNIA MANUAL OF TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES" (SAF-T-MANUAL).

VERTICAL AND HORIZONTAL CONTROL

WELL 22

BASIS OF BEARINGS

THE BEARINGS SHOWN HERON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 3623 AND STATION GPS NO. 3624R1 BEING N89°25'40"W PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

BENCHMARK

ORANGE COUNTY BENCH MARK NO. 1H-115-70
ELEVATION: 45.810
DATUM: NAVD 88, 2005 O.C.S. ADJUSTMENT

DESCRIPTION

DESCRIBED BY OCS 2002 - FOUND 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "1H-115-70", SET IN THE WESTERLY CORNER OF A 5.5 FT. BY 14.5 FT. CURVED CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEASTERLY CORNER OF THE INTERSECTION OF CHAPMAN AVENUE AND KNOTT AVENUE, 52 FT. EASTERLY OF THE CENTERLINE OF KNOTT AND 55 FT. NORTHERLY OF THE CENTERLINE OF CHAPMAN. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

WELL 26

BASIS OF BEARINGS

THE BEARINGS SHOWN HERON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 4167 AND STATION GPS NO. 4156R1 BEING N89°20'52"W PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

BENCHMARK

ORANGE COUNTY BENCH MARK NO. 1F-160-92
ELEVATION: 92.747
DATUM: NAVD 88, 2010 O.C.S. ADJUSTMENT

DESCRIPTION

DESCRIBED BY OCS 2002 - FOUND 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "1F-160-92", SET IN THE SOUTHWEST CORNER OF A 6 FT. BY 4 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEAST CORNER OF THE INTERSECTION OF TRASK AVENUE AND HARBOR BOULEVARD, 72 FT. NORTHERLY OF THE CENTERLINE OF TRASK AVENUE AND 52 FT. EASTERLY OF THE CENTERLINE OF HARBOR BOULEVARD. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

WELL 27

BASIS OF BEARINGS

THE BEARINGS SHOWN HERON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 3503 AND STATION GPS NO. 3007 BEING N89°22'55"W PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

BENCHMARK

ORANGE COUNTY BENCH MARK NO. 1G-137-69
ELEVATION: 77.337
DATUM: NAVD 88, 2005 O.C.S. ADJUSTMENT

DESCRIPTION

DESCRIBED BY OCS 2002 - FOUND 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "1G-137-69", SET IN THE SOUTHWESTERLY CORNER OF A 4 FT. BY 22 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEASTERLY CORNER OF THE INTERSECTION OF MAGNOLIA STREET AND ORANGEWOOD AVENUE, 43 FT. EASTERLY OF THE CENTERLINE OF MAGNOLIA AND 68 FT. NORTHERLY OF THE CENTERLINE OF ORANGEWOOD. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: M. BURBA
DRAWN BY: S. YOSAFI
CHECKED BY: M. BURBA

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
STEPHEN M. DIAMOND
No. C76490
CIVIL
STATE OF CALIFORNIA
04/09/2026

Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

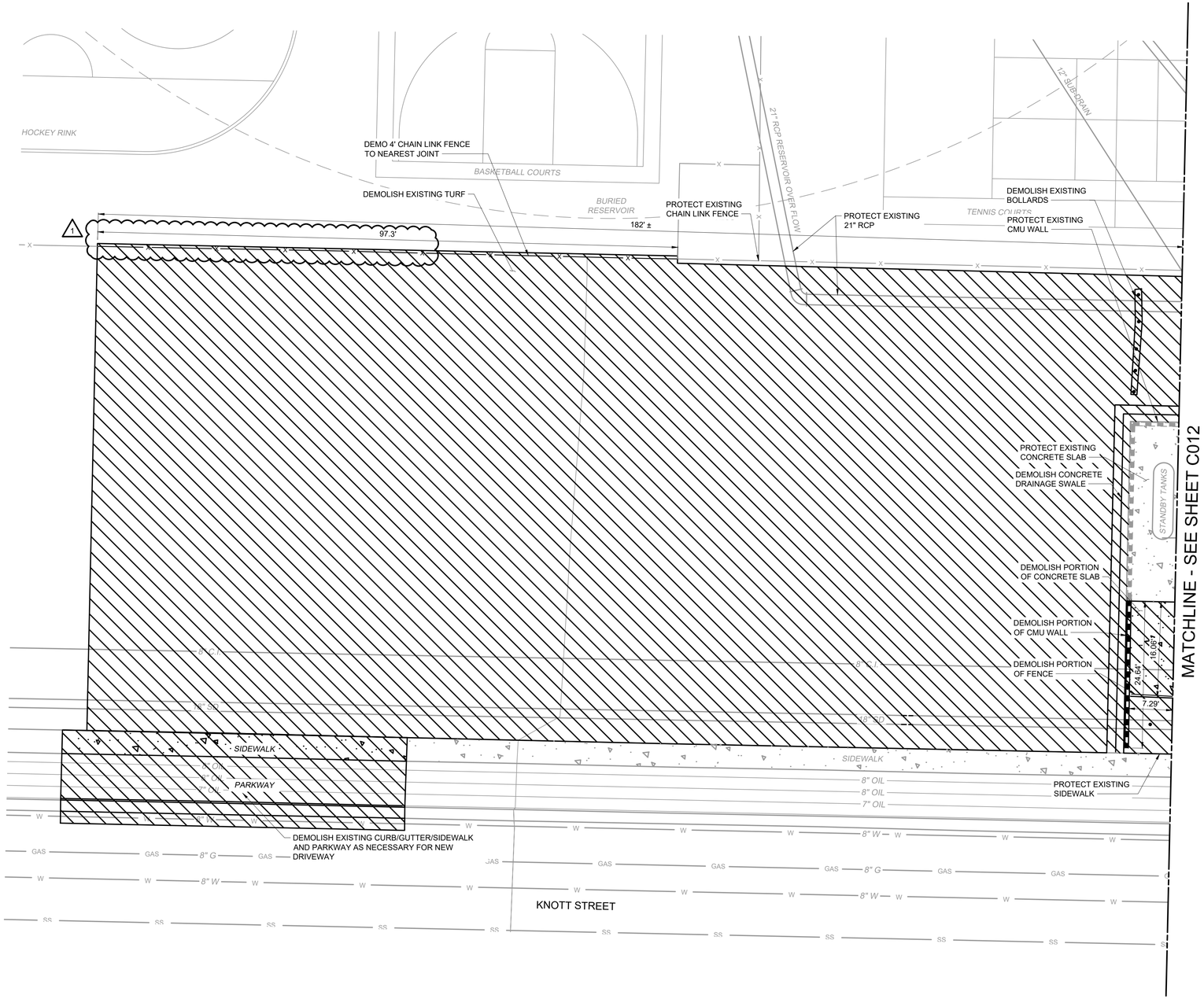
ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

GENERAL
GENERAL NOTES

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: G004

File: C:\USERS\SYOSAFI\DOCACCDOCS\HAZEN AND SAWYER\20232-002_GARDEN GROVE WELLS 22, 26 AND 27\PROJECT FILES\1-DESIGN\01-HAZEN\GENERAL\G004_GENERAL NOTES Saved by SYOSAFI Save date: 2/18/2026 4:36 PM
PLOT DATE: 3/24/2026 10:38 AM BY: SYOSAFI



PLAN
1"=10'

NOTES:

1. DEMOLITION LIMITS SHOWN ON THIS SHEET ARE APPROXIMATE. FINAL DEMOLITION LIMITS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE CITY TO ACCOMMODATE MEANS/METHODS.
2. CONTRACTOR SHALL REMOVE EXISTING IRRIGATION PIPING WITHIN THE PROPOSED PROJECT SITE TO THE NEAREST CONTROL VALVE. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING IN KIND A FULLY FUNCTIONAL IRRIGATION SYSTEM IN THE AREA INDICATED FOR CONTRACTOR LAYDOWN AND ON THE NORTH EXTERIOR OF THE FENCE LINE.
3. ASBESTOS CEMENT PIPE SHALL BE HANDLED IN ACCORDANCE WITH CAL-OSHA STANDARDS AND THE LAWS OF THE STATE OF CALIFORNIA. ALL ASBESTOS RESIDUE SHALL BE REMOVED FROM THE JOB SITE AND DISPOSED OF ACCORDING TO THE STATE LAW. THE CONTRACTOR WORKING WITH ASBESTOS MATERIAL MUST HAVE REGISTRATION FOR THIS WORK FROM CAL-OSHA.

LEGEND

DEMOLISH

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORY C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

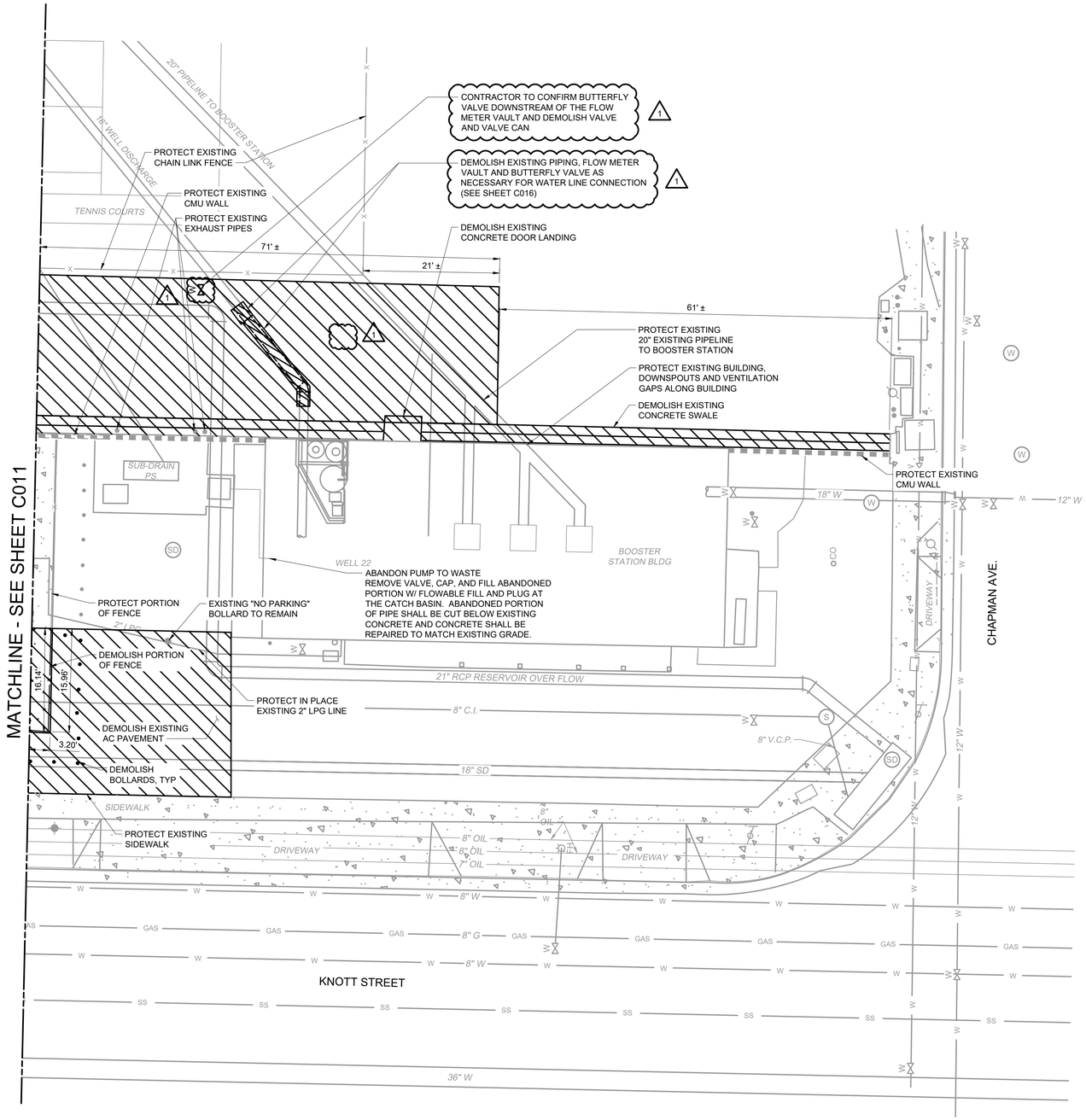
ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
SITE DEMOLITION PLAN - SHEET 1

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C011

File: C:_DCACCDOCS\HAZEN AND SAWYER\20232-002_GARDEN GROVE WELLS 22, 26 AND 27\PROJECT FILES\1-DESIGN\01-HAZEN\CIVIL\20232-002 C011 Saved by LDESKINS Save date: 5/26/2026 1:30 PM
PLOT DATE: 5/26/2026 1:35 PM BY: LDESKINS



PLAN
1"=10'

NOTES:

1. DEMOLITION LIMITS SHOWN ON THIS SHEET ARE APPROXIMATE. FINAL DEMOLITION LIMITS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE CITY TO ACCOMMODATE MEANS/METHODS.
2. CONTRACTOR SHALL REMOVE EXISTING IRRIGATION PIPING WITHIN THE PROPOSED PROJECT SITE TO THE NEAREST CONTROL VALVE. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING IN KIND A FULLY FUNCTIONAL IRRIGATION SYSTEM IN THE AREA INDICATED FOR CONTRACTOR LAYDOWN AND ON THE NORTH EXTERIOR OF THE FENCE LINE.
3. ASBESTOS CEMENT PIPE SHALL BE HANDLED IN ACCORDANCE WITH CAL-OSHA STANDARDS AND THE LAWS OF THE STATE OF CALIFORNIA. ALL ASBESTOS RESIDUE SHALL BE REMOVED FROM THE JOB SITE AND DISPOSED OF ACCORDING TO THE STATE LAW. THE CONTRACTOR WORKING WITH ASBESTOS MATERIAL MUST HAVE REGISTRATION FOR THIS WORK FROM CAL-OSHA.

LEGEND

DEMOLISH

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	C. JANSEN
DRAWN BY:	M. BAUTISTA
CHECKED BY:	S. MALLOY

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORY C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

Hazen

HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

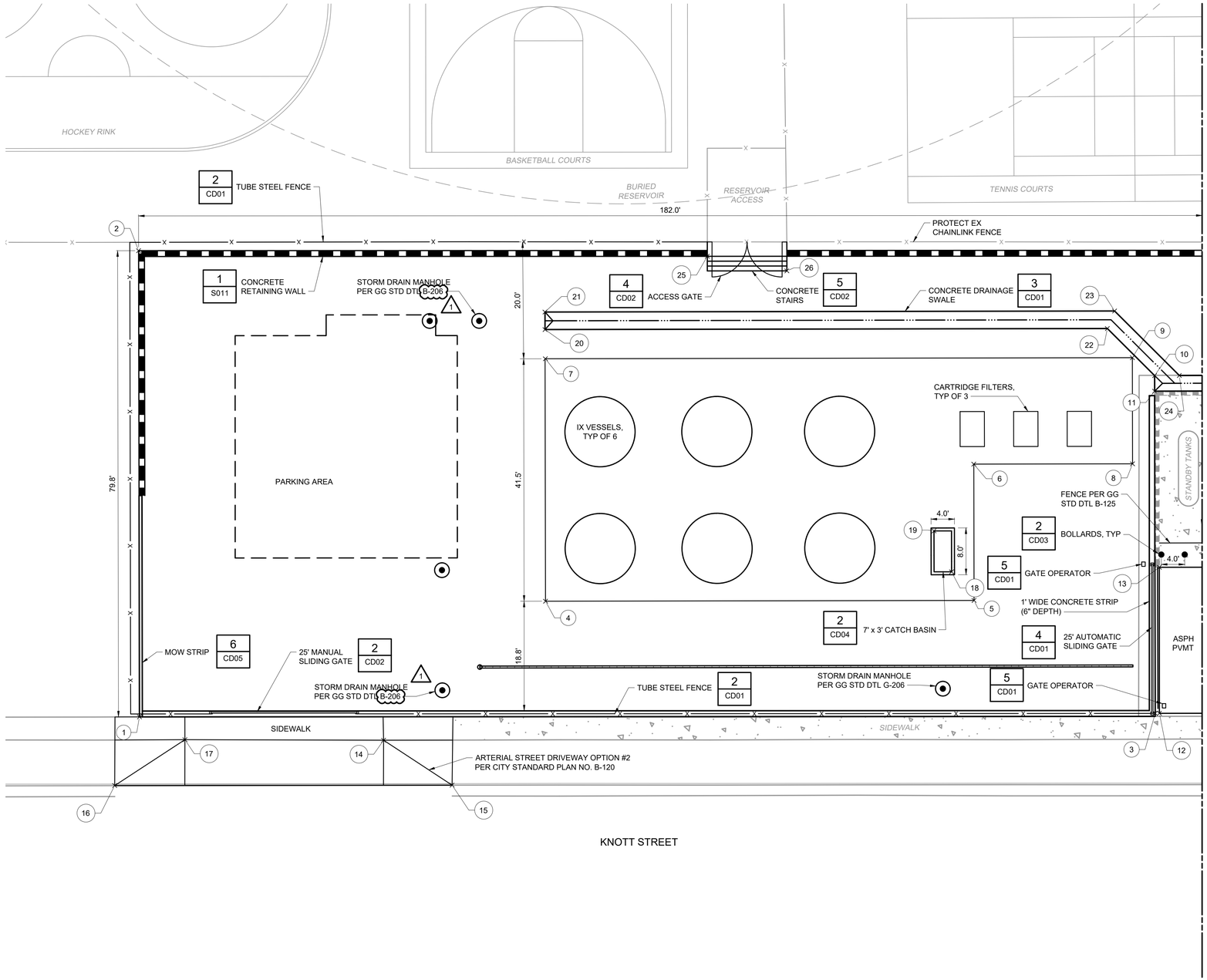
ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
SITE DEMOLITION PLAN - SHEET 2

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	C012

File: C:_DCIACCDOCS\HAZEN AND SAWYER\20232-002_GARDEN GROVE WELLS 22, 26 AND 27\PROJECT FILES\1-DESIGN\01-HAZEN\CIVIL\20232-002 C012 Saved by LDESKINS Save date: 5/27/2026 9:55 AM
PLOT DATE: 5/27/2026 9:56 AM BY: LDESKINS



PLAN
SCALE: 1" = 10'

STAKING TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	2235338.33	6026644.57	CURB
2	2235336.69	6026724.35	WALL
3	2235164.53	6026641.29	SWALE / FENCE
4	2235268.41	6026662.81	PAD
5	2235195.09	6026661.30	PAD
6	2235194.61	6026684.63	PAD
7	2235267.51	6026704.30	PAD
8	2235167.45	6026684.07	PAD
9	2235167.08	6026702.24	PAD
10	2235163.34	6026699.09	SWALE
11	2235163.39	6026696.42	SWALE
12	2235163.81	6026641.28	PAVEMENT
13	2235163.26	6026666.27	PAVEMENT
14	2235296.64	6026639.64	DRIVEWAY
15	2235285.10	6026631.69	DRIVEWAY
16	2235342.82	6026632.91	DRIVEWAY
17	2235330.63	6026640.49	DRIVEWAY
18	2235198.82	6026666.29	CATCH BASIN
19	2235201.68	6026673.35	CATCH BASIN
20	2235267.45	6026709.30	SWALE
21	2235267.39	6026712.30	SWALE
22	2235171.24	6026707.32	SWALE
23	2235169.94	6026710.30	SWALE
24	2235159.11	6026699.01	SWALE
25	2235239.41	6026721.21	STAIRS
26	2235225.86	6026718.41	STAIRS

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER TORY C. YOKOYAMA No.71482 CIVIL STATE OF CALIFORNIA
4/10/26

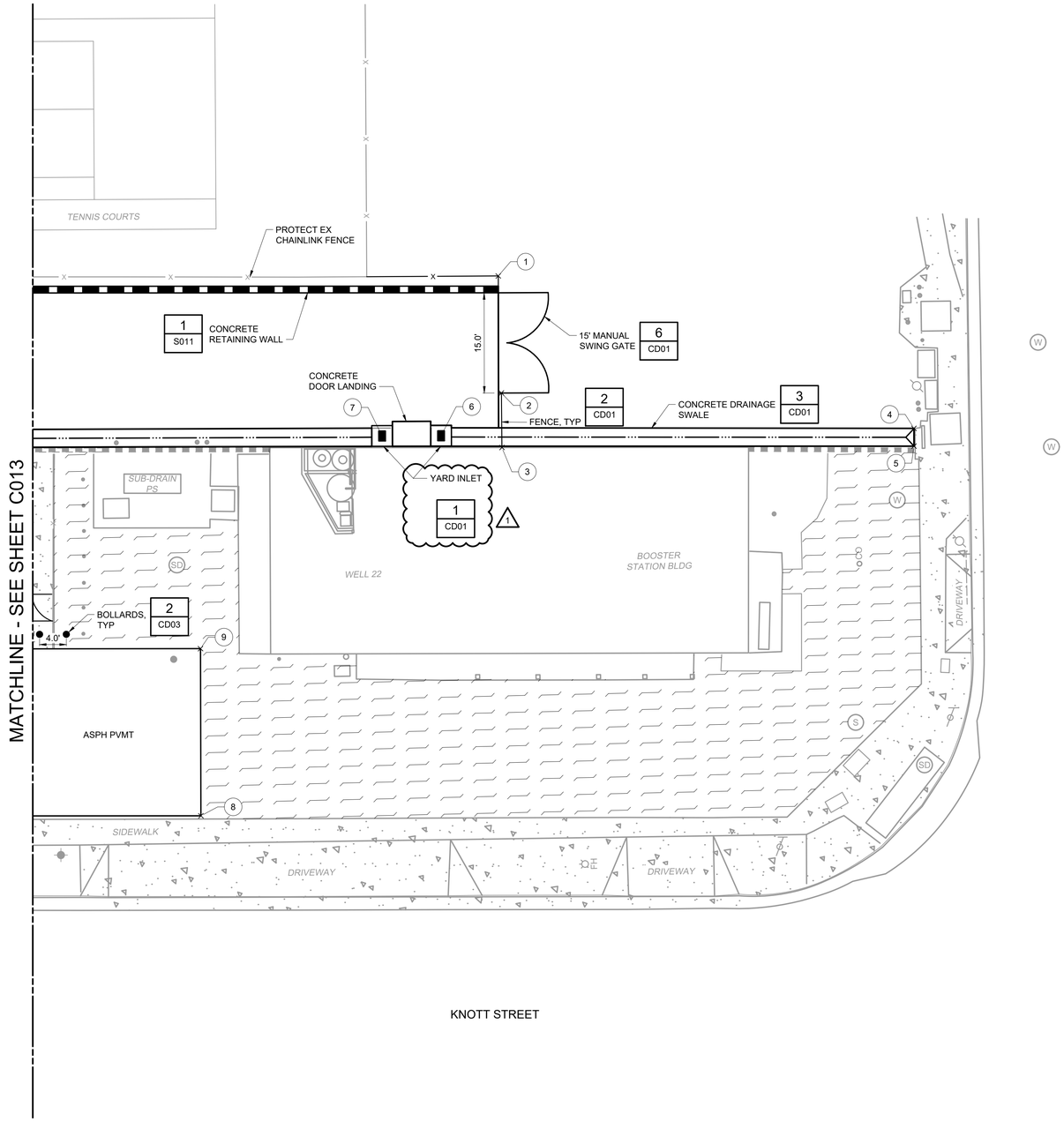
Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
SITE PLAN AND HORIZONTAL CONTROL - SHEET 1

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C013



STAKING TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	2235085.07	6026720.34	FENCE
2	2235084.99	6026702.82	FENCE
3	2235085.10	6026694.66	FENCE
4	2235023.40	6026696.15	SWALE
5	2235023.46	6026693.48	SWALE
6	2235094.16	6026696.63	YARD INLET
7	2235102.98	6026696.79	YARD INLET
8	2235131.35	6026640.57	PAVEMENT
9	2235130.86	6026665.58	PAVEMENT

PLAN
SCALE: 1" = 10'

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER TORY C. YOKOYAMA No.71482 CIVIL STATE OF CALIFORNIA
4/10/26

Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

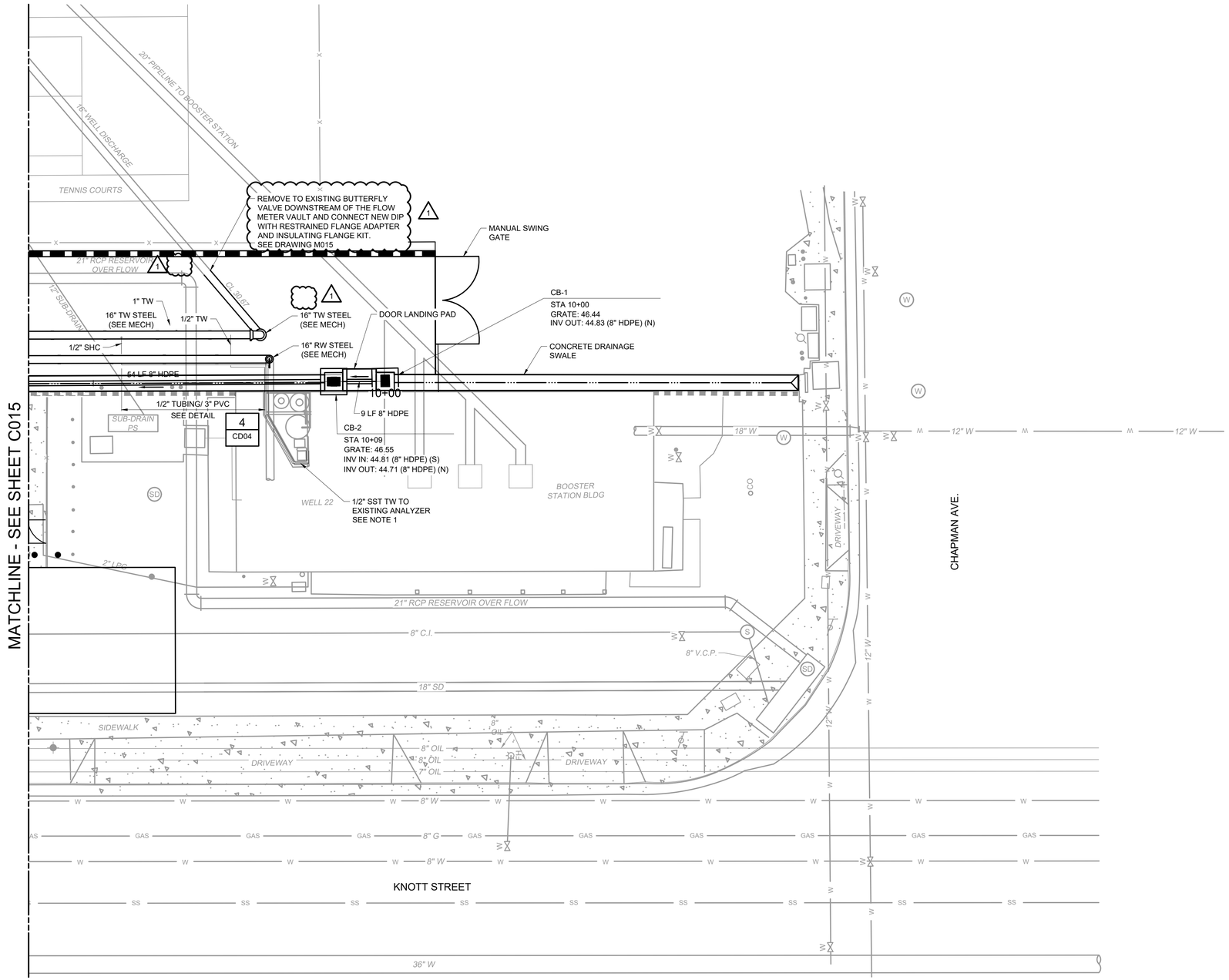
ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
SITE PLAN AND HORIZONTAL CONTROL - SHEET 2

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C014

File: C:_DCACCDOCS\HAZEN AND SAWYER\20232-002_GARDEN GROVE WELLS 22, 26 AND 27\PROJECT FILES\1-DESIGN\01-HAZEN\CIVIL\20232-002 C014 Saved by LDESKINS Save date: 5/26/2026 1:30 PM
PLOT DATE: 5/26/2026 1:34 PM BY: LDESKINS



PLAN
SCALE: 1" = 10'

N

NOTES:

1. CONTRACTOR SHALL ROUTE PIPING FOR THE CHEMICAL INJECTION AND THE TREATED WATER TO ANALYZER WITHIN THE CONTAINMENT AREA INSIDE OF THE BUILDING.
2. SEE SHEET C016A FOR YARD PIPING PROFILES.

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORT C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

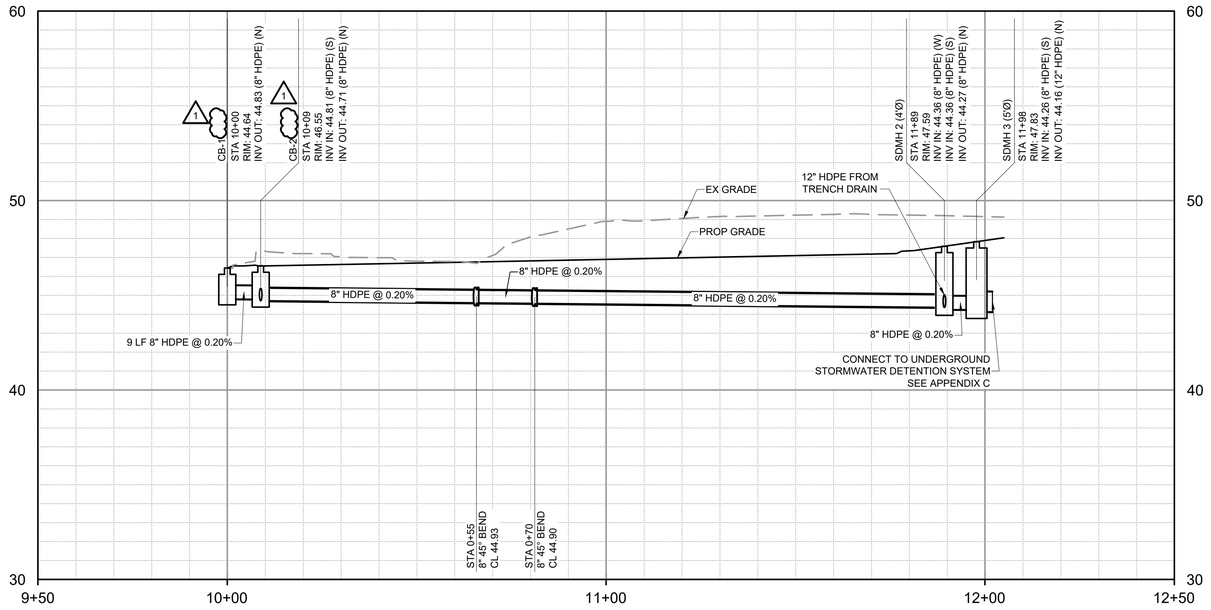
Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

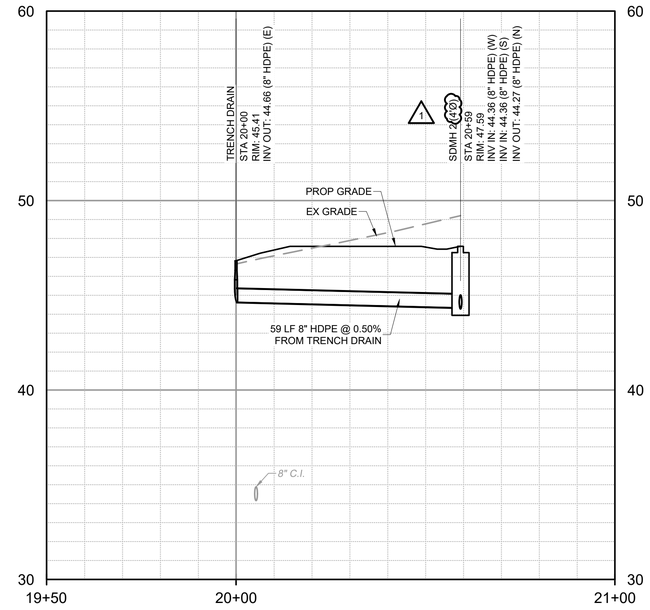
WELL 22
CIVIL
SITE YARD PIPING PLAN - SHEET 2

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C016



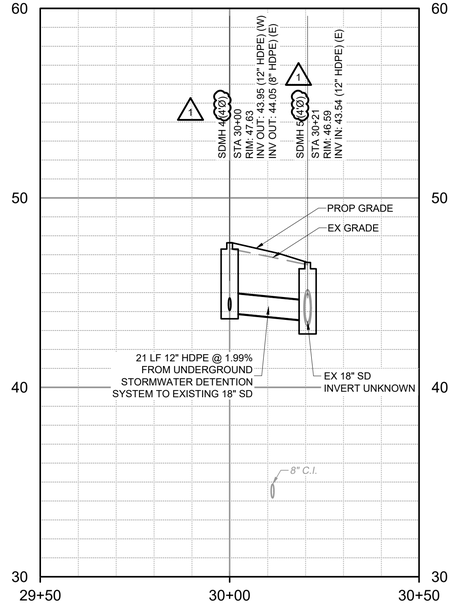
STORM DRAIN PROFILE

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



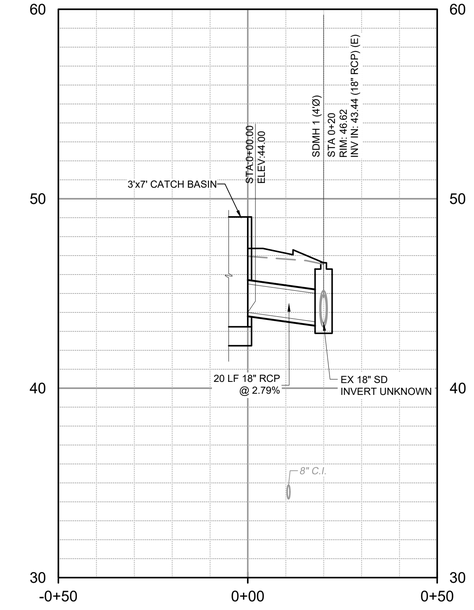
TRENCH DRAIN PROFILE

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



EXISTING SD PROFILE CONNECTION

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



FFW PROFILE

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0 — 1/2" — 1")

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	C. JANSEN
DRAWN BY:	L. DESKINS
CHECKED BY:	S. MALLOY

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORY C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

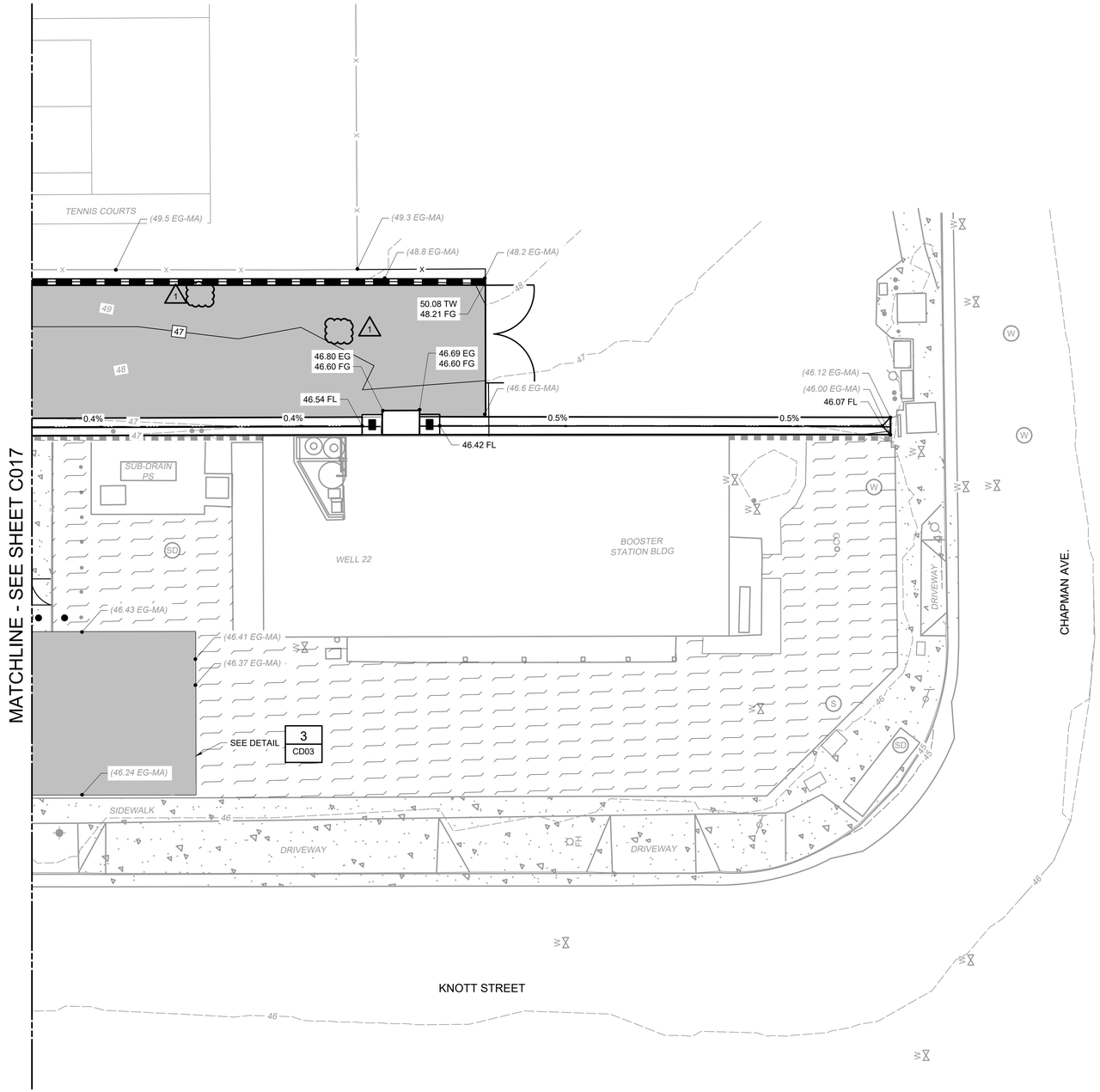
Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
YARD PIPING PROFILES

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	C016A



PLAN
SCALE: 1" = 10'

PAVEMENT LEGEND

- CONCRETE
- ASPHALT PAVEMENT PER DETAIL ON 5/CD03
- PERMEABLE PAVERS PER DETAIL 2/CD05
- SLURRY SEAL PER CALTRANS SPECIFICATION SECTION 37 FOR SLURRY SEAL COAT (1)

GRADING ABBREVIATIONS

TC	TOP OF CURB
FL	GUTTER FLOWLINE
LG	LIP OF GUTTER
PAD	TOP OF CONCRETE PAD
FS	TOP OF FINISHED SURFACE (HARDSCAPE)
EG	EXISTING GRADE
MA	MATCH
GB	GRADE BREAK

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
LORI C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

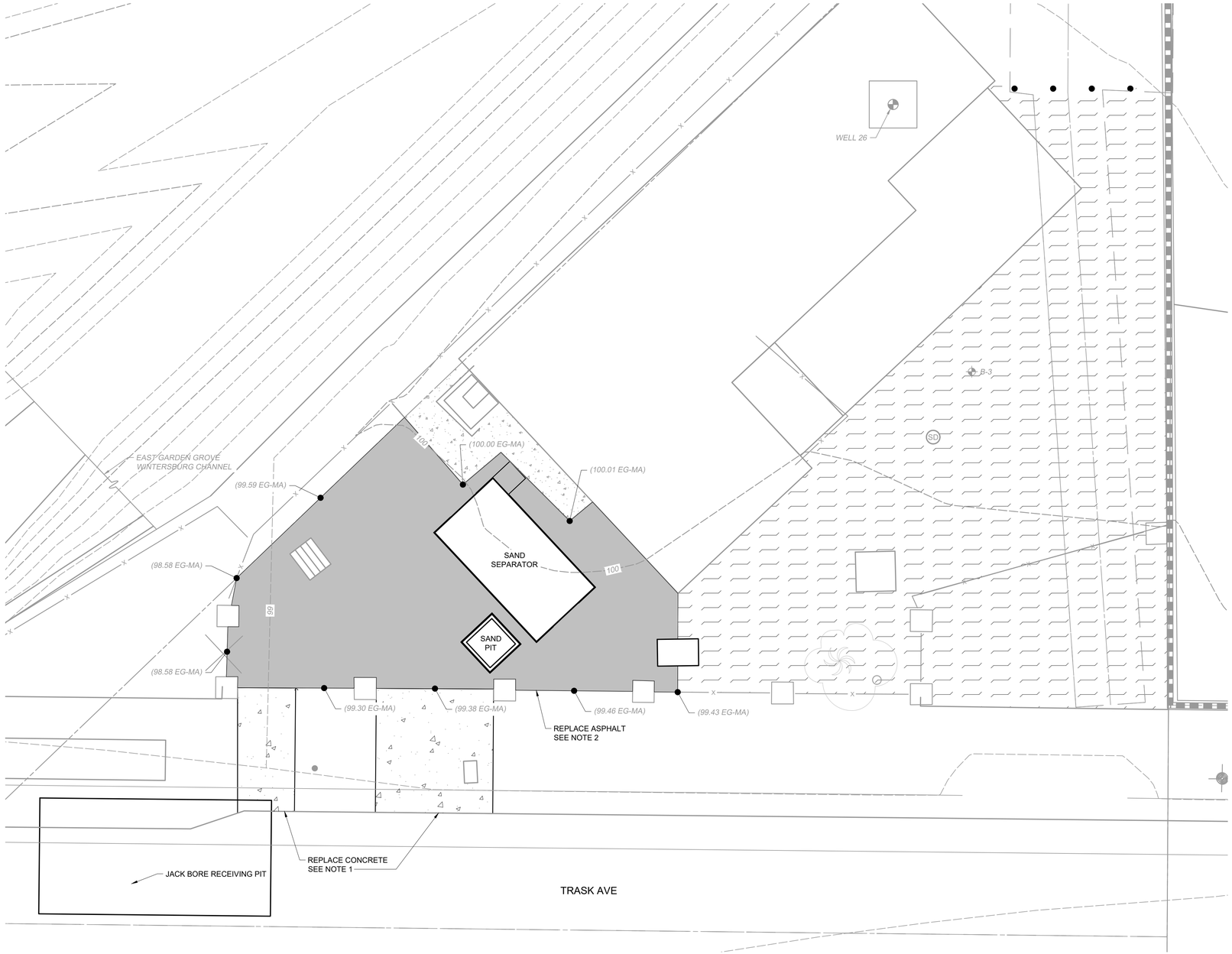
Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
CIVIL
SITE GRADING, PAVING, AND DRAINAGE PLAN
SHEET 2

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C018



PLAN
SCALE: 1" = 5'

N

NOTES:

1. CONCRETE EXTENTS SHOWN ARE APPROXIMATE. CONTRACTOR TO REPLACE CONCRETE TO NEAREST CONSTRUCTION JOINT WITH SAW CUTTING (4' MINIMUM, 10' MAXIMUM IN ANY SIDE OF CONCRETE PANEL).
2. ASPHALT REPLACEMENT TO MATCH EXISTING GRADE.

PAVEMENT LEGEND

- CONCRETE
- ASPHALT PAVEMENT PER DETAIL ON 5/CD03
- SLURRY SEAL PER CALTRANS SPECIFICATION SECTION 37 FOR SLURRY SEAL COAT (1)

GRADING ABBREVIATIONS

TC	TOP OF CURB
FL	GUTTER FLOWLINE
LG	LIP OF GUTTER
PAD	TOP OF CONCRETE PAD
FS	TOP OF FINISHED SURFACE (HARDSCAPE)
EG	EXISTING GRADE
MA	MATCH
GB	GRADE BREAK

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

PROJECT ENGINEER: S. DIAMOND
DESIGNED BY: C. JANSEN
DRAWN BY: M. BAUTISTA
CHECKED BY: S. MALLOY

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORI C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

Hazen

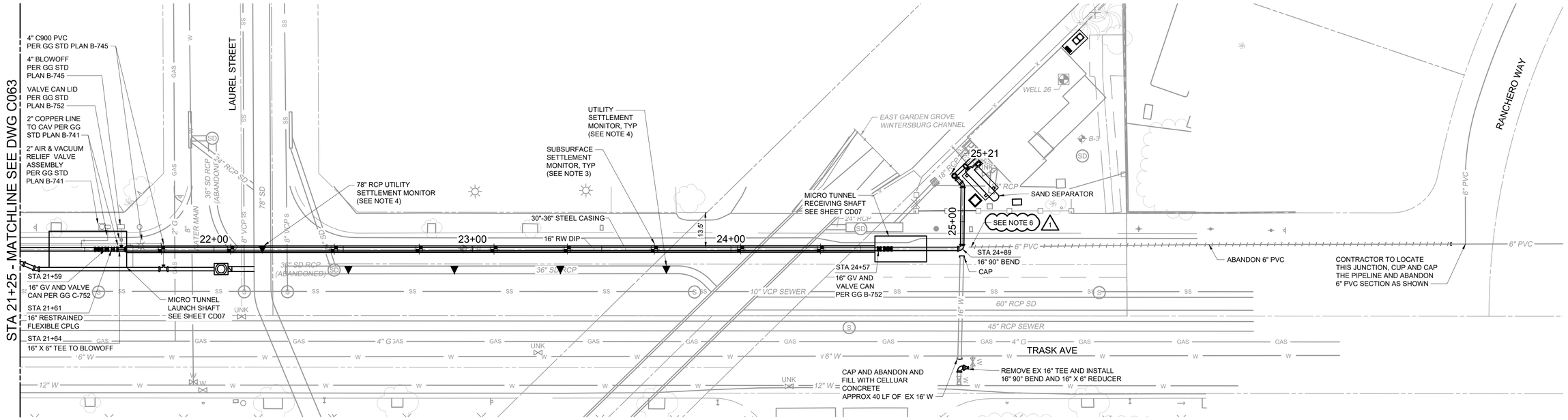
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

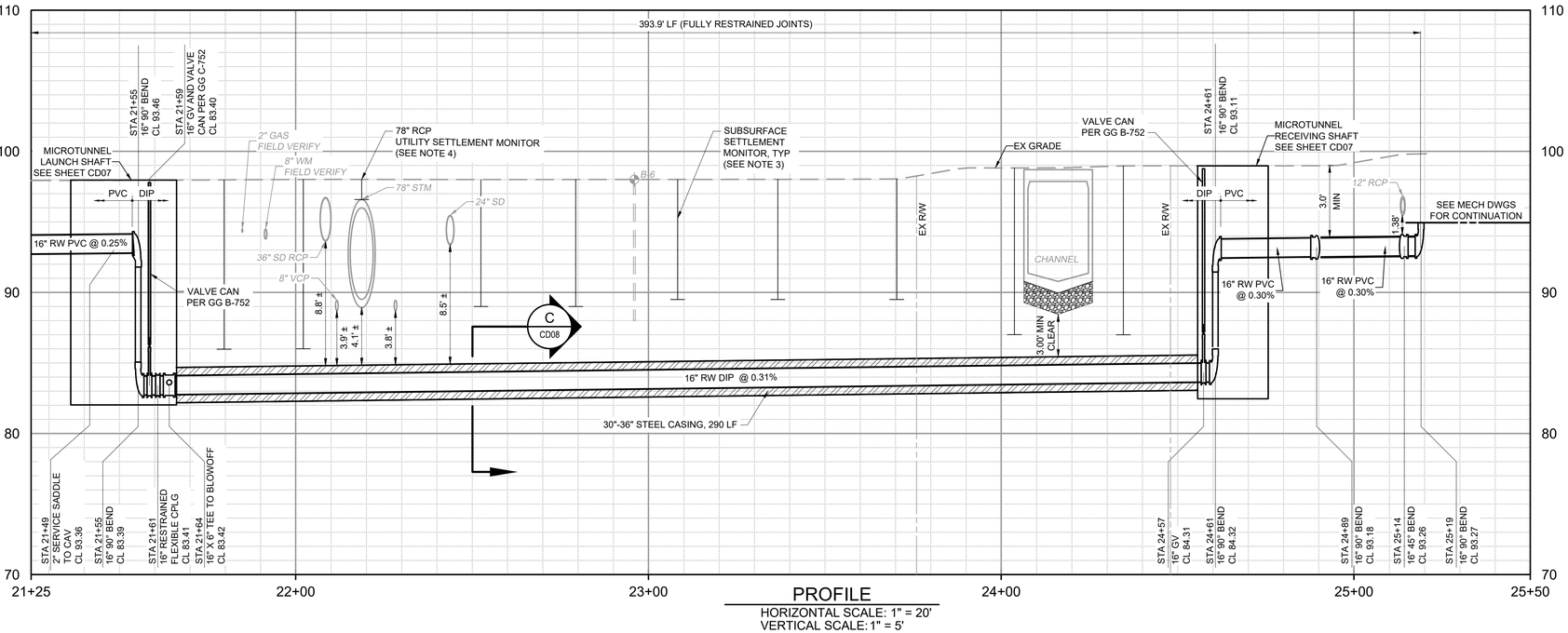
GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 26
CIVIL
SITE GRADING, PAVING, AND DRAINAGE PLAN
SHEET 3

DATE: APRIL 2026
HAZEN NO.: 20232-002
CONTRACT NO.: GG-2025-1
DRAWING NUMBER: C059



PLAN
SCALE: 1" = 20'



PROFILE
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'

NOTES:

1. TUNNEL SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPEC 31 71 20 - TUNNEL BY SLURRY MTBM.
2. SHAFT SHAPE AND SIZE ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL SHAPE AND DIMENSIONS SHALL BE AS DETERMINED BY CONTRACTOR'S MEANS AND METHODS. MINIMUM PERFORMANCE REQUIREMENTS SHOWN ON CD07.
3. SUBSURFACE SETTLEMENT MONITORS SHALL BE IN ACCORDANCE WITH SPECIFICATION 31 09 13 - SETTLEMENT MONITORING AND TO THE ELEVATIONS SHOWN ON THIS SHEET. SUBSURFACE SETTLEMENT MONITORS SHALL BE PLACED WITHIN 10 FEET EITHER SIDE OF EAST GARDEN GROVE WINTERSBERG CHANNEL. SEE DETAIL SHEET CD08.
4. UTILITY SETTLEMENT MONITORS SHALL BE IN ACCORDANCE WITH SPECIFICATION 31 09 13 - SETTLEMENT MONITORING. UTILITY SETTLEMENT MONITORS SHALL BE PLACED ON 36" RCP AT SPACINGS NO GREATER THAN 50 FEET O.C. SEE DETAIL SHEET CD08.
5. SURFACE SETTLEMENT MARKERS SHALL BE IN ACCORDANCE WITH SPECIFICATION 31 09 13 - SETTLEMENT MONITORING.
6. CONTRACTOR SHALL CONNECT NEW 1"-PVC WATER SUPPLY FOR THE PUMP ROOM AND NOT ABANDON PIPE IF WATER SUPPLY IS LOST WHEN DEMOLISHING EXISTING PIPING. CONTRACTOR SHALL PROVIDE ALL FITTINGS NECESSARY TO CONNECT THE NEW PIPE TO THE EXISTING 3/4"-CU PIPE. IF WATER SUPPLY IS NOT LOST DURING DEMOLITION, CUT AND CAP AT THE EXISTING PIPE JUNCTION AT TRASK AVENUE AND RANCHERO WAY AND ABANDON EXISTING PORTION OF 6" PVC PIPE AS SHOWN.

REV	ISSUED FOR	DATE	BY
1	ADDENDUM NO. 2	5/26/26	SD

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0, 1/2", 1")

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	C. JANSEN
DRAWN BY:	M. BAUTISTA
CHECKED BY:	S. MALLOY

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
TORU C. YOKOYAMA
No.71482
CIVIL
STATE OF CALIFORNIA
4/10/26

Hazen

HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 26
CIVIL
RAW WATER PLAN AND PROFILE
STA 21+25 - END

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	C064

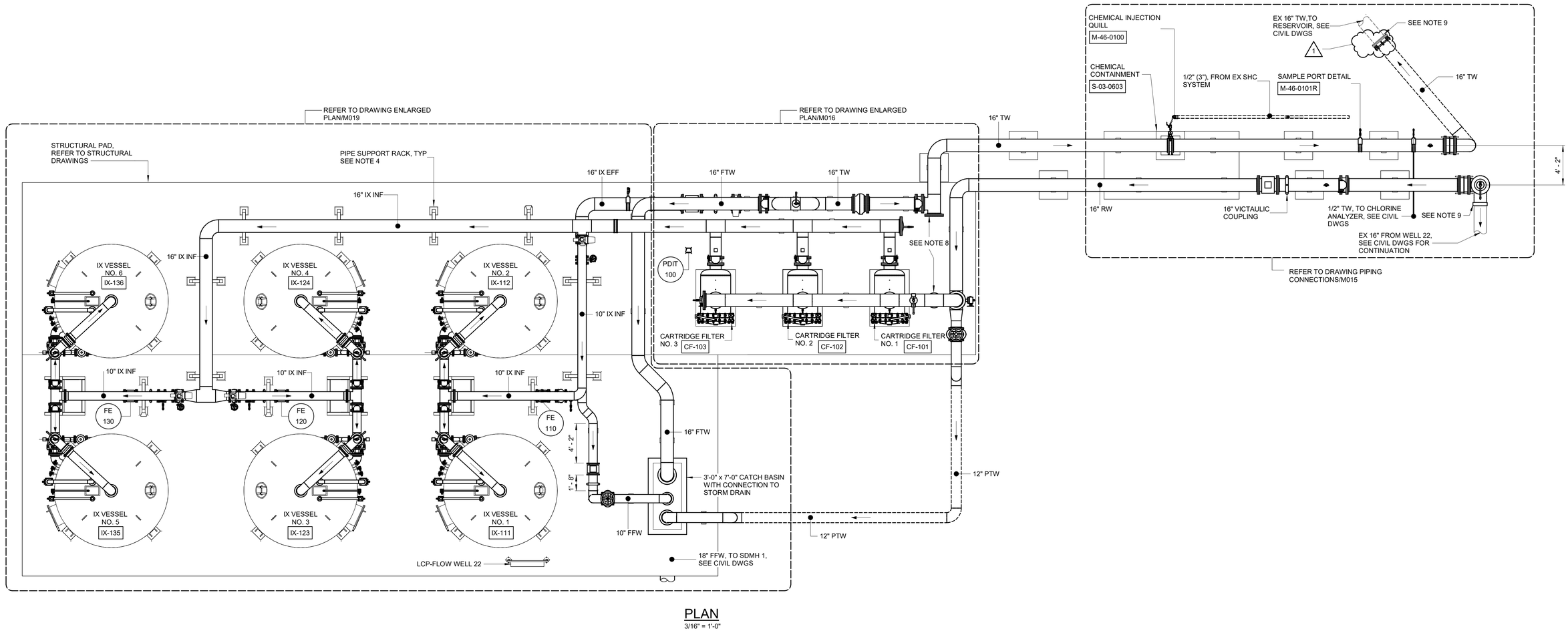
File: C:_DOCACCDOCS\HAZEN AND SAWYER\20232-002_GARDEN GROVE WELLS 22, 26 AND 27\PROJECT FILES\1-DESIGN\01-HAZEN\CIVIL\20232-002 C064 Saved by: LDESKINS Save date: 5/26/2026 1:50 PM
PLOT DATE: 5/26/2026 2:19 PM BY: LDESKINS

N

NOTES:

1. REFER TO SPECIFICATION SECTION 46 55 00 FOR CARTRIDGE FILTERS.
2. REFER TO SPECIFICATION SECTION 46 60 00 FOR IX VESSELS AND APPURTENANCES.
3. REFER TO P&ID AND SPECIFICATIONS FOR SCOPE OF SUPPLY DETAILS.
4. PIPE SUPPORTS SHOWN ON THESE DRAWINGS ARE SCHEMATIC. GENERAL CONTRACTOR TO DESIGN AND INSTALL ADEQUATE PIPE SUPPORTS AND PIPE RACKS PER REQUIREMENTS DETAILED IN SPECIFICATION 40 05 07 AND SHEET MD01.
5. CONTRACTOR SHALL VERIFY EXACT DIMENSIONS AND CONFIGURATION WITH IX VESSELS MANUFACTURER.
6. CHAIN WHEEL TO BE USED TO ACTUATE VALVES LOCATED HIGHER THAN 7'-0" ABOVE THE FLOOR.
7. REFER TO P&ID FOR TAGGING PREFIX.
8. CONTRACTOR SHALL PREPARE SHOP DRAWINGS FOR THE PIPING TO BYPASS THE TREATMENT SYSTEM.
9. CONTRACTOR TO CONNECT NEW DIP TO EXISTING FLANGE WITH RESTRAINED FLANGE ADAPTER AND INSULATING FLANGE KIT, SEE DETAIL P-22-0110.

1



PLAN
3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	BID ADDENDUM NO. 2	5/26/26	SD

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	M. BURBA
DRAWN BY:	R. SHNAYDERMAN
CHECKED BY:	A. RAHIMIAN-POUR

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER STEPHEN M. DIAMOND No. C78490 CIVIL STATE OF CALIFORNIA
04/10/2026

Hazen

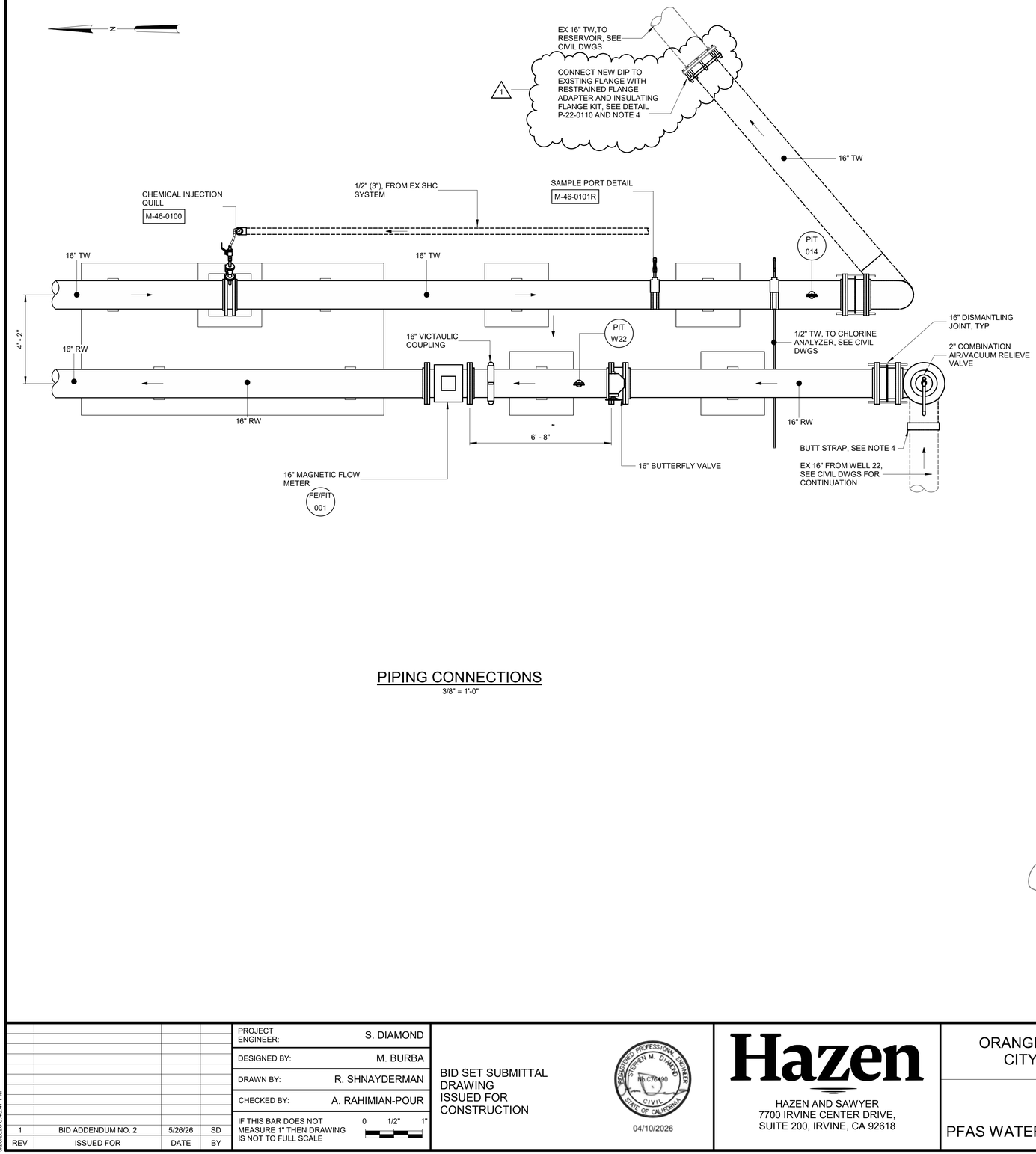
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 22
MECHANICAL
TREATMENT AREA PLAN

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	M013



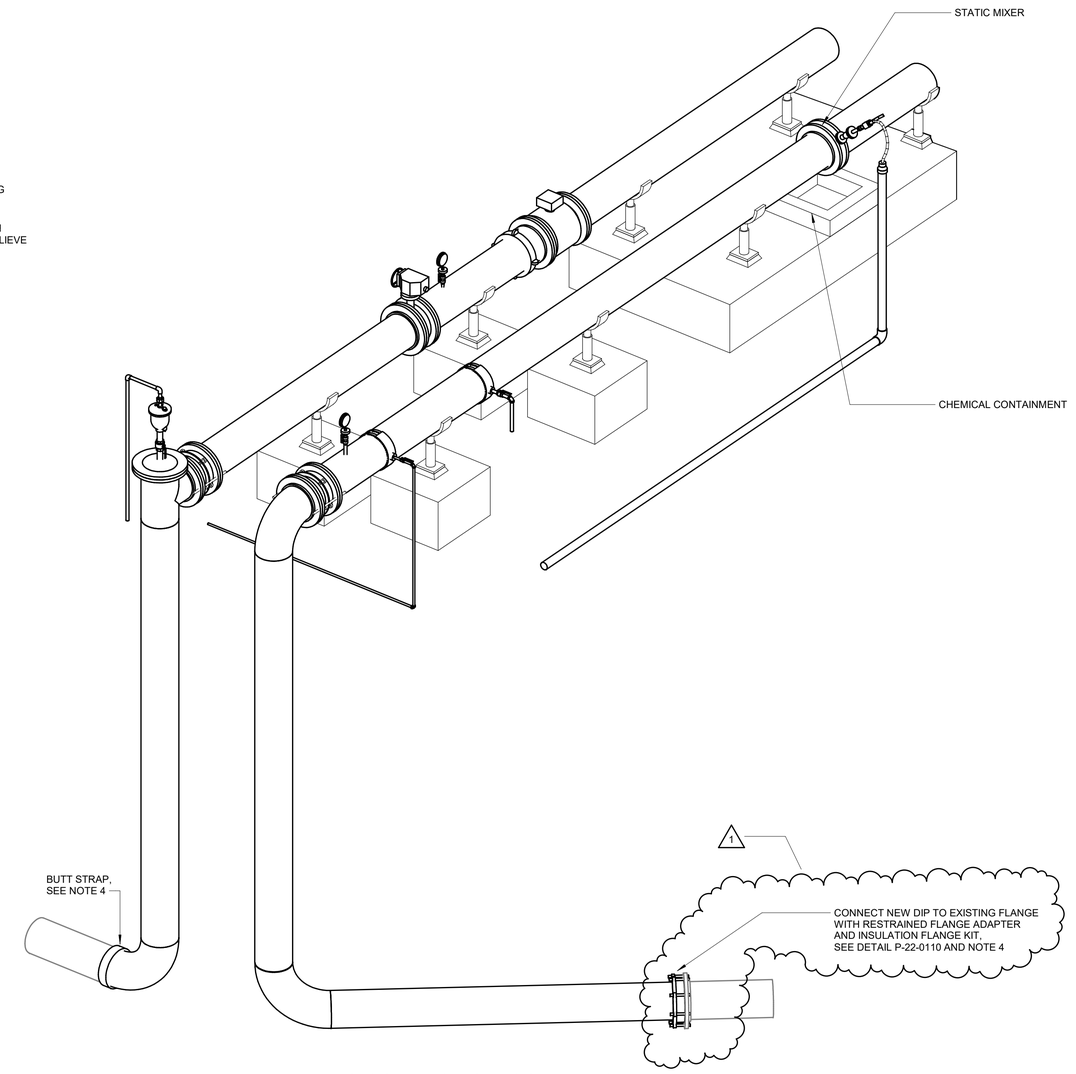
PIPING CONNECTIONS

3/8" = 1'-0"

NOTES:

1. REFER TO P&ID AND SPECIFICATIONS FOR SCOPE OF SUPPLY DETAILS.
2. PIPE SUPPORTS SHOWN ON THESE DRAWINGS ARE SCHEMATIC. GENERAL CONTRACTOR TO DESIGN AND INSTALL ADEQUATE PIPE SUPPORTS AND PIPE RACKS PER REQUIREMENTS DETAILED IN SPECIFICATION 40 05 07 AND SHEET MD01.
3. REFER TO P&ID FOR TAGGING PREFIX.
4. CONTRACTOR TO CONNECT NEW DIP TO EXISTING FLANGE WITH RESTRAINED FLANGE ADAPTER AND INSULATING KIT, SEE DETAIL P-22-0110.

1



PIPING CONNECTION ISOMETRIC

REV	ISSUED FOR	DATE	BY
1	BID ADDENDUM NO. 2	5/26/26	SD

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0 1/2" 1")

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	M. BURBA
DRAWN BY:	R. SHNAYDERMAN
CHECKED BY:	A. RAHIMIAN-POUR

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
STEPHEN M. DIAMOND
No. C78490
CIVIL
STATE OF CALIFORNIA
04/10/2026

Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

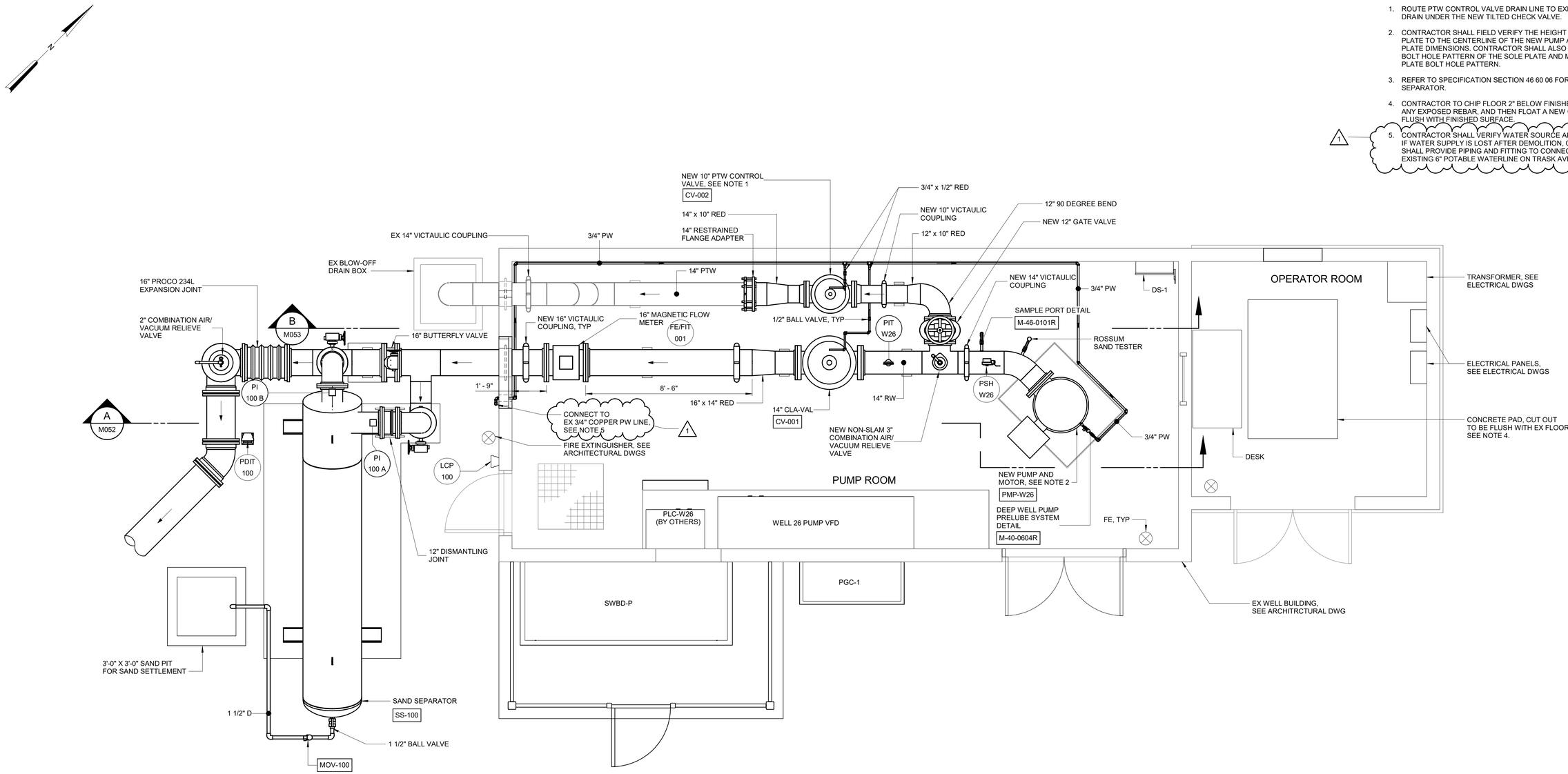
WELL 22
MECHANICAL
PIPING CONNECTION PLAN AND ISOMETRIC

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	M015

NOTES:

1. ROUTE PTW CONTROL VALVE DRAIN LINE TO EXISTING FLOOR DRAIN UNDER THE NEW TILTED CHECK VALVE.
2. CONTRACTOR SHALL FIELD VERIFY THE HEIGHT OF THE SOLE PLATE TO THE CENTERLINE OF THE NEW PUMP AND MATCH BASE PLATE DIMENSIONS. CONTRACTOR SHALL ALSO FIELD VERIFY THE BOLT HOLE PATTERN OF THE SOLE PLATE AND MATCH THE BASE PLATE BOLT HOLE PATTERN.
3. REFER TO SPECIFICATION SECTION 46 60 06 FOR SAND SEPARATOR.
4. CONTRACTOR TO CHIP FLOOR 2" BELOW FINISHED SURFACE, CUT ANY EXPOSED REBAR, AND THEN FLOAT A NEW CONCRETE LAYER FLUSH WITH FINISHED SURFACE.
5. CONTRACTOR SHALL VERIFY WATER SOURCE AFTER DEMOLITION. IF WATER SUPPLY IS LOST AFTER DEMOLITION, CONTRACTOR SHALL PROVIDE PIPING AND FITTING TO CONNECT TO THE EXISTING 6" POTABLE WATERLINE ON TRASK AVENUE.

1



PLAN VIEW
3/8" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	BID ADDENDUM NO. 2	5/26/26	SD

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0, 1/2", 1")

PROJECT ENGINEER:	S. DIAMOND
DESIGNED BY:	M. BURBA
DRAWN BY:	T. ROBINSON
CHECKED BY:	A. RAHIMIAN-POUR

BID SET SUBMITTAL
DRAWING
ISSUED FOR
CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER — STEPHEN M. DIAMOND — No. C78490 — CIVIL — STATE OF CALIFORNIA
04/10/2026

Hazen
HAZEN AND SAWYER
7700 IRVINE CENTER DRIVE,
SUITE 200, IRVINE, CA 92618

ORANGE COUNTY WATER DISTRICT
CITY OF GARDEN GROVE, CA

GARDEN GROVE
WELL 22, 26 AND 27
PFAS WATER TREATMENT PLANTS PROJECT

WELL 26
MECHANICAL
WELL PLAN

DATE:	APRIL 2026
HAZEN NO.:	20232-002
CONTRACT NO.:	GG-2025-1
DRAWING NUMBER:	M051

ATTACHMENT F

No.	QUESTIONS	ANSWERS
1	Will another pre-bid meeting be held if we were unable to attend the pre-bid meeting?	No. Any bids received from bidders who did not attend the mandatory virtual pre-bid meeting on Thursday, May 7, 2026, at 8 AM will be rejected.
2	Can construction on all of the well sites be started simultaneously and run concurrently?	Yes. Refer to Section 01 14 00, 1.06.
3	What are the extents of the Well 26 pump discharge pipeline demolition underneath the pump building slab? Can it be abandoned below the surface?	Existing Well 26 pump discharge pipeline shall be abandoned below the pump building slab. Refer to Drawing M050.
4	With June 8th,2026 being a Monday , will the Owner consider pushing the bid date out at the minimum 3 days , maximum 2 weeks?	Due to schedule obligations tied to the Federal grant funds associated with this project, the bid opening date cannot be extended.
5	We are very interested in bidding on this project; however, our current schedule includes several public works solicitations with overlapping deadlines that have been advertised for a longer period. To ensure we can provide a comprehensive and competitive proposal, would it be possible to extend the bid deadline by two weeks? This additional time would allow us to prioritize this project and dedicate the necessary resources to meet all requirements.	Due to schedule obligations tied to the Federal grant funds associated with this project, the bid opening date cannot be extended.
6	Per the project specifications, the current deadline for submitting questions is May 14, 2026. We respectfully request that the deadline be extended by one week to May 21, 2026, to allow additional time for review and preparation of clarification requests.	Please refer to Addendum No. 1.

7	Will you please advise if BABA or AIS are required on the following sections of this project: •Spec Section 46 55 00 CARTRIDGE FILTERS •Spec Section 46 60 06 SAND SEPARATORS	BABA compliance is required for both cartridge filters (both vessels and filters) and sand separators for this project. Refer to Exhibit F of the Special Provisions for BABA requirements.
8	Table 2 on page 16 of the geotechnical report identifies pavement thicknesses based on traffic indexes but do not match the detail for new asphalt pavement on CD03. Please confirm paving and aggregate thicknesses.	Follow pavement detail on Drawing CD03.
9	Spec 03 40 00 is referenced in spec 33 05 61 but is not provided. Please provide spec 03 40 00- Precast Concrete, if applicable.	Refer to Bid Addendum No. 2.
10	SP-20 Section 700- Asbestos Materials states the intent of these documents is to exclude from the work any and all products or materials containing asbestos. Note3 on C011 calls out handling and removal of asbestos cement pipe. Please confirm whether contractors are to include asbestos removal, as well as locations and/or quantities.	The asbestos pipes are the existing 12-inch treated water pipeline on Trask Avenue. The buried portions of the existing Well 26 16-inch raw water pipeline are being demolished and abandoned.
11	Per Spec 01 14 00 1.05, City will assist in dewatering tanks, conduits and other works areas. Please identify the extents of Contractors scope or limitations for draining/cleaning if applicable.	Refer to Bid Addendum No. 2.

12	Spec 31 33 16.13 2.07 specifies chloride and sulfate concentrations of water used for construction. Do city hydrants meet these requirements? Or will contractors need to use alternative water sources?	Domestic City water meets the water quality requirements of the referenced specification section.
13	The Well 26 Pipe Schedule in Sec 40 06 20 lists the Treated Water Line as being Restrained MJ Ductile Iron Pipe. Drawing page C060 labels the pipe as PVC. Order of precedence govern specifications over drawings. Please clarify what material is required for the Treated Water line.	The treated water pipe material should be C900 PVC. Refer to Bid Addendum No. 2.
14	Would you accept a 6 pulse VFD and Active Harmonic Filter system as an equal to the 18 pulse or Active Front End VFD specified in 26 29 23 2.02 VFD systems? If so, we would subsequently ask for approval of Galt Electric as a manufacturer.	The VFD must be 18 pulse or active front end. A 6 pulse VFD with active harmonic filter is not acceptable.
15	What percentage or volume of existing soil should the contractor assume is affected by the presence of the Red Imported Fire Ant?	General Comment 23 is deleted. Refer to Bid Addendum No. 2.
16	Section SP-6 Subsection N – Permits: Can OCWD please provide clarification to the questions for each permit item detailed in the table below? This project has tight timelines and milestones with significant Liquidated Damages. It is critical to note that the contractor cannot be held liable for any project delays tied to permitting outside of our control.	See responses to Comments 17-23.
17	Regarding: Encroachment Permit – Well 26 Raw Water Pipeline. Can OCWD, the EOR or responsible party provide a date of completion? Potential schedule impacts contractor cannot be liable for.	The County of Orange Flood Control encroachment permit for the Well 26 Raw Water Pipeline is anticipated to be approved prior to issuance of the project's Notice to Proceed.
18	Regarding: Upgraded Service Request – Well 26. Can OCWD, the EOR or responsible party provide a date of completion? Potential schedule impacts contractor cannot be liable for.	The Southern California Edison Upgraded Service Request for Well 26 is anticipated to be approved prior to issuance of the project's Notice to Proceed.
19	Reagrding: Encroachment Permit – Well 26 Pipeline Traffic Control. Can OCWD, the EOR or responsible party provide a date of completion? Potential schedule impacts contractor cannot be liable for.	The CALTRANS encroachment permit for the Well 26 Pipeline Traffic Control is anticipated to be approved prior to issuance of the project's Notice to Proceed.

20	Can OCWD, the EOR or responsible party provide a date of completion? Potential schedule impacts contractor cannot be liable for.	The Southern California Edison New Service Request for Well 26 PFAS Water Treatment Plant is anticipated to be approved prior to issuance of the project's Notice to Proceed.
21	Regarding: Building Permits – Well 26 and Well 26 PFAS Water Treatment Plant. Has the City and EOR applied for the building permits? Is it expected that the contractor is only required to pull the completed permits? Potential schedule impacts contractor cannot be liable for. Who is paying for the project permits?	City of Garden Grove Building Permits are expected to be applied for and obtained by the Contractor. Per Special Provisions Section 200.N, the District shall pay permit fees due directly to permitting agencies, while Contractor shall pay for the effort of obtaining the permits.
22	Regarding: Electrical Permits – Well 26 and Well 26 PFAS Water Treatment Plant. Has the City and EOR applied for the building permis? Is it expected that the contractor is only required to pull the completed permits? Potential schedule impacts contractor cannot be liable for. Who is paying for the project permits?	City of Garden Grove Electrical Permits are expected to be applied for and obtained by the Contractor. Per Special Provisions Section 200.N, the District shall pay permit fees due directly to permitting agencies, while Contractor shall pay for the effort of obtaining the permits.
23	Regarding: Transportation/Overlimit Permit(s) if required by means and methods. Can OCWD, the EOR or responsible party provide a date of completion? Potential schedule impacts contractor cannot be liable for.	City of Garden Grove Transportation/Overlimit Permit(s) are expected to be applied for and obtained by the Contractor.
24	Section 40 05 24.23 Paragraph 2.01-B states that “All steel pipes shall be supplied by American Spiralweld Pipe Company or Northwest Pipe Company.” Please clarify if other fabricators are acceptable, or if bidding contractors are to only use the listed vendors.	Other pipe fabricators are acceptable given they meet the requirements in Specification 40 05 24.23 Section 1.04. Refer to Bid Addendum No. 2.
25	Detail M-40-0709R appears to show Cement Mortar Lined and Coated steel pipe. No mention of CML&C pipe is mentioned in section 40 05 24.23. Please confirm there is no CML&C steel pipe on this project.	No new CML&C steel pipe on this project. Refer to Bid Addendum No. 2.
26	Please refer to attached information regarding the addition of Poly Processing as a viable Polyethylene Storage Tank Manufacturer. Poly Processing is a direct competitor to Synder Industries and has been specified on previous projects. I’ve attached a recent project where Poly Processing was the first named on an OCWD project for a similar application. This is the OCWD Well 19 PFAS Treatment Project.	Specificaiton 43 41 43 does not sole source the polyethylene storage tank. Poly Processing may be submitted as an equal for approval.

27	The Treated Water Pipeline at Well 26 is called out as PVC on the plan & profile sheet (C060), but the Pipe Schedule lists this designation as Ductile Iron Pipe for lines greater than 4” diameter. Which material are we to use?	The treated water pipe materal should be C900 PVC. Refer to Bid Addendum No. 2.
28	Question – Contract No. GG-2025-1 - There seems to be overlapping existing and proposed fence lines on the east side of Well 22 on C017. Please confirm limits of new fence install, as they do not match the demolition limits on C011.	Refer to Bid Addendum No. 2.
29	Due to the current bid date of Monday, June 8, falling immediately after the weekend, we respectfully request that the bid date be extended by one day to Tuesday, June 9.	Due to schedule obligations tied to the Federal grant funds associated with this project, the bid opening date cannot be extended.
30	Will Excess Liability coverage be accepted in addition to the primary General Liability limits to meet the $5M per occurrence limit?	Yes.
31	Attached is Filanc’s General Liability Blanket Additional Insured endorsement, which contains the carriers equivalent to the CG 20 10 10 01 and CG 20 37 10 01. Please advise if Filanc’s General Liability Blanket Additional Insured endorsement is acceptable.	Please refer to ACWA JPIA's accepted insurnace coverage at https://www.acwajpia.com/services/#risk-transfer.
32	Primary and Non-Contributory wording is included in Filanc’s General Liability Blanket Additional Insured endorsement (attached). Please confirm this will be acceptable in lieu of a CG 20 01 04 13 endorsement.	Please refer to ACWA JPIA's accepted insurnace coverage at https://www.acwajpia.com/services/#risk-transfer.
33	The Builder’s Risk requirements reference All Risk/100% replacement cost. Please confirm whether Earthquake and Flood coverage are to be included and if so, at what limits?	Earthquake and flood coverage are not included in Builders Risk.
34	Builder’s Risk coverage is intended to cover the project during the course of construction. Upon completion of the project and acceptance of the work by the District, responsibility for insuring the completed project would typically transfer to the District. Please confirm that Continuation of Coverage is not intended to apply to Builder’s Risk coverage following project completion and acceptance by the District.	Correct, until the completion and final acceptance by the OCWD of all the work under and implied, the work shall be under the Contractor's responsibility care and charge.

35	Ion Exchange System 46 60 00-7 2.03 MEDIA TRANSFER SYSTEM A. General: Provide each vessel with IX transfer piping and valves for filling the contactors with IX and discharging IX from the contactors. Orient the fill and discharge nozzles and piping as shown on the Drawings. Provide 4-inch stainless steel pipe. We recommend lined CS media supply lines. The lined carbon steel 4" lines tend to show less corrosion and pitting when compared to 316SS lines. In addition, this would be consistent with the previously provided systems.	Using lined carbon steel pipe in lieu of 316SST for the media supply line is acceptable. Lining material must be NSF 61 certified. Refer to Bid Addendum No. 2.
36	Why is this second ARV located on the IX veseel influent pipe in the specifications? Can this 2" CARVC remove this since there is another located at the top of the vessel?	The influent pipe is higher than the top of the vessels, so this ARV is needed in case air builds up in the influent piping.
37	Expansion Joint: Part 2.01. E.11 11. Provide restrained flanged couplings at the influent pipe connection from the valve manifold to the IX vessels per the drawings. Expansion joints connecting the manifold piping to vessels piping shall not be provided. The drawings and previously provided systems utilize expansion joints. Please confirm the use of expansion joints is permitted.	Expansion joints are acceptable. Refer to Bid Addendum No. 2.
38	For well site 26, will our construction impact the functions of the fire department? If so, do we need to plan on creating temporary access as needed to not impact their operation?	Contractor shall provide access to the fire authority at OCFA Station #83 at all times per Section 01 14 00, 1.01.B. Contractor shall provide temporary access to the site to minimize impact to fire station operations during construction.
39	Drawing page C017 shows limits of existing buried reservoir, detail 1 on S011 shows the new retaining wall with rock up to the existing buried reservoir. Following the existing reservoir line will extend excavations and backfill. Please confirm limits of rock placement behind proposed CMU retaining wall.	The limit of rock placement behind retaining wall is 12-inch. Detail 1, Drawing S011 is showing that face of new retaining wall shall be 2-feet away minimum from existing reservoir wall face.

40	For well site 26, are we allowed to close more than one lane of traffic at a time for the new pipe install?	Refer to Bid Addendum No. 2 for traffic control plans.
41	There are several references to “GG STD PLAN B-745” for blowoff details. This detail cannot be found. Please provide the detail.	Refer to City of Garden Grove Standard Plans available on the City of Garden Grove website: https://ggcity.org/sites/default/files/www/pw/landdev/Series%207.pdf
42	Spec Section 40 05 64 – We respectfully request that Val-Matic AWWA Butterfly Valves be added as an approved manufacturer for this project. Orange County Water District and the City of Garden Grove have successfully utilized Val-Matic butterfly valves on recent projects, including the Well 19 PFAS Water Treatment Plant Project and the Well 27 & 28 Wellhead Treatment Project. Their prior approval and use on comparable municipal water projects demonstrate the valves’ proven reliability, performance, and compliance with project requirements.	Specification 40 05 64 does not sole-source a valve manufacturer. Val-Matic may be submitted as an equal for approval.
43	Section 31 09 13, Settlement Monitoring. Drawing Number C064 shows several low clearance utilities within the trenchless alignment, was systematic settlement calculations conducted for the specified steel casing sizes at each of these low clearance utility locations? Are the results of the systematic settlement calculations consistent with the table and requirements set forth in Section 31 09 13-6, 3.3, A., If not please consider one of the following options: 1. Lower the trenchless alignment to a sufficient depth to mitigate any systematic settlement issues. 2. Provide a bid item to allow the contractors to mitigate any systematic settlement issue by installing a grout support system adjacent and under the utilities. We ask the Owner to share the systematic settlement calculations result with the bidding contractors for these low clearance utility locations.	The thresholds provided are achievable with slurry MTBM methods, but are dependent on contractor selected overcut, advance rate, and slurry composition, density, and pressure. If a bidder considers a grout support system to be necessary to achieve the prescribed tolerances, then the cost associated with such grouting should be included in the bid.

44	Regarding the Special Provisions, SP-3 Time of Completion Schedule. The specification lists durations for the different well sites as follows: •Produce PFAS-treated water from Well 22 – 360 days •Produce PFAS-treated water from Well 27 – 480 days •Produce PFAS-treated water from Well 26 – 610 days •Substantial Project Completion – 640 days The liquidated damages section only references failure to achieve Substantial Completion. Please confirm whether liquidated damages will also apply to failure to meet any of the interim completion dates listed above.	Liquidated damages apply if the work is not substantially complete within 640 calendar days following the date of the Notice to Proceed as shown in Special Provisions Section 100.D and subject to the terms defined in the General Provisions.
45	At the Well 26 Treatment Plant site located behind the fire station, please confirm the available access points for construction activities. Is access limited to the front gate on Trask Avenue, or may Rainbow Street and James Avenue also be used for site access?	Access to the Well 26 PFAS Treatment Plant site is only available at the property frontage on Trask Avenue.
46	Section 11: Warranty is 1 year from “the date of acceptance of the Work”. We request this is changed to 1 year from substantial completion which is a defined term in the contract.	Section 11 cannot be revised.
47	Please update the contract documents with the attached DBE guideline requirements.	The California SWRCB has provided OCWD the latest DBE Guidelines with a Revised Date of 09/2025 (see attachment). Due to the recent suspension of several DBE requirements, OCWD decided to remove the written language of DBE guidelines in Exhibit C and replaced the Exhibit C with EPA Forms 4500-3 and 4500-4.
48	Please remove Forms 4500-3 and 4500-4 as they are no longer required per the updated DBE guidelines.	The California SWRCB has not advised OCWD on the discontinued use of EPA Forms 4500-3 and 4500-4. Until a written advice is received from the California SWRCB, OCWD shall continue the use of Forms EPA 4500-3 and 4500-4 for compliance and auditing purposes.
49	Please confirm when the GFE documentation is due to the District by the lowest bidder.	OCWD hereby confirms that the GFE documentation is due to OCWD by the lowest bidder.

50	Due to scheduling conflicts with other active pursuits within our estimating workload, we respectfully request consideration for a two (2) week extension to the Bid Due Date to allow adequate time for a complete and competitive proposal submission. Please advise if an extension can be accommodated.	Due to schedule obligations tied to the Federal grant funds associated with this project, the bid opening date cannot be extended.
51	Please provide the CPT data file for CPT-7 found in the Geotechnical Evaluation Report prepared by Ninyo & Moore. The data file should be in excel format.	See attachment to Addendum No. 2.
52	Under the insurance conditions it states if the contractor is going to be using subcontractors, that the contractor is responsible for requiring and confirm that each subcontractor meets the minimum insurance requirements. The limits of $5,000,000 per occ for GL and $10,000,000 excess liability will be difficult for almost all subs to obtain. Since the GC is the backstop to all coverage gaps, please consider allowing the GC to set the limits for its subs based on the size and scope of the contract. Or please consider requiring trades with a smaller contract of less than $1,000,000 to provide coverage limits that would be reasonable and obtainable in the marketplace.	In the event that the Contractor employs other Contractors (sub-contractors) as part of the work covered by this agreement, it shall be the Contractor's responsibility to require and confirm that each sub-contractor meets the minimum insurance requirements listed on the contract documents (via CGL endorsement as broad as ISO CG 20 38 04 13).

END OF ADDENDUM

MANDATORY FORM

ACKNOWLEDGE RECEIPT OF ADDENDUM NO. 2

CONTRACT DOCUMENTS
CITY OF GARDEN GROVE WELLS 22, 26, AND 27
PFAS WATER TREATMENT PLANTS PROJECT
CONTRACT NO. GG-2025-1
5/27/2025

THE BIDDER SHALL EXECUTE THE CERTIFICATION AT THE END OF THIS ADDENDUM AND SHALL ATTACH IT TO THE PROPOSAL SUBMITTED.

ORANGE COUNTY WATER DISTRICT

John C. Kennedy
General Manager

5/28/26
Date

BIDDER'S CERTIFICATION

I acknowledge receipt of the foregoing Addendum No. 2 to Contract No. GG-2025-1 and accept all conditions contained therein:

Date: _____

Bidder: _____

By: _____