Appendix F

Project Specific Water Quality Management Plan
Stevenson, Porto & Pierce, Inc.
February 4, 2022
Revised May 27, 2022, September 19, 2022

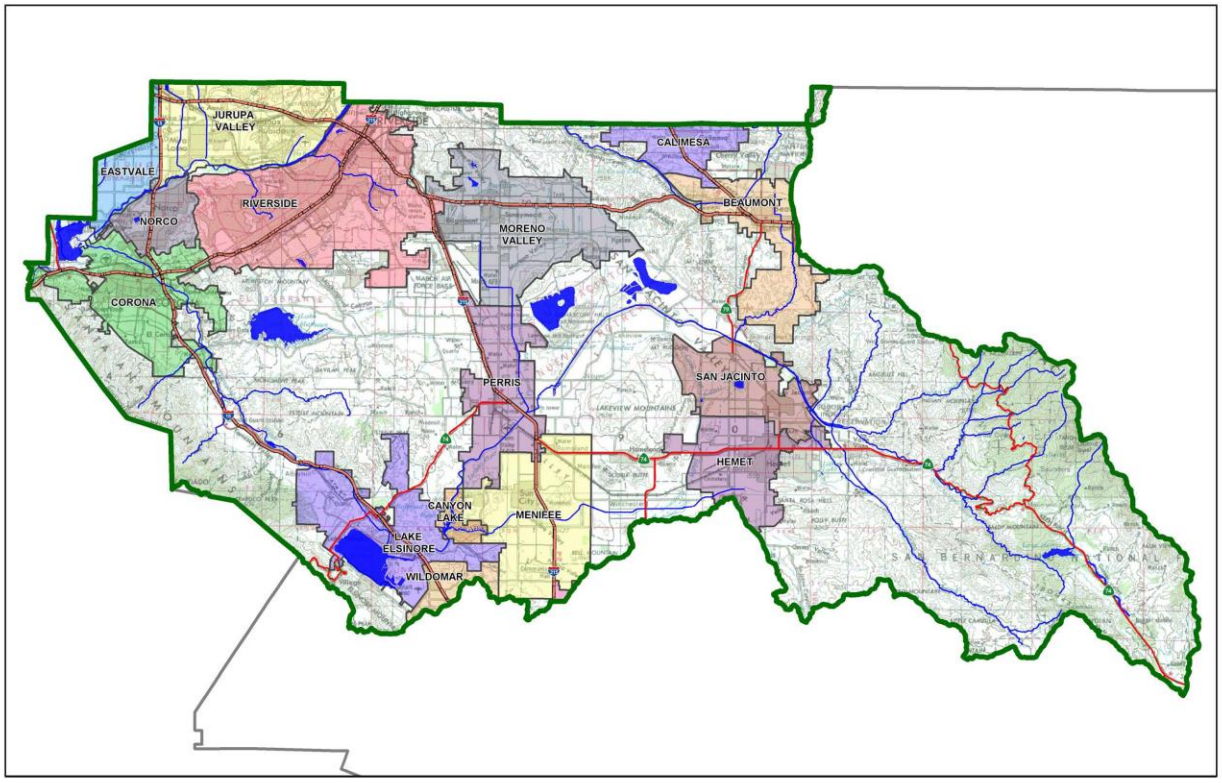
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Xenia Apartments

Tract Number: Parcel Map No. 38233

Design Review/Case No: PW2021-0822



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 2/4/2022

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Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

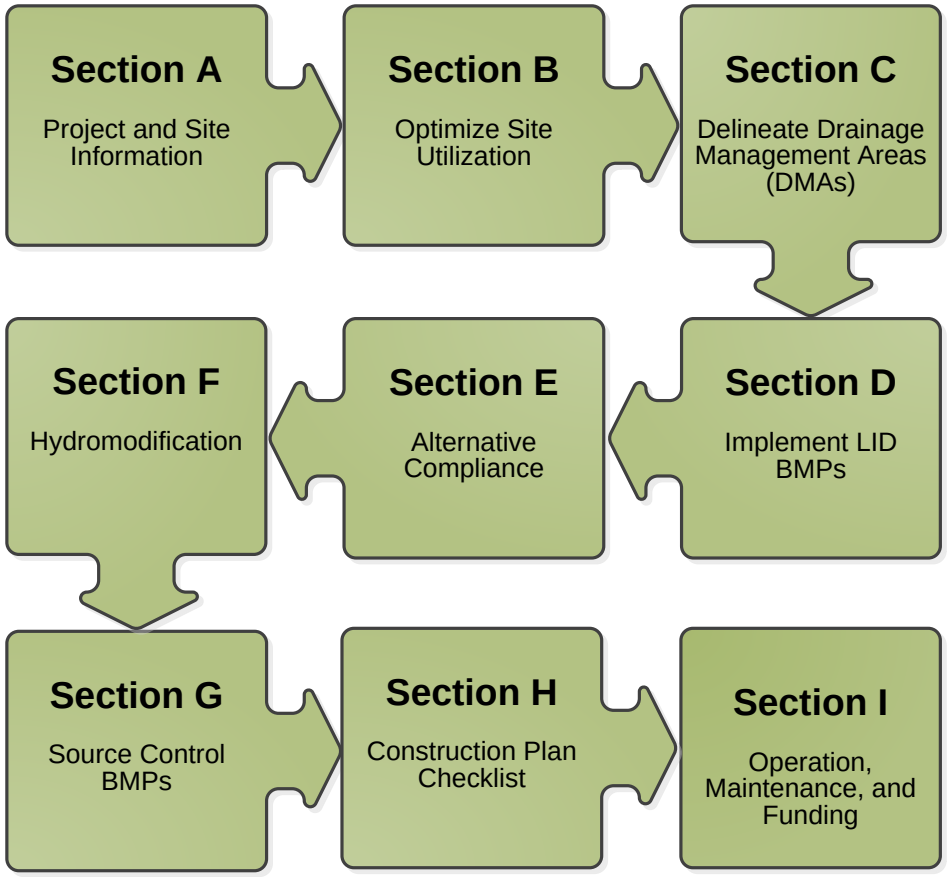
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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This preliminary Project-Specific Water Quality Management Plan (PWQMP) has been prepared for **Beaumont Land Partners, LLC. – Paul Onufer** by **Stevenson, Porto & Pierce, Inc.** for the **Xenia Apartment Project**.

This WQMP is intended to comply with the requirements of City of Beaumont per city ordinance for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Beaumont Water Quality Ordinance.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature

Owner's Printed Nam TO BE COMPLETE PRIOR TO FINAL APPROVAL

Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature

Date

Jimmy C. Chen

ct Manager

Preparer's Printed Name

Preparer's Title/Position

TO BE COMPLETE PRIOR TO FINAL APPROVAL

Engineer of Record Signature

Date

Jimmy C. Chen

Senior Project Manager

Engineer of Record Printed Name

Engineer of Record Title/Position

EOR's Licensure: RCE #51394, Exp: 6/30/22

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Residential - Apartments
Planning Area:	N/A
Community Name:	Xenia Apartments
Development Name:	Xenia Apartments
PROJECT LOCATION	
Latitude & Longitude 33°55'53.37"N, 116°57'09.89"W	
Project Watershed and Sub-Watershed: Santa Ana River Watershed, San Jacinto River Basin	
Gross Acres: 10.93 acres	
APN(s): 419-160-005, 419-160-024, 419-170-016, 419-170-017, 419-170-018, 419-170-022, & 419-170-027	
Map Book and Page No.:	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	R-MF (Residential Mulit-Family)
Proposed or Potential SIC Code(s)	1521, General Builder Contractor, single-family residential.
Area of Impervious Project Footprint (SF)	320,796 s.f.
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	320,796 s.f.
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 s.f.
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	Not in a cell
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	
What is the Water Quality Design Storm Depth for the project?	0.85

A.1 Maps and Site Plans

The Project-Specific WQMP, includes a map of the local vicinity and existing site. In addition, all grading, drainage, landscape details and other pertinent construction plans are in Appendix 2. The WQMP Site Plan includes the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

Project Description:

The Xenia Apartments project proposes the development of 10.93-acres into an apartment complex within the City of Beaumont and County of Riverside. At present, the site is vacant and that is mostly comprised of bare soil with sparse vegetation. The site's topography generally slopes from north to south with no definitive historical concentrated drainage paths. Currently, the runoff that leaves the site flows through the neighboring properties along the south property line and eventually reaches the inlets along E 6th Street. These inlets connect to the city storm drain system within E 6th Street and proceeds eastward. The project is primarily accessed via Xenia Avenue, south of 8th Street. The project is surrounded by vacant, undeveloped land, and single-family residential lands.

For the proposed condition, all the onsite runoff generally flows from the north towards the south and is collected by the proposed stormwater systems consisting of catch basin inlets, stormwater conveyance pipes, and an extended detention basin. From here, the treated runoff leaves the project via a calibrated outlet structure within the basin through an extension of the existing 30" storm drain from E 6th Street.

A.2 Identify Receiving Waters

Table A.1 below lists in order of upstream to downstream, the receiving waters that the project site is tributary to and identifies the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Appendix 1 includes a map of the receiving waters.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
On-site Storm Drain System	N/A	N/A	N/A
San Jacinto River 3 – Canyon Lake to Nuevo Road	N/A	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
San Jacinto Reach 2 - Canyon Lake (HU 802.11)	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
San Jacinto River Reach 1 – Lake Elsinore to Canyon Lake (HU 801.32)	N/A	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
Lake Elsinore (HU 802.31)	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Sedimentation/Siltation	MUN, AGR, REC1, REC2, WARM, WILD	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N

US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N

Section B: Optimize Site Utilization (LID Principles)

The 2010 Santa Ana MS4 Permit requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible or in some other way not required. Therefore, the narratives below identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, noted opportunities that exist are described below as to how they will be utilized during project design. These Constraints and Opportunities are noted on the WQMP Site plan in Appendix 1.

Site Optimization

The following questions help describe the site's opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, the existing site drains towards the south via overland sheet flow and concentrated flow paths until is confluences and is intercepted by the existing City drainage system located within E 6th Street. The proposed on-site system will discharge treated runoff in the City's storm drain system upstream within Xenia Avenue which connects to the mainline in E 6th Street.

Did you identify and protect existing vegetation? If so, how? If not, why?

No. The current site is barren which will be graded and compacted for the proposed improvements. However, the proposed site will be planted with landscaping approved by the city of Beaumont.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

No; infiltration capacity will be lessened due to the proposed impermeable surfaces, and soil compaction. In areas where ornamental landscaping is proposed, natural infiltration may be implemented.

Did you identify and minimize impervious area? If so, how? If not, why?

Yes - Within the development envelope, street and sidewalk widths were minimized to the acceptable City standards.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes—buildings are to drain to adjacent landscape areas where possible. All runoff from the project will be directed to the proposed Extended Detention Basin before leaving the site.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping the project site into individual DMAs, the completed Table C.1 below appropriately categorizes the types of classification (e.g., Roofs, Ornamental Landscaping, etc.) of the DMA's for your project site.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA 1	Rooftop, Driveway, Sidewalk, Asphalt Street, Landscaping	267,513 s.f.	Type D
SRA-1	Mixed: Roofs, Sidewalks, Ornamental Landscaping	14,190 s.f.	Type B
SRA-2	Mixed: Roofs, Sidewalks, Ornamental Landscaping	9,969 s.f.	Type B
SRA-3	Mixed: Roofs, Sidewalks, Ornamental Landscaping	10,820 s.f.	Type B
SRA-4	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,479 s.f.	Type B
SRA-5	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,250 s.f.	Type B
SRA-6	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,448 s.f.	Type B
SRA-7	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,688 s.f.	Type B
SRA-8	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,055 s.f.	Type B
SRA-9	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,788 s.f.	Type B
SRA-10	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,601 s.f.	Type B
SRA-11	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,141 s.f.	Type B
SRA-12	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,281 s.f.	Type B
SRA-13	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,911 s.f.	Type B
SRA-14	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,613 s.f.	Type B
SRA-15	Mixed: Roofs, Sidewalks, Ornamental Landscaping	12,084 s.f.	Type B
SRA-16	Mixed: Roofs, Sidewalks, Ornamental Landscaping	11,994 s.f.	Type B

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

(Impervious Cover for Developed Areas RCFC & WCD Hydrology Manual Plate D-5.6)

Table C.2 Type 'A', Self-Treating Areas – **NOT APPLICABLE**

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
SRA-1	Ornamental Landscaping	6,410	0.85	**SRA-1**	7,780	1.88
SRA-2	Ornamental Landscaping	3,354	0.85	**SRA-2**	6,615	2.53
SRA-3	Ornamental Landscaping	3,683	0.85	**SRA-3**	7,137	2.50
SRA-4	Ornamental Landscaping	4,008	0.85	**SRA-4**	7,471	2.43
SRA-5	Ornamental Landscaping	4,439	0.85	**SRA-5**	7,811	2.35
SRA-6	Ornamental Landscaping	4,777	0.85	**SRA-6**	7,671	2.21
SRA-7	Ornamental Landscaping	4,258	0.85	**SRA-7**	7,430	2.33
SRA-8	Ornamental Landscaping	4,610	0.85	**SRA-8**	7,445	2.22
SRA-9	Ornamental Landscaping	4,124	0.85	**SRA-9**	7,664	2.43
SRA-10	Ornamental Landscaping	3,961	0.85	**SRA-10**	7,640	2.49
SRA-11	Ornamental Landscaping	4,703	0.85	**SRA-11**	7,438	2.19
SRA-12	Ornamental Landscaping	4,824	0.85	**SRA-12**	7,457	2.16

SRA-13	Ornamental Landscaping	4,151	0.85	**SRA-13**	7,760	2.44
SRA-14	Ornamental Landscaping	4,015	0.85	**SRA-14**	7,598	2.46
SRA-15	Ornamental Landscaping	4,672	0.85	**SRA-15**	7,412	2.20
SRA-16	Ornamental Landscaping	4,802	0.85	**SRA-16**	7,192	2.12

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product		Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]
SRA-1	7,780	Roofs & Sidewalks	1.0	7,780	**SRA-1**	6,410	1.21 < 2
SRA-2	6,615	Roofs & Sidewalks	1.0	6,615	**SRA-2**	3,354	1.97 < 2
SRA-3	7,137	Roofs & Sidewalks	1.0	7,137	**SRA-3**	3,683	1.94 < 2
SRA-4	7,471	Roofs & Sidewalks	1.0	7,471	**SRA-4**	4,008	1.86 < 2
SRA-5	7,811	Roofs & Sidewalks	1.0	7,811	**SRA-5**	4,439	1.76 < 2
SRA-6	7,671	Roofs & Sidewalks	1.0	7,671	**SRA-6**	4,777	1.61 < 2
SRA-7	7,430	Roofs & Sidewalks	1.0	7,430	**SRA-7**	4,258	1.74 < 2
SRA-8	7,445	Roofs & Sidewalks	1.0	7,445	**SRA-8**	4,610	1.61 < 2

SRA-9	7,664	Roofs & Sidewalks	1.0	7,664	**SRA-9**	4,124	1.86 < 2
SRA-10	7,640	Roofs & Sidewalks	1.0	7,640	**SRA-10**	3,961	1.93 < 2
SRA-11	7,438	Roofs & Sidewalks	1.0	7,438	**SRA-11**	4,703	1.58 < 2
SRA-12	7,457	Roofs & Sidewalks	1.0	7,457	**SRA-12**	4,824	1.55 < 2
SRA-13	7,760	Roofs & Sidewalks	1.0	7,760	**SRA-13**	4,151	1.87 < 2
SRA-14	7,598	Roofs & Sidewalks	1.0	7,598	**SRA-14**	4,015	1.89 < 2
SRA-15	7,412	Roofs & Sidewalks	1.0	7,412	**SRA-15**	4,672	1.59 < 2
SRA-16	7,192	Roofs & Sidewalks	1.0	7,192	**SRA-16**	4,802	1.50 < 2

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA 1	Bioretention Basin "A"

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

Geotechnical Report

A Geotechnical Report and Phase I Environmental Site Assessment has been prepared for this project to confirm present and past site characteristics that may affect the use of Infiltration BMPs. The geotechnical report is included it in Appendix 3. In addition, the Phase I Environmental Site Assessment is included in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		x
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		x
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		x
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	x	
If Yes, list affected DMAs: Entire Site, especially at the WQ Basin site (0.5 in/hr.)		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?	x	
If Yes, list affected DMAs: All		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		x
Describe here: low to no infiltration capability		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

Infiltration will not be relied upon due to in-situ infiltration rates below 1.6 in/hr.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site: **Not Feasible.**

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 2.68 acres

Type of Landscaping (Conservation Design or Active Turf): Active Turf

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 7.36 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 1.10

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 8.10 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
8.10 acres	**2.68 acres**

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site: **Not Feasible.**

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 768 users

Project Type: Residential

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 7.36 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 138

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 1,016 users

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
1,016 Users	**768 Users**

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Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

Not Applicable – No other non-potable uses available.

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: **Not Applicable– No other non-potable uses available.**

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as

a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: **Not Applicable– No other non-potable uses available.**

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: **Not Applicable– No other non-potable uses available.**

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: **Not Applicable– No other non-potable uses available.**

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
Not Applicable	Not Applicable

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA 1	☐	☐	☒	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Infiltration will not be relied upon due to in-situ infiltration rates below 1.6 in/hr. Harvest and Use is not feasible because all landscaped areas are within each privately owned lot thereby eliminating the ability to apply harvest reuse for irrigation. An extended Detention Basin will be used for DMA 1 sized for both water quality and increased runoff mitigation.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculations were prepared of the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** the Co-permittee approved design of the LID BMP meet the requirements of the V_{BMP}. The completed Table D.3 below documents the Design Capture Volume and the Proposed Volume for each LID BMP. The completed design procedure sheets for each LID BMP in located in Appendix 6.

Table D.5.1 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (s.f.)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP Name:* *Extended Detention Basin "A"*		
DMA 1	*[A]*		*[B]*	*[C]*	*[A] x [C]*			
Impervious: Roofs, Sidewalks & Parking / Streets	*201,250*	*Roofs, Concrete and Asphalt*	*1*	*0.89*	*179,515*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Pervious: Open Space / Landscaping	*44,922*	*Ornamental Landscaping*	*0.1*	*0.1*	*4,962*			
Basin	*21,341*	*Ornamental Landscaping*	*0.1*	*0.1*	*2,357.3*			
	$A_T = \Sigma[A]$ **267,513**				$\Sigma = [D]$ **186,834.3**	*[E]* **0.85**	$[F] = \frac{[D]x[}{12}$ **13,234.1**	*[G]* ***97,162***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program) – N/A

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Table A.1 from Section A above noted the project's receiving waters and their associated EPA approved 303(d) listed impairments. Table E.1 below cross references this information with the selected Priority Development Project Category. The identified General Pollutant Categories of Nutrients is the same as those listed for the receiving waters. As such, **Nutrients** will be the "Pollutants of Concern" for this project. The purpose of this is to document compliance and appropriately plan for mitigating the Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☒ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P

☐	Parking Lots (>5,000 ft^2)	P[6]	P	P[1]	P[1]	P[4]	P[1]	P	P
☐	Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern		☒	☐	☒	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

[1] A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

[2] A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

[3] A potential Pollutant is land use involving animal waste

[4] Specifically petroleum hydrocarbons

[5] Specifically solvents

[6] Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits (High Density can only apply one category)

Qualifying Project Categories	Credit Percentage[2]
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.3 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

DMA A	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration (minutes)	10.40	15.57	49.7%
Volume (Cubic Feet)	54,991	72,977	32.7%

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

C. The proposed extended detention basin "A" and outlet structure has been designed to detain and mitigate the 2-year post-developed peak runoff to below 110% of the 2-year pre-developed peak runoff rate. This is achieved with a basin that has a total capacity of 1.87 ac-ft with a calibrated outlet structure. Please see the following table summarizing the pre- and post-developed peak runoff and the results basin mitigation results. Therefore, HCOC mitigation has been achieved through method C. Please see Appendix 7 for the supporting calculations and results.

Site Flow Rate Summary				
Undeveloped	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Total Site Peak Flow (cfs) 15.3 Ac.	13.2	6.0	4.2	1.2
Developed	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Total Site Peak Flow (cfs) 15.3 Ac.	16.8	9.2	7.5	3.5
Mitigation Status	Fail	Fail	Fail	Fail
Developed w/ Detention Routing	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Total Site Peak Flow (cfs) 68.7 Ac.	1.2	1.0	1.1	1.3
Percent Difference	-91%	-83%	-73%	6%
Mitigation Status	Pass	Pass	Pass	Pass

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
D1. Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Intergraded Pest Management information to owners, lessees, and operators.
D2. Landscape/Outdoor Pesticide Use	Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution by following manufactures guidelines. Where landscaped areas are used to retain or detain	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in "What you should know for….Landscaping and Gardening" at http://rcflood.org/stormwater/ Provide IPM information to new owners, lessees and operation

	stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soil, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	
E. Pools, spas, ponds, decorative fountains, and other water features.	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
G. Refuse areas	State how site refuse will be handled and provide supporting detail to what is shown on plans. State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/ prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick-up spills immediately. See Fact Sheet WM-4 "Spill Prevention and Control" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com Keep spill control materials available on-site. See Fact Sheet SC-34. "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Onsite Storm Drain Inlets	Mark with "Only Rain in the Drain"	Maintain regularly, provide educational material to residents (good practices and discharge prohibitions)
Sidewalks & Streets	n/a	Sweep regularly and prevent litter from accumulating (no cleaning agents or degreasers discharging to storm drain system)

N. Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com
O. Roofing, gutter, and trim.	Avoid roofing, gutter, and trim made of copper or other unprotected metals that may leach into runoff.	n/a

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
Bioretention Basin "A"	Extended Detention Basin sized to capture and treat the required Design Volume	Preliminary WQMP Site Plan Exhibit

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

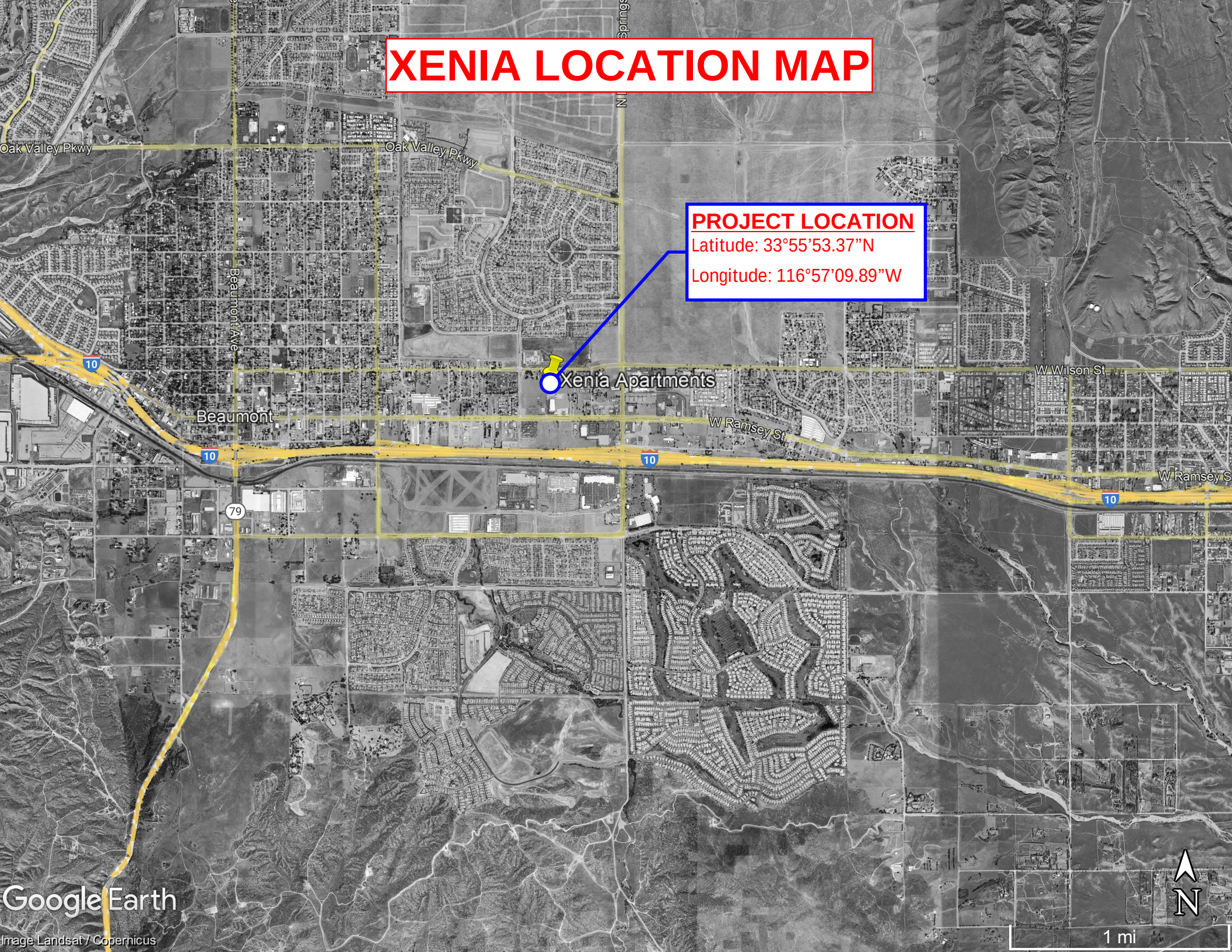
Maintenance Mechanism: Public facilities, like the storm drain system within public right-of-way, will be maintained by the City of Beaumont and funded by City maintenance funds. Flood Control District will own and maintain the Flood Control storm drain system and funding will be District maintenance funds. Private facilities, like the extended detention basin and onsite drainage inlets and pipes, will be maintained by the Property Owner's Association and funded by a residential HOA fee assessment.

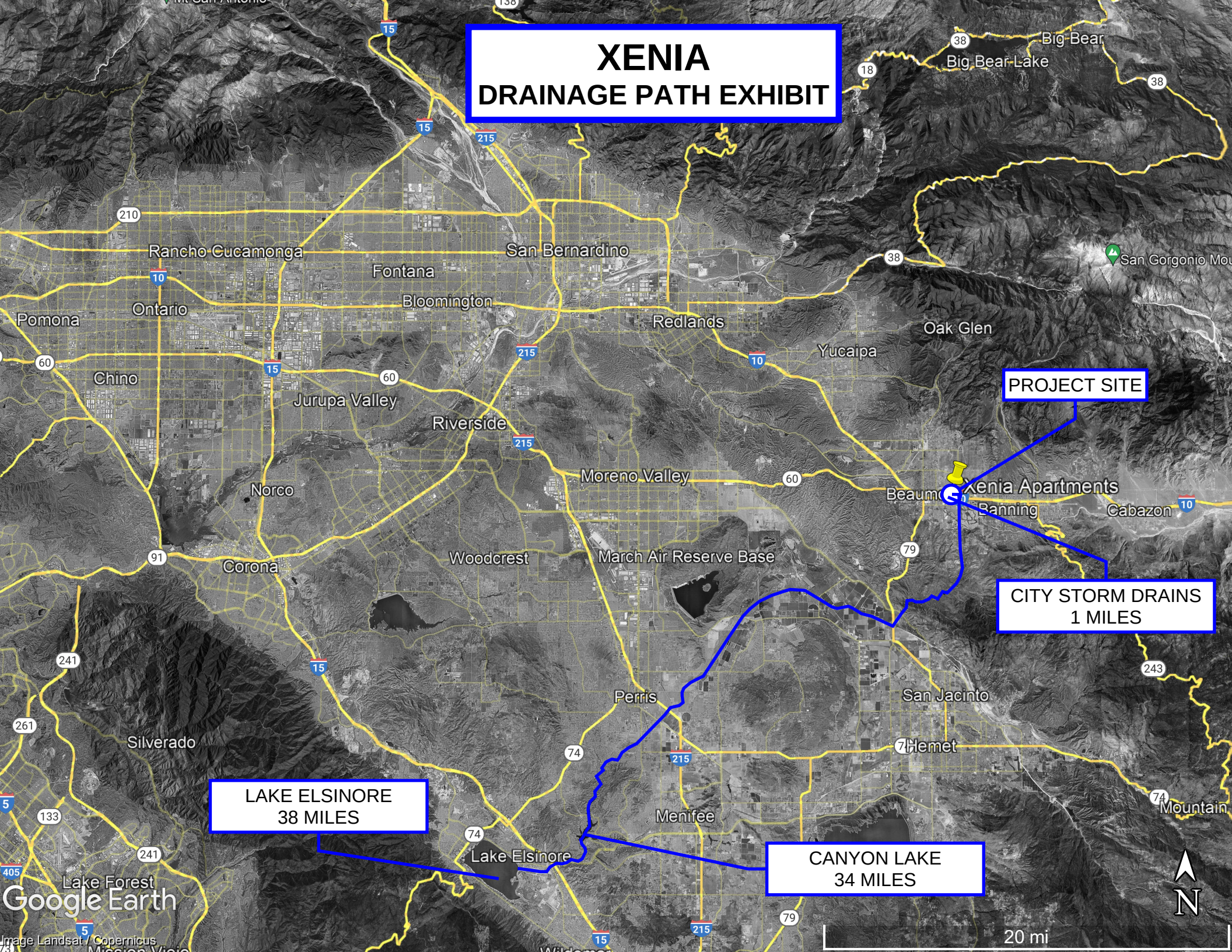
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

This site has one (1) primary water quality treatment BMP's which would require an O&M Plan. As described throughout this document, there a Bioretention Basin proposed. This basin will be maintained by the Property Owner's Association where maintenance and the funding mechanism will be detailed in the Conditions, Covenants and Restrictions (CC&R's). The maintenance schedule is included in the Operations & Maintenance Plan for BMP Basins in Appendix 10.

Appendix 1: Maps and Site Plans


XENIA LOCATION MAP
PROJECT LOCATION
Latitude: 33°55'53.37"N
Longitude: 116°57'09.89"W
Xenia Apartments
Oak Valley Pkwy
Oak Valley Pkwy
Beaumont Ave
Beaumont
W Wilson St
W Ramsey St
W Ramsey St
10
10
10
79
N
1 mi
Google Earth
Image Landsat / Copernicus


XENIA
DRAINAGE PATH EXHIBIT
PROJECT SITE
Xenia Apartments
CITY STORM DRAINS
1 MILES
LAKE ELSINORE
38 MILES
CANYON LAKE
34 MILES
Rancho Cucamonga
San Bernardino
Fontana
Bloomington
Ontario
Pomona
Redlands
Oak Glen
Yucaipa
Chino
Jurupa Valley
Riverside
Moreno Valley
Norco
Corona
Woodcrest
March Air Reserve Base
Banning
Cabazon
Beaumont
Perris
San Jacinto
Hemet
Silverado
Menifee
Lake Elsinore
Lake Forest
Big Bear
Big Bear Lake
Mountain
Google Earth
Image Landsat / Copernicus
N
20 mi

XENIA

PROJECT SITE = 0.85

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S | T 02 S | T 03 S | T 04 S | T 05 S | T 06 S | T 07 S | T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiverSideNorth
0.68 PigeonPass
0.54 RiverSideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed

Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | HEMET | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | MURRIETA | TEMECULA

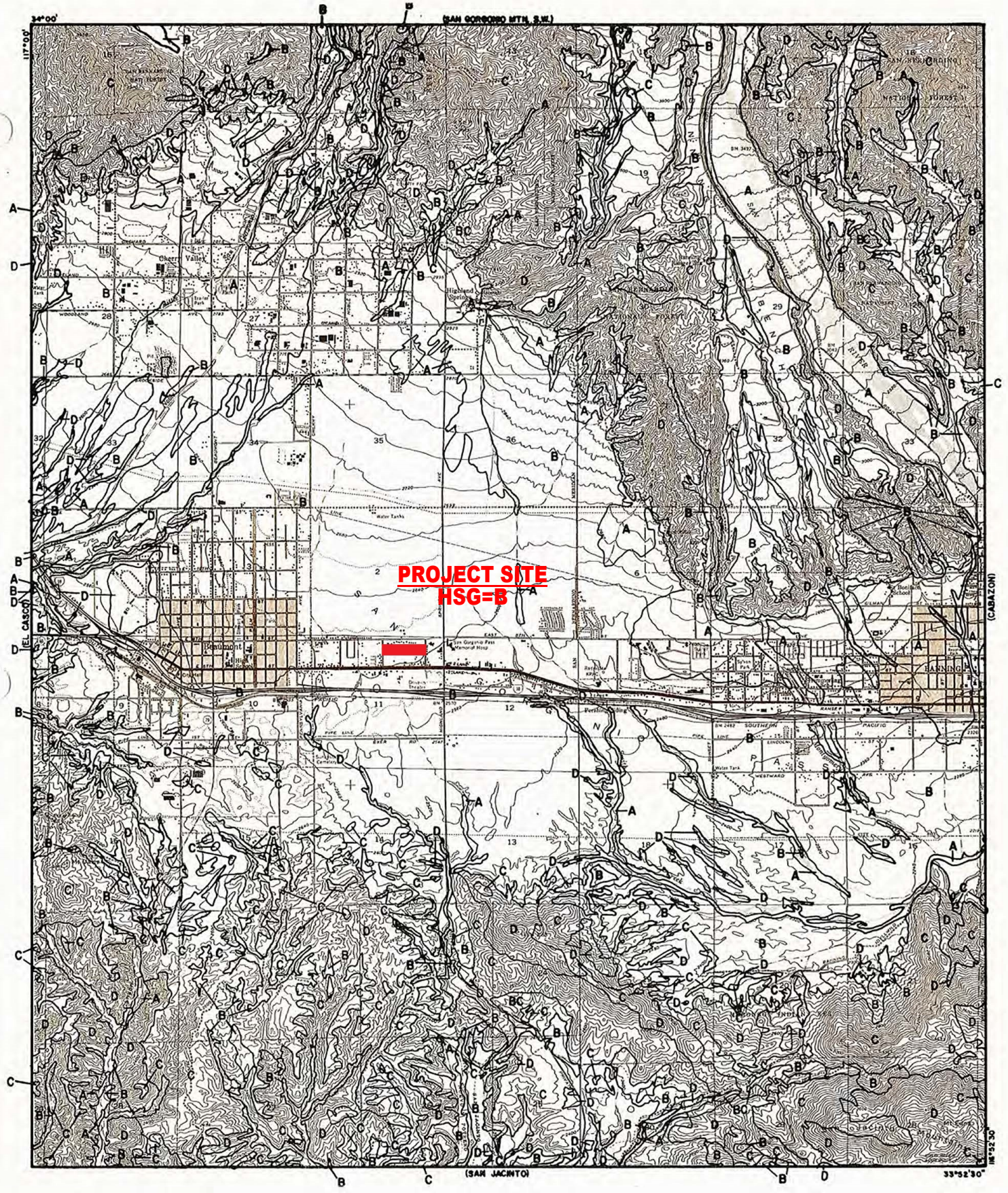
N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

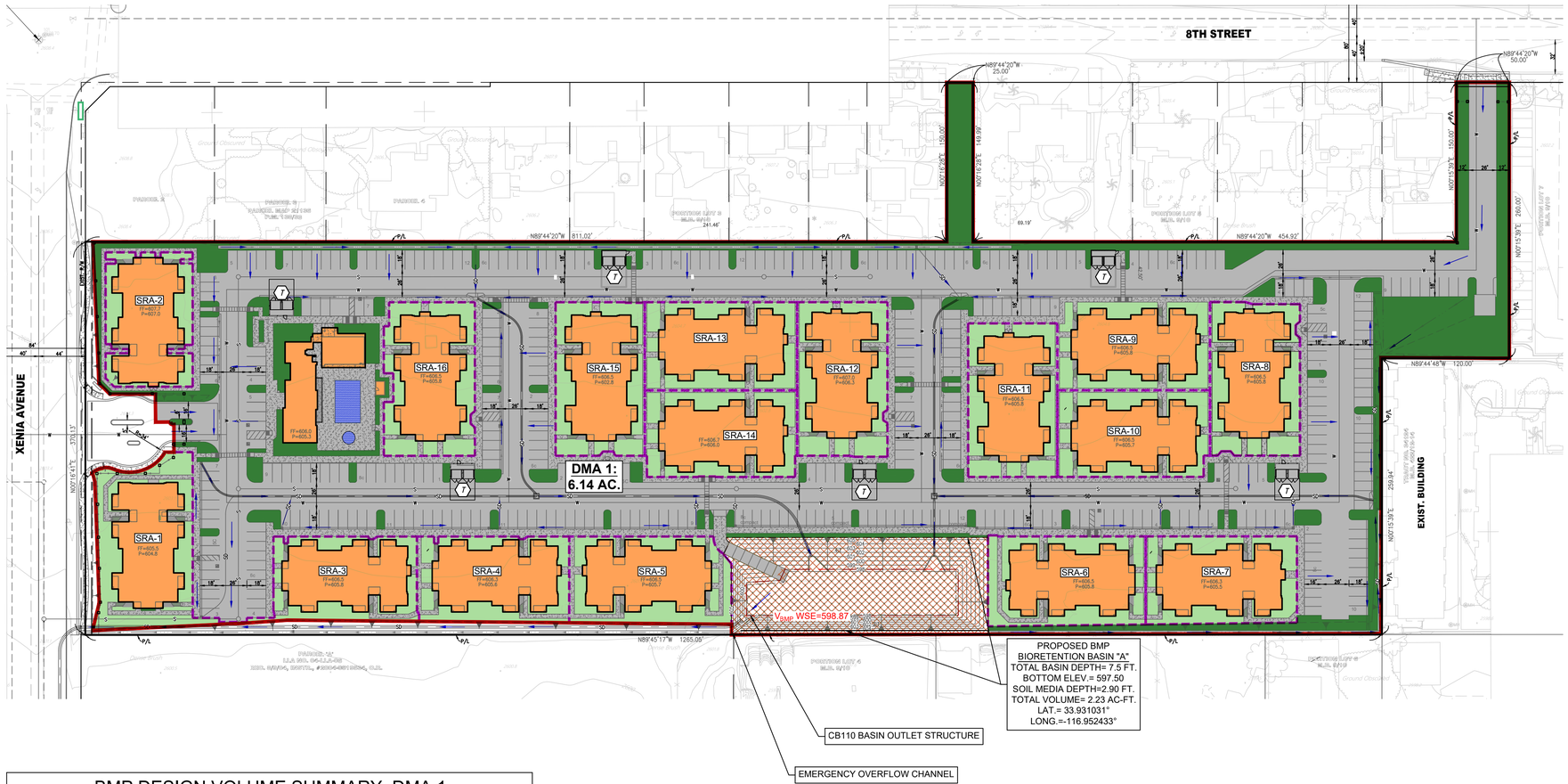
HYDROLOGY MANUAL

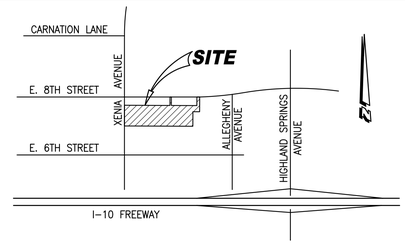
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0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR BEAUMONT

PLATE C-1.19





VICINITY MAP
NTS

OWNER/APPLICANT:

BEAUMONT LAND PARTNERS, LLC
16133 VENTURA BLVD. #633
ENCINO, CA 91436
CONTACT: PAUL ONUFER
OFFICE PH: 626-263-4205
EMAIL: PONUFER@AVPRE.NET

GENERAL MAP NOTES:

1. ASSESSOR'S PARCEL NUMBER:
   419-160-005, 419-160-024, 419-170-016, 419-170-017, 419-170-018, 419-170-022, & 419-170-027.
2. SITE ZONING:
   - (R-MF) RESIDENTIAL MULTI-FAMILY (20 DU ACRE)
3. SITE GENERAL PLAN DESIGNATION:
   -MULTI-FAMILY RESIDENTIAL
4. LAND USE:
   -EXIST: VACANT
   -PROPOSED: APARTMENTS
5. SITE ACREAGE:
   - GROSS AREA: 10.931 ACRES (476,164.12 SF)
   - NET AREA: 10.927 NET (475,964.1 SF)
6. NO OFF-SITE RIGHT-OF-WAY IS REQUIRED FOR FOR SITE ACCESSIBILITY.
7. THIS PARCEL MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
8. WATER QUALITY AND DETENTION AREAS TO BE MAINTAINED BY LAND OWNER.
9. NO HAZARDOUS MATERIALS HAVE BEEN KNOWN TO BE STORED ON SITE.
10. THE PROPERTY IS NOT SUBJECT TO LIQUEFACTION OR GEOLOGICAL HAZARDS. OR SUBJECT TO OVERFLOW, INUNDATION, OR FLOOD HAZARDS.
11. THERE ARE NO KNOWN WELLS ON-SITE OR WITHIN 200' OF THE SITE.

LEGEND:

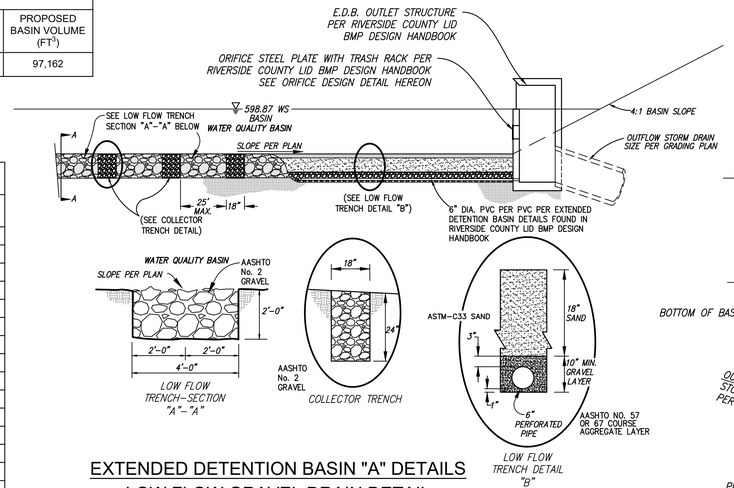
- FLOW ARROW
- DMA BOUNDARY
- SELF-RETAINING AREA BOUNDARY
- IMPERVIOUS AREAS: (STREET, PARKING, AND SIDEWALKS)
- IMPERVIOUS AREAS: (ROOFS)
- PERVIOUS AREAS: (OPEN SPACE AND LANDSCAPING)
- PERVIOUS AREAS: (SELF-RETAINING LANDSCAPED AREAS)
- PROPOSED BMP AREAS
- PROPOSED STORM DRAIN
- (7) PROPOSED TRASH ENCLOSURE
- PROPOSED INLETS (TYPICAL)

BMP DESIGN VOLUME SUMMARY: DMA 1

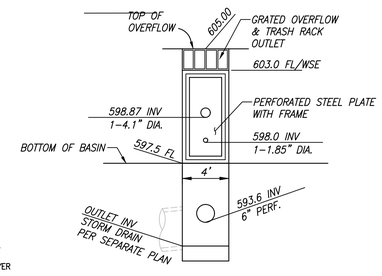
IMPERVIOUS AREAS: ROOFS, SIDEWALKS, & STREETS/PARKING (FT^2)	PERVIOUS AREAS: OPEN SPACES & LANDSCAPING (FT^2)	BASIN AREA (FT^2)	TOTAL AREA (AC.)	VBMP (FT^3)	PROPOSED BASIN VOLUME (FT^3)
201,250	44,922	21,341	6.14	13,234	97,162

SELF-RETAINING AREA SUMMARY

AREA ID	PERVIOUS AREA (SQ-FT.)	IMPERVIOUS AREA (SQ-FT.)	TOTAL AREA (SQ-FT.)	REQ. RETENTION DEPTH (IN)	RATIO
SRA-1	6,410	7,780	14,190	1.88	1.12 < 2
SRA-2	3,354	6,615	9,969	2.53	1.97 < 2
SRA-3	3,683	7,137	10,820	2.50	1.94 < 2
SRA-4	4,008	7,471	11,479	2.43	1.86 < 2
SRA-5	4,439	7,811	12,250	2.35	1.76 < 2
SRA-6	4,777	7,671	12,448	2.21	1.61 < 2
SRA-7	4,258	7,430	11,688	2.33	1.74 < 2
SRA-8	4,610	7,445	12,055	2.22	1.61 < 2
SRA-9	4,124	7,664	11,788	2.43	1.86 < 2
SRA-10	3,961	7,640	11,601	2.49	1.93 < 2
SRA-11	4,703	7,438	12,141	2.19	1.58 < 2
SRA-12	4,824	7,457	12,281	2.16	1.55 < 2
SRA-13	4,151	7,760	11,911	2.44	1.87 < 2
SRA-14	4015	7,598	11,613	2.46	1.89 < 2
SRA-15	4,672	7,412	12,084	2.20	1.59 < 2
SRA-16	4,802	7,192	11,994	2.12	1.50 < 2



EXTENDED DETENTION BASIN "A" DETAILS
LOW FLOW GRAVEL DRAIN DETAIL
N.T.S.



BASIN "A" OUTLET DETAIL
PER RIVERSIDE COUNTY LID BMP DESIGN HANDBOOK

SOURCE CONTROL

- LANDSCAPED AREAS WITHIN THE RESIDENTIAL LOTS AND RIGHT-OF-WAYS SHALL BE MAINTAINED USING MINIMUM TO NO PESTICIDES
- POOLS SHALL BE PLUMBED TO THE SANITARY SEWER IF REQUESTED BY THE CO-PERMITTEE.
- PROPERTY OWNERS SHALL KEEP TRASH RECEPTACLES CLOSE AT ALL TIMES.
- CAR WASHING AND MAINTENANCE SHALL BE PROHIBITED ONSITE.
- FIRE SPRINKLERS TEST WATER SHALL DRAIN TO THE SANITARY SEWER.
- CONDENSATION DRAIN LINES MAY DISCHARGE TO LANDSCAPED AREAS IF THE FLOW IS SMALL ENOUGH THAT RUNOFF WILL NOT OCCUR. CONDENSATE DRAIN LINES MAY NOT DISCHARGE TO THE STORM DRAIN SYSTEM.
- AVOID ROOFING, GUTTERS, AND TRIM MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF.
- STREET SHALL BE SWEPT BY A PRIVATE CONTRACTOR EVERY TWO WEEKS.

85TH PERCENTILE, 24-HOUR RAIN FALL DEPTH FROM ISOHYETAL MAP: D_{85} = 0.85 IN

60' 0 60' 120' 180'
SCALE: 1" = 60'

PREPARED BY:
SP2 & Co.
A LAND DEVELOPMENT SERVICES COMPANY
265 S. RANDOLPH AVENUE #105
BREA, CA 92821
PHONE: (714) 490-1500
"SERVING THE DEVELOPMENT COMMUNITY SINCE 1985"

XENIA APARTMENTS
PRELIMINARY WATER QUALITY MANAGEMENT PLAN
SITE PLAN

Plotted: Sep 18, 2022 - 5:38pm By: AlexanderJaramillo DWG: C:\Users\AlexanderJaramillo\OneDrive - sp2inc.com\Projects\Xenia\Beaumont-10\Stormwater\Water Quality\Drawings\Xenia-PWQMP Site Plan.dwg

Appendix 2: Construction Plans

REVISIONS			
NO.	BY:	DESCRIPTION	DATE

(CASE# _____)

TENTATIVE PARCEL MAP 38233

IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

LEGEND

B.W.	BACK OF WALK
F.S.	FINISHED SURFACE
P/L	PROPERTY LINE
S.M.H.	SEWER MANHOLE
C&G	CURB AND GUTTER
S.C.O.	SEWER CLEAN OUT
C.L.F.	CHAIN LINK FENCE
A.C.	ASPHALT CONCRETE PAVEMENT
R.V.	RECREATIONAL VEHICLE
E.P.	EDGE OF PAVEMENT
S.D.	STORM DRAIN
R/W	RIGHT-OF-WAY
DRWY.	CONCRETE APRON DRIVEWAY
B.S.L.	BUILDING SETBACK LINE
F.H.	FIRE HYDRANT
T.C.	TOP OF CURB
F.L.	FLOW LINE
P.B.	PULL BOX
I.B.	IRRIGATION BOX
C.F.	CURB FACE
	LIGHT STANDARD
	FIRE HYDRANT
	WATER VALVE
	TUBULAR STEEL FENCE
W	PROP. WATER LINE
	PROPERTY LINE
S.D.	STORM DRAIN

BASIS OF BEARINGS

"THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM, CCS83, ZONE 6, BASED LOCALLY ON CONTROL STATIONS "P609", "PPBF", AND "P584" NAD 83 (CSRS) EPOCH 2017.50 AS SHOWN HEREON. ALL BEARINGS SHOWN ON THIS MAP ARE GRID. QUOTED BEARINGS AND DISTANCES FROM REFERENCE MAPS OR DEEDS ARE AS SHOWN PER THAT RECORD REFERENCE. ALL DISTANCES SHOWN ARE GROUND DISTANCES UNLESS SPECIFIED OTHERWISE. GRID DISTANCES, MAY BE OBTAINED BY MULTIPLYING THE GROUND DISTANCE BY A COMBINATION FACTOR OF 0.9998886511. CALCULATIONS ARE MADE AT "1000" WITH COORDINATES OF: N: 2,283,669.169, E: 6,347,837.206, USING AN ELEVATION OF 2611.65'.

PUBLIC SERVICE/UTILITY PURVEYORS

SCHOOL DISTRICT: BEAUMONT UNIFIED SCHOOL DISTRICT
SEWER: CITY OF BEAUMONT
WATER: BEAUMONT CHERRY WATER DISTRICT
FIRE PROTECTION: CITY OF BEAUMONT
GAS: SOUTHERN CALIFORNIA GAS COMPANY
ELECTRIC: SOUTHERN CALIFORNIA EDISON COMPANY

FLOOD ZONE DESIGNATION

ZONE X, MAP PANEL #06065C0812G, EFFECTIVE DATE: AUGUST 28, 2008

0.2% ANNUAL CHANCE FLOOD , AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN ONE SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

BENCHMARK:

RIVERSIDE COUNTY BENCHMARK C-2-2-65
STANDARD 3 1/4" ALUMINUN DISK SET ON TOP CONCRETE POST
STAMPED C-2-2-65 ELEVATION 2635.813' NGVD 29 DATUM.

LEGAL DESCRIPTION

BEING A SURVEY OF PARCEL 1 OF PARCEL MAP NO. 21136 AS SHOWN ON MAP ON FILE IN BOOK 138, PAGE 33 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA AND PORTIONS OF LOTS 3, 5 AND 7 IN BLOCK 5 OF THE SUBDIVISION OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SAN BERNARDINO BASE AND MERIDIAN AS SHOWN BY MAP ON FILE IN BOOK 9, PAGE 10 OF MAPS, RECORDS OF THE COUNTY OF SAN BERNARDINO IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.

RECORDED EASEMENT NOTES

1. AN EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES, RECORDED JANUARY 12, 1910, BOOK 295, PAGE 204, OF OFFICIAL RECORDS RIVERSIDE COUNTY. (LOCATION OF EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION).
2. AN EASEMENT FOR INGRESS AND EGRESS PURPOSES, RECORDED FEBRUARY 6, 1980, AS INSTRUMENT NO. 24822, AND JUNE 11, 1985, AS INSTRUMENT NO. 125201, BOTH OF OFFICIAL RECORDS.

PROPOSED EASEMENT NOTES

1. AN PROPOSED EASEMENT FOR EMERGENCY ACCESS AND PUBLIC UTILITY PURPOSES IN FAVOR OF THE CITY OF BEAUMONT.
2. AN PROPOSED EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF THE BEAUMONT CHERRY VALLEY WATER DISTRICT
3. AN PROPOSED EASEMENT FOR SEWER PURPOSES IN FAVOR OF THE CITY OF BEAUMONT.

SETBACK CRITERIA (*)

SETBACKS:

A. FRONT YARD:
- 25'
- 25' (TWO-LEVEL)

B. REAR YARD:
- 15' FOR INTERIOR LOTS.
- 5' FOR ACCESSORY STRUCTURES USED EXCLUSIVELY FOR PARKING
- 20' (TWO-LEVEL)

C. SIDE YARD:
- 5' FOR INTERIOR LOTS.
- 10' FOR INTERIOR LOTS>70' IN WIDTH
- 10' FOR CORNER LOTS
- 15' (TWO-LEVEL)
- 20' (TWO-LEVEL/CORNER LOTS)

* SETBACK CRITERIA PER BMC TABLE 17.03-2

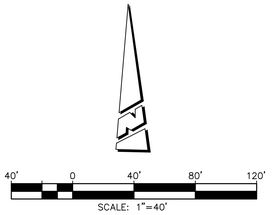
NEIGHBORING ZONING AND GENERAL PLAN DESIGNATIONS

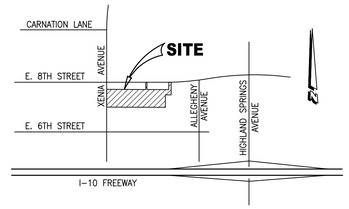
NORTH:
ZONING: DOWNTOWN RESIDENTIAL MULTIFAMILY
GP LAND USE: DOWNTOWN MIXED USE

SOUTH:
ZONING: SIXTH STREET MIXED USE
GP LAND USE: DOWNTOWN MIXED USE

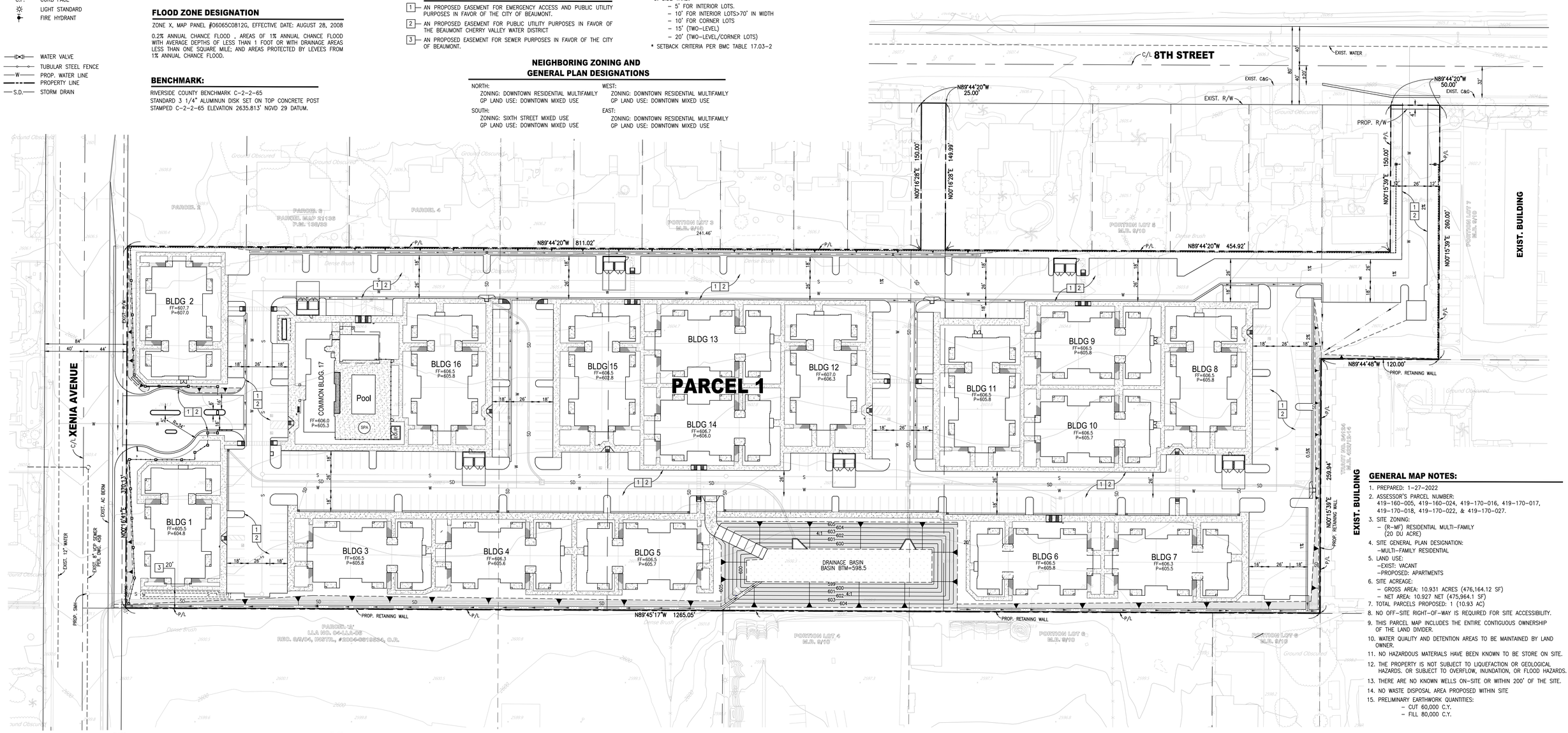
WEST:
ZONING: DOWNTOWN RESIDENTIAL MULTIFAMILY
GP LAND USE: DOWNTOWN MIXED USE

EAST:
ZONING: DOWNTOWN RESIDENTIAL MULTIFAMILY
GP LAND USE: DOWNTOWN MIXED USE



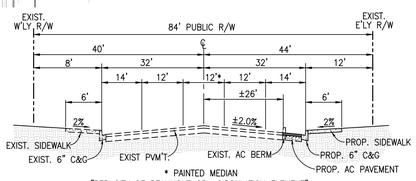


VICINITY MAP
NTS



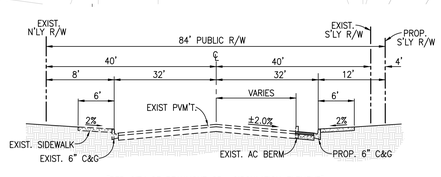
GENERAL MAP NOTES:

1. PREPARED: 1-27-2022
2. ASSESSOR'S PARCEL NUMBER: 419-160-005, 419-160-024, 419-170-016, 419-170-017, 419-170-018, 419-170-022, & 419-170-027.
3. SITE ZONING:
   - (R-MF) RESIDENTIAL MULTI-FAMILY (20 DU ACRE)
4. SITE GENERAL PLAN DESIGNATION:
   -MULTI-FAMILY RESIDENTIAL
5. LAND USE:
   -EXIST: VACANT
   -PROPOSED: APARTMENTS
6. SITE ACREAGE:
   - GROSS AREA: 10.931 ACRES (476,164.12 SF)
   - NET AREA: 10.927 NET (475,964.1 SF)
7. TOTAL PARCELS PROPOSED: 1 (10.93 AC)
8. NO OFF-SITE RIGHT-OF-WAY IS REQUIRED FOR SITE ACCESSIBILITY.
9. THIS PARCEL MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
10. WATER QUALITY AND DETENTION AREAS TO BE MAINTAINED BY LAND OWNER.
11. NO HAZARDOUS MATERIALS HAVE BEEN KNOWN TO BE STORE ON SITE.
12. THE PROPERTY IS NOT SUBJECT TO LIQUEFACTION OR GEOLOGICAL HAZARDS. OR SUBJECT TO OVERFLOW, INUNDATION, OR FLOOD HAZARDS.
13. THERE ARE NO KNOWN WELLS ON-SITE OR WITHIN 200' OF THE SITE.
14. NO WASTE DISPOSAL AREA PROPOSED WITHIN SITE
15. PRELIMINARY EARTHWORK QUANTITIES:
    - CUT 60,000 C.Y.
    - FILL 80,000 C.Y.



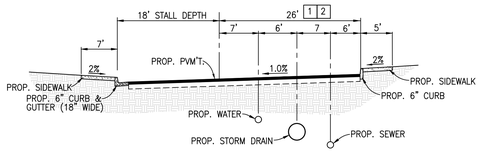
* PAINTED MEDIAN
"PER CITY OF BEAUMONT GP CIRCULATION ELEMENT"

XENIA AVENUE - SECONDARY B
N.T.S.



"PER CITY OF BEAUMONT GP CIRCULATION ELEMENT"

8TH STREET- SECONDARY A
N.T.S.



TYPICAL PRIVATE DRIVE AISLE SECTION
N.T.S.

PREPARED BY:
STEVENSON, PORTO & PIERCE, INC.
A LAND DEVELOPMENT SERVICES COMPANY
265 S. RANDOLPH AVENUE #105
BREA, CALIFORNIA 91750
PHONE: (714) 490-1514
CONTACT: HENRY LOZANO
EMAIL: HENRY@SP2INC.COM

OWNER/APPLICANT:
BEAUMONT LAND PARTNERS, LLC
16133 VENTURA BLVD. #633
ENCINO, CA 91436
CONTACT: PAUL ONUFER
OFFICE PH: (626) 263-4205
EMAIL: PONUFER@AVPRE.NET

REVISIONS			
NO.	BY:	DESCRIPTION	DATE

TENTATIVE PARCEL MAP 38233
CONCEPTUAL GRADING PLAN
IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

(CASE# _____)

LEGEND

B.W.	BACK OF WALK
F.S.	FINISHED SURFACE
P/L	PROPERTY LINE
S.M.H.	SEWER MANHOLE
C&G	CURB AND GUTTER
S.C.O.	SEWER CLEAN OUT
C.L.F.	CHAIN LINK FENCE
A.C.	ASPHALT CONCRETE PAVEMENT
T.G.	TOP OF GRATE INLET
R.V.	RECREATIONAL VEHICLE
E.P.	EDGE OF PAVEMENT
S.D.	STORM DRAIN
R/W	RIGHT-OF-WAY
DRWY.	CONCRETE APRON DRIVEWAY
B.S.L.	BUILDING SETBACK LINE
F.H.	FIRE HYDRANT
T.C.	TOP OF CURB
F.L.	FLOW LINE
G.I.	GRATE INLET
C.B.	CATCH BASIN
P.B.	PULL BOX
I.B.	IRRIGATION BOX
C.F.	CURB FACE
	LIGHT STANDARD
	FIRE HYDRANT
	WATER VALVE
	TUBULAR STEEL FENCE
W	PROP. WATER LINE
	PROPERTY LINE
SD	STORM DRAIN
S	PROP. SEWER LINE
	TYPICAL CROSS-SECTION REFERENCE
	SHEET NO.
	PROP. SLOPE

BASIS OF BEARINGS

"THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM, CCS83, ZONE 6, BASED LOCALLY ON CONTROL STATIONS "P609", "PPBF", AND "P584" NAD 83 (CSRS) EPOCH 2017.50 AS SHOWN HEREON. ALL BEARINGS SHOWN ON THIS MAP ARE GRID. QUOTED BEARINGS AND DISTANCES FROM REFERENCE MAPS OR DEEDS ARE AS SHOWN PER THAT RECORD REFERENCE. ALL DISTANCES SHOWN ARE GROUND DISTANCES UNLESS SPECIFIED OTHERWISE. GRID DISTANCES, MAY BE OBTAINED BY MULTIPLYING THE GROUND DISTANCE BY A COMBINATION FACTOR OF 0.9998886511. CALCULATIONS ARE MADE AT "1100" WITH COORDINATES OF: N: 2,283,669.169, E: 6,347,837.206, USING AN ELEVATION OF 2611.65'.

PUBLIC SERVICE/UTILITY PURVEYORS

SCHOOL DISTRICT: BEAUMONT UNIFIED SCHOOL DISTRICT
SEWER: CITY OF BEAUMONT
WATER: BEAUMONT CHERRY WATER DISTRICT
FIRE PROTECTION: CITY OF BEAUMONT
GAS: SOUTHERN CALIFORNIA GAS COMPANY
ELECTRIC: SOUTHERN CALIFORNIA EDISON COMPANY

FLOOD ZONE DESIGNATION

ZONE X, MAP PANEL #06065C0812G, EFFECTIVE DATE: AUGUST 28, 2008

0.2% ANNUAL CHANCE FLOOD , AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN ONE SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

RECORDED EASEMENT NOTES

1. AN EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES, RECORDED JANUARY 12, 1910, BOOK 295, PAGE 204, OF OFFICIAL RECORDS RIVERSIDE COUNTY (LOCATION OF EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION).
2. AN EASEMENT FOR INGRESS AND EGRESS PURPOSES, RECORDED FEBRUARY 6, 1980, AS INSTRUMENT NO. 24822, AND JUNE 11, 1985, AS INSTRUMENT NO. 125201, BOTH OF OFFICIAL RECORDS.

LEGAL DESCRIPTION

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GENERAL MAP NOTES:

1. PREPARED: 1/27/2022
2. ASSESSOR'S PARCEL NUMBER: 419-160-005, 419-160-024, 419-170-016, 419-170-017, 419-170-018, 419-170-022, & 419-170-027.
3. SITE ZONING:
   - (R-MF) RESIDENTIAL MULTI-FAMILY (20 DU ACRE)
4. SITE GENERAL PLAN DESIGNATION:
   - MULTI-FAMILY RESIDENTIAL
5. LAND USE:
   - EXIST: VACANT
   - PROPOSED: APARTMENTS
6. SITE ACREAGE:
   - GROSS AREA: 10.931 ACRES (476,164.12 SF)
   - NET AREA: 10.927 NET (475,964.1 SF)
7. NO OFF-SITE RIGHT-OF-WAY IS REQUIRED FOR SITE ACCESSIBILITY.
8. THIS PARCEL MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
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13. NO WASTE DISPOSAL AREA PROPOSED WITHIN SITE
14. PRELIMINARY EARTHWORK QUANTITIES:
    - CUT 60,000 C.Y.
    - FILL 80,000 C.Y.

SETBACK CRITERIA (*)

SETBACKS:

A. FRONT YARD:
   - 25'
   - 25' (TWO-LEVEL)

B. REAR YARD:
   - 15' FOR INTERIOR LOTS.
   - 5' FOR ACCESSORY STRUCTURES USED EXCLUSIVELY FOR PARKING
   - 20' (TWO-LEVEL)

C. SIDE YARD:
   - 5' FOR INTERIOR LOTS.
   - 10' FOR INTERIOR LOTS>70' IN WIDTH
   - 10' FOR CORNER LOTS
   - 15' (TWO-LEVEL)
   - 20' (TWO-LEVEL/CORNER LOTS)

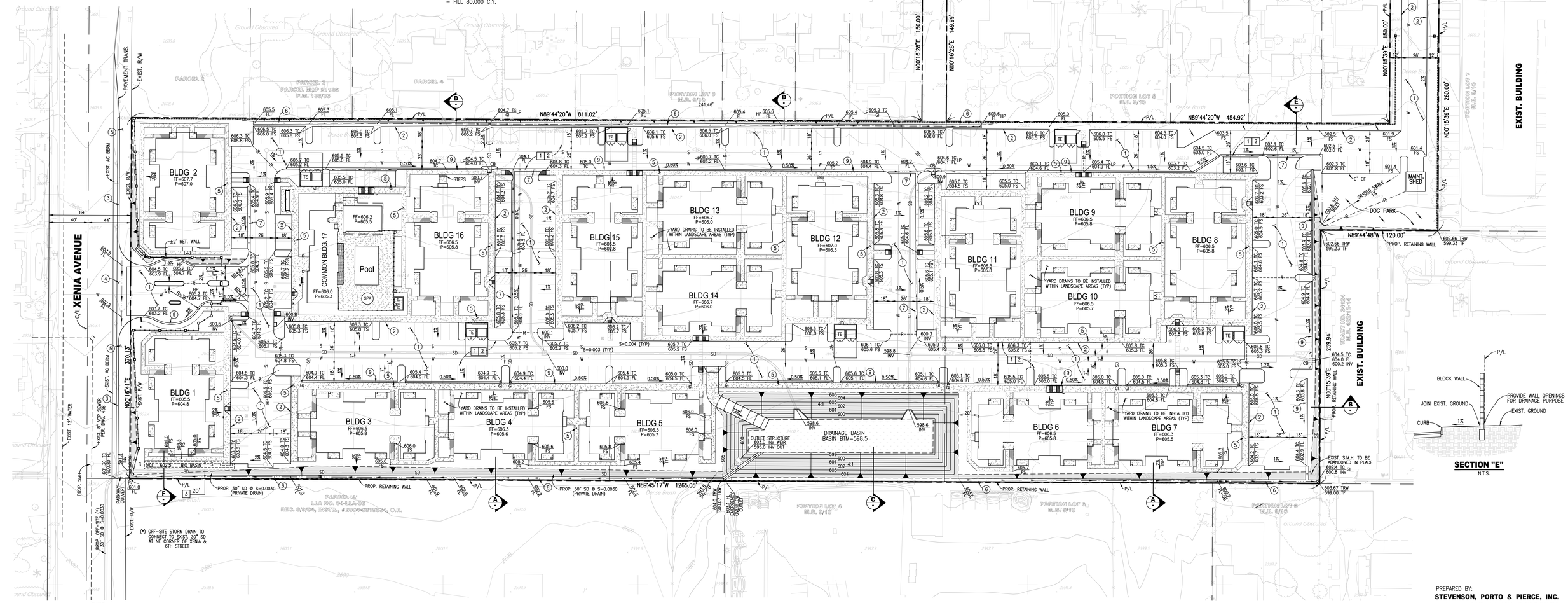
* SETBACK CRITERIA PER BMC TABLE 17.03-2

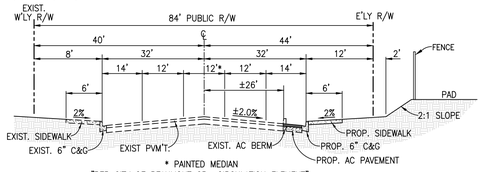
BENCHMARK:

RIVERSIDE COUNTY BENCHMARK C-2-2-65
STANDARD 3 1/4" ALUMINUN DISK SET ON TOP CONCRETE POST STAMPED C-2-2-65 ELEVATION 2635.813' NGVD 29 DATUM.

TYPICAL IMPROVEMENT PLAN NOTES:

1. CONCRETE PAVING PER GEOTECHNICAL RECOMMENDATIONS
2. PROPOSED 6" (TYPE "D") CURB PER R.C.T.D. PER R.C.T.D. STD. 204.
3. PROPOSED 6" (TYPE "A-6") CURB AND GUTTER PER R.C.T.D. STD. 200.
4. PROPOSED COMMERCIAL DRIVEWAY PER R.C.T.D. STD. 207A.
5. PROPOSED SIDEWALK PER R.C.T.D. STD. 401
6. 3" WIDE (18" DEEP) CONCRETE "V" DITCH (S=0.003)
7. 3" WIDE RIBBON GUTTER
8. PROPOSED RESIDENTIAL DRIVEWAY PER R.C.T.D. STD. 207.
9. PROPOSED 6" (TYPE "A-6"-18" GUTTER) CURB AND GUTTER PER R.C.T.D. STD. 200.



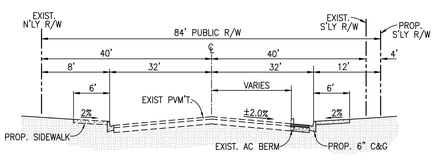


* PAINTED MEDIAN

"PER CITY OF BEAUMONT GP CIRCULATION ELEMENT"

XENIA AVENUE - SECONDARY B

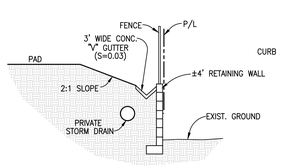
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"PER CITY OF BEAUMONT GP CIRCULATION ELEMENT"

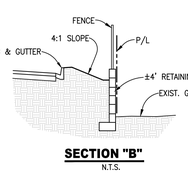
8TH STREET- SECONDARY A

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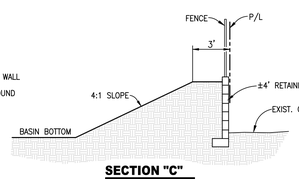
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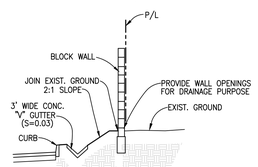
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SECTION "C"

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SECTION "D"

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SECTION "E"

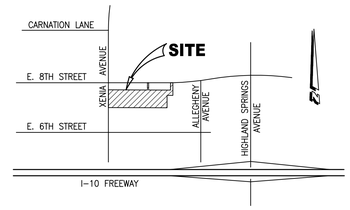
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SECTION "F"

N.T.S.

SCALE: 1"=40'



VICINITY MAP

NTS

PROPOSED EASEMENT NOTES

1. AN PROPOSED EASEMENT FOR EMERGENCY ACCESS AND PUBLIC UTILITY PURPOSES IN FAVOR OF THE CITY OF BEAUMONT.
2. AN PROPOSED EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF THE BEAUMONT CHERRY VALLEY WATER DISTRICT
3. AN PROPOSED EASEMENT FOR SEWER PURPOSES IN FAVOR OF THE CITY OF BEAUMONT.

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Appendix 3: Soils Information

UPDATED GEOTECHNICAL AND INFILTRATION EVALUATION

FOR

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
XENIA APARTMENT PROJECT
EAST OF XENIA AVENUE AND ABOUT 200 FEET SOUTH OF EAST 8TH STREET
BEAUMONT, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

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PREPARED BY

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PROJECT NO. 2784-CR **JULY 7, 2021**

GEOTEK

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July 7, 2021
Project No. 2784-CR

Beaumont Land Partners
556 South Fair Oaks Avenue
Pasadena, California 91105

Attention: Mr. Paul Onufer

Subject: Updated Geotechnical and Infiltration Evaluation
Proposed Multi-Family Residential Development
Xenia Apartment Project
East of Xenia Avenue and about 200 Feet South of East 8th Street
Beaumont, Riverside County, California

Dear Mr. Onufer:

We are pleased to provide our updated geotechnical and infiltration report for proposed development at the subject property located in the city of Beaumont, Riverside County, California. This report presents a discussion of our evaluation and provides updated geotechnical recommendations for earthwork, foundation design, and construction.

In our opinion, site development appears feasible from a geotechnical viewpoint provided that the recommendations presented in this report are incorporated into the design and construction phases of the project.

The opportunity to be of service is sincerely appreciated. If you have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

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Distribution: (1) Addressee via email (one PDF file)

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Appendix B – Logs of Borings and Laboratory Test Results by Converse (2019)
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1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the existing geotechnical conditions for the currently proposed development. Services provided for this study included the following:

- Research and review of readily available geologic data and past soil reports pertinent to the site,
- A site reconnaissance,
- Site exploration via two exploratory borings excavated to 20 feet below existing grade and four Cone Penetration Test (CPT) soundings to depths of about 50 feet each across the site,
- Testing of eight percolation test borings to estimate the infiltration rate of the subsoils within two basins (four tests at each basin) proposed at the site,
- Collection relatively undisturbed and bulk samples of the site soils for geotechnical and corrosion assessment,
- Review and evaluation of site seismicity,
- Engineering analyses, and;
- Compilation of this updated geotechnical and infiltration evaluation which presents our findings, conclusions, and recommendations for site development.

The intent of this report is to aid in the evaluation of the site for future proposed development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report may need to be updated based upon our review of the final site development plans. Final site development plans should be provided to GeoTek for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The project site comprises 10.9 acres located east of Xenia Avenue and about 200 feet south of East 8th Street in the city of Beaumont, Riverside County, California. The property consists of vacant land; however, the site was used as agricultural land in the 1990s and earlier. The property has a relatively flat terrain with elevations ranging from 2607 feet above mean sea level (amsl) toward the north portion of the site to 2600 feet amsl in the south portion. Surface drainage is generally to the south, with some minor local variations. At the time of our visit, the property had minor visible trash and was mostly void of vegetation.

The site is bounded on the north by existing single-family residences; on the west by Xenia Avenue with apartment homes beyond; on the south by commercial properties and vacant land; and on the east by an apartment complex. The general location of the site is shown in Figure 1.

2.2 PROPOSED DEVELOPMENT

According to the *Xenia Apartment Complex – Proposed Off-Site Sewer & Storm Drain Plan* prepared by Stevenson, Porto & Pierce, Inc. and undated, the site will be developed with 16 apartment buildings, a pool/recreation area, two water quality basins, parking/drive areas, underground utilities, and other improvements. The residential structures are anticipated to be up to three stories in height, of wood-framed construction, utilizing conventional shallow foundations and slab-on-grade. A maximum wall load of about 3 kips per linear foot and a maximum column load of about 40 kips were assumed.

Proposed cuts and fills as well as slopes are anticipated to be minimal. The two water quality basins are planned to be constructed near the south property line and will be excavated to a depth of about five feet, as indicated by the project civil engineer.

If site development differs from the information presented in this report, the recommendations should be subject to further review and evaluation by GeoTek. Final site development plans should be reviewed by GeoTek when they become available.

3. REVIEW OF PAST REPORTS

On May 9, 2006, Earth System Southwest (ESSW) issued a *Preliminary Geotechnical Engineering Report* for the project. The study indicated that six borings were drilled on the 11-acre site to depths ranging from 14 to 21.5 feet. ESSW stated that the borings encountered "very low" expansive silty sand and clayey sand. However, no results of laboratory testing were included in the ESSW report.

ESSW stated that groundwater was not encountered in any of their exploratory borings, and depth to groundwater was on the order of 300 feet. The potential for soil liquefaction at the site was considered negligible. However, no information regarding the potential for seismically induced settlement of dry sands was furnished.

ESSW recommended that the existing soils within the building pad and foundation areas be over-excavated to a minimum of three feet below existing grade or two feet below the footing level (whichever is lower). The over-excavation was recommended to extend five feet beyond the outer edges of the exterior footings. Garden and retaining wall areas were recommended to be prepared similar to building pads, but the lateral extent of the over-excavations should be at least two feet beyond the edges of the improvements.

Foundations were suggested to be designed using an allowable bearing capacity of 1,500 pounds per square foot (psf). Total static settlement of about one-inch and differential static settlement of less than 0.5-inch in 20 feet were predicted.

On September 27, 2019, Converse Consultants (Converse) completed a *Preliminary Geotechnical Investigation Report* for the site. The evaluation included the excavation of eight exploratory borings to 16.5 to 51.5 feet below grade. The excavations encountered native alluvial materials consisting of silty sand, sand, and silt.

Groundwater was not encountered in any of the borings by Converse to a maximum depth of 51.5 feet, and the risk of liquefaction was considered low. Converse also stated that the risk of seismically induced settlement was low due to the absence of unconsolidated granular sediments at the site.

The study stated that building areas should be over-excavated to at least five feet below proposed grade or two feet below the bottom of footings, whichever is deeper. The over-excavation was recommended to extend a minimum of five feet beyond the building footprint. Pavement areas were recommended to be supported on at least 12 inches of compacted fill.

Geotechnical design parameters for conventional foundations resting on "very low" expansive soils were provided by Converse. The study recommended the use of an allowable bearing pressure of 2,000 psf. Static settlement of less than one-inch total and less than 0.5-inch differential settlement over 40 feet were also estimated.

A shrinkage factor of about 10 to 15 percent for soil excavated and replaced as compacted fill, and a subsidence of about 0.10 to 0.15 feet were estimated for the project. The study also reported that soluble sulfate contents of two surface soil samples were negligible (0.0036 and 0.0038 percent) and a minimum concrete compressive strength of 2,500 psi was recommended. The minimum resistivity for surficial soil samples was found to be about 10,158 and 6,826 ohm-cm, and the soils were considered to have a "moderate" corrosive potential with respect to ferrous metal installations.

Logs of the exploratory borings reported by ESSW (2006) and Converse (2019) are included in Appendices A and B, respectively. The locations of these explorations are shown on the Exploration Location Map presented as Figure 2.

4. FIELD EXPLORATION, LABORATORY TESTING, AND PERCOLATION TESTING

4.1 FIELD EXPLORATION

GeoTek conducted a field exploration at the site on June 14, 2021 which consisted of excavating two exploratory borings and four CPT soundings across the property. The explorations were excavated to depths ranging from 21.5 to 50 feet. The borings were excavated with a truck-mounted drill rig, and the CPT soundings with a 30-ton CPT rig. The approximate locations of these excavations along with the borings reported by the ESSW (2006) and Converse (2019) are shown on Figure 2, Exploration Location Map. Logs of the excavations performed by GeoTek are included in Appendix C.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected soil samples collected during our field exploration. The purpose of the laboratory testing was to confirm the field classification of the soil materials encountered and to evaluate the physical properties of the soils for use in the engineering design and analysis. Laboratory testing included in-situ dry density-moisture

content, proctor, remolded direct shear, collapse, expansion index, among other tests. Test results are presented in Appendix D.

4.3 PERCOLATION TESTING

GeoTek utilized the percolation test procedure (Riverside County, 2011) to estimate the infiltration rate of the subsurface materials encountered at the two proposed site basins.

The percolation test borings (Borings I-1 through I-8) were excavated with a hollow-stem auger drill rig within the basin areas as shown on the *Xenia Apartment Complex Off-Site Sewer & Storm Drain Plan* (Stevenson, Porto & Piece, Inc., undated). All test borings were drilled to depths of about five feet, which was the approximate depth of the proposed basins. The borings were approximately eight inches in diameter. A three-inch diameter perforated PVC pipe encapsulated in filter sock was inserted into each of the test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel.

Native alluvial materials typically consisting of silty sand were encountered in our test holes. In addition to the test borings, Borings B-1 and B-2 were drilled to 20 feet below grade within the future basin areas to confirm the absence of impermeable materials or groundwater. All deep borings encountered granular alluvial materials of silty sand. The logs of the borings are presented in Appendix C. The locations of the test borings and deep borings drilled within the basin areas are shown on Figure 2.

Subsequent to pre-soaking the test holes, percolation testing was performed in the lower 20 inches of each test hole by a representative from our firm. The percolation rates were converted to infiltration rates via the Porchet Method.

The infiltration rates, which do not include a factor of safety and were determined after the water levels had stabilized, are presented in the following table.

SUMMARY OF INFILTRATION FIELD RATES		
Basin	Boring No.	Infiltration Field Rate (inches per hour)
South-Central	I-1	2.4
	I-2	3.3
	I-3	1.1
	I-4	1.4
Southeastern	I-5	4.0
	I-6	2.3
	I-7	1.1
	I-8	0.5

Detailed infiltration/percolation test data and Porchet conversion calculations are presented in Appendix E.

Over the lifetime of the basin systems, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rates to design the infiltration system.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed native materials. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates will be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water management system.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. Basically, it extends from the point of contact with the Transverse Ranges geomorphic province, southerly to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California, and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

More specific to the subject property, the site is located in an area geologically mapped to be underlain by alluvial fan deposits (Dibblee, T.W., and Minch, J.A., 2003). According the CGS 7.5-Minute Quadrangle, the nearest known active faults are the San Gorgonio Pass Fault Zone located 2.7 miles to the northeast of the site and the Banning Fault located 2.6 miles to the north of the site. No active faults are shown in the immediate site vicinity on the maps reviewed for the area.

5.2 SUBSURFACE SOIL CONDITIONS

A brief description of the earth materials reported to be on the site by ESSW (2006) and Converse (2019) and encountered during our field investigation is presented in the following sections.

5.2.1 Topsoil/Disturbed Soil (unmapped)

Our explorations noted that the upper one foot (±) of soil is loose and disturbed due to the past agricultural activities at the site. The topsoil mostly consists of dry to slightly moist, light brown silty sand.

5.2.2 Alluvium Fan Deposits

Our excavations encountered alluvial fan deposits below the topsoil. The alluvium was typically composed of silty sand and occasional gravel and was light brown to brown in color, slightly moist to moist, and medium dense to dense, as indicated by our blow counts and in-place density data. Tests performed on the most unfavorable samples of the alluvium (selected based on blow counts) suggest a slight potential for soil collapse (0.2 to 1.2 percent). This agrees with Converse's findings that the alluvium has slight to moderate potential for collapse (0.1 to 2.5 percent).

Results of expansion index tests show that the site surficial soils have a "very low" expansion potential (EI ≈ 5 to 10) which concurs with the findings by Converse and ESSW.

Detailed logs of the site explorations are included in Appendices A through C. The locations of the site explorations are shown on the Exploration Location Map, Figure 2.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

Surface water on this site is the result of precipitation or surface run-off from surrounding areas. Overall surface drainage is generally to the south.

5.3.2 Groundwater

The exploratory boring BH-5 by Converse (2019) and all of our CPT soundings excavated to a maximum depth of 50 feet did not encounter groundwater at the property.

The California Water Dara Library (https://wdl.water.ca.gov/waterdatalibrary/) shows a groundwater well located approximately one-quarter mile northeast from the site. Records of this well indicate that groundwater in the region is deeper than 200 feet.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is presently known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone. The County of Riverside (https://countyofriverside.us/Residents/PropertyInformation.aspx) has designated the site area as "not in fault zone", "not in a fault line", having a "low" potential for liquefaction, and "susceptible" to subsidence. According the CGS 7.5-Minute Quadrangle, the nearest known active faults are the San Gorgonio Pass Fault Zone located 2.7 miles to the northeast of the site and the Banning Fault located 2.6 miles to the north of the site.

5.4.1 Seismic Design Parameters

The site is located at approximately 33.9315° Latitude and -116.9527° Longitude. Site spectral accelerations (S_a and S_1), for 0.2 and 1.0 second periods for a Class "D" site, was determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. Using the ASCE 7-16 option on the SEAOC/OSHPD website results in the values for S_{M1} and S_{D1} reported as "null-See Section 11.4.8" (of ASCE 7-16). As noted in ASCE 7-16, Section 11.4.8, a site-specific ground motion procedure is recommended for Site Class "D" when the value S_1 exceeds 0.2. The value S_1 for the subject site exceeds 0.2.

For a site Class "D", an exception to performing a site-specific ground motion analysis is allowed in ASCE 7-16 where S_1 exceeds 0.2 provided the value of the seismic response

coefficient, Cs, is conservatively calculated by Eq 12.8-2 of ASCE 7-16 for values of T≤1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5Ts$ or Eq. 12.8-4 for $T > T_L$.

The results, based on the 2015 NEHRP and the 2019 CBC, are presented in the following table and we have assumed that the exception as allowed in ASCE 7-16 is applicable. If the exception is deemed not appropriate, a site-specific ground motion analysis will be required.

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	2.013g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.69g
Site Coefficient for Site Class "D", F_a	1.0
Site Coefficient for Site Class "D", F_v	1.7
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	2.013g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	1.173g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.342g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.782g
Peak Ground Acceleration Adjusted for Site Class Effects, PGA_M	0.903g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.5 LIQUEFACTION AND SEISMICALLY INDUCED SETTLEMENT

Due to the anticipated depth to groundwater (greater than 200 feet), the potential for liquefaction at the site is nil.

However, loose to medium dense granular soils tend to density during strong earthquake shaking. The potential for seismically induced settlements of the upper 50 feet of dry sandy alluvial fan sediments at the property was assessed using the data of our CPT soundings with the aid of the computer program Cliq version 3.3.1.14 (Geologismiki, 2006). A mean magnitude weighted (Mw) seismic event of 7.13 obtained using the USGS deaggregation web application (based on a two percent exceedance in 50 years) and a PGA_M of 0.903g obtained from the USGS website were used in our assessment.

The results of the analyses indicated the presence of occasional layers of loose to medium dense sands and silty sands that would be prone to settlement. The following table summarizes the amount of total seismically induced settlement estimated at each CPT location:

ESTIMATED SEISMICALLY INDUCED TOTAL SETTLEMENT	
CPT Sounding	Total Settlement (in)
1	1.0
2	0.2
3	0.2
4	1.5

As noted above, a seismically induced settlement of up to about 1.5 inches total and 0.75 inches differential over a 40-foot span is estimated for the property. The results of the seismic settlement analyses are presented within Appendix F.

5.6 OTHER HAZARDS

Evidence of ancient landslides or slope instabilities at this site was not observed during our site reconnaissance. Thus, the potential for landslides is considered negligible for design purposes.

The potential for secondary seismic hazard such as a tsunami or a seiche is considered negligible due to site elevation and great distance to the ocean or a lake.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

The proposed development appears feasible from a geotechnical viewpoint provided that the following recommendations are incorporated into design and construction.

The site contains topsoil and loose surficial alluvium. These materials are unsuitable for foundation support and thus should be removed and replaced as engineered compacted fill.

Our analyses also indicate that site may be subject to densification of the upper dry sands during the design level earthquake. This could result in seismically induced settlement of up to about 1.5 inches total and 0.75-inch differential over a 40-foot span. Provided that the site is prepared as recommended in the following sections of this report, static settlement is estimated to be up to 0.5-inch total and up to 0.25-inch differential over a 40-foot span. The

combined static plus seismic differential settlement of about 1 inch in 40 feet is anticipated to be tolerated by the residential buildings supported on conventional shallow footings.

6.2 EARTHWORK CONSIDERATIONS

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Beaumont/County of Riverside, the 2019 California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix G outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix G.

6.2.1 Site Clearing

The site should be cleared of existing vegetation, roots, and debris. These materials should be properly disposed of off-site.

6.2.2 Remedial Grading

The upper five feet of existing soil or two feet below the base of footings, whichever is deeper, should be completely over-excavated from proposed building areas and areas to receive structural fill. Additional over-excavation may be recommended if unsuitable materials are exposed. The bottom of over-excavations should expose competent native materials which are defined as relatively uniform, no visually porous soils with an in-place compaction of at least 85 percent of the soil's maximum dry density as determined per ASTM D 1557. As a minimum over-excavations should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth or a minimum of 5 feet.

The upper two feet of existing soil or one foot below the pavement/flatwork subgrade, whichever is deeper, should be removed. The horizontal extent of over-excavations should extend at least two feet beyond the edge of the improvement.

The bottom of all removals should be scarified to a minimum depth of eight inches, brought to above the optimum moisture content, and then recompacted to at least 90 percent of the soil's maximum dry density per ASTM D 1557. The bottoms of remedial excavations should be observed by a GeoTek representative prior to scarification.

6.2.3 Excavation Characteristics

Excavation in the on-site soils is expected to be feasible utilizing heavy-duty grading equipment in good operating condition.

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary vertical excavations within the on-site materials should be stable up to four feet with a 1:1 (h:v) cut above. Flatter inclinations may be needed depending on the field conditions. Temporary construction slopes should be periodically examined by a competent person, per Cal-OSHA requirements, to look of evidence of instability.

6.2.4 Engineered Fill

The onsite soils are considered suitable for reuse as engineered fill provided they are free from vegetation, debris, deleterious material, and hard lumps greater than six inches in maximum dimension.

Fill materials should be placed in horizontal lifts not exceeding six inches in loose thickness, moisture conditioned to at least the optimum moisture content, and compacted to a minimum relative compaction of 90 percent (ASTM D 1557).

Detailed recommendations pertaining to the placement of engineered fill are presented in Appendix G.

6.2.5 Slopes

Fill and cut slopes constructed at gradients of 2:1 (h:v) or flatter, in accordance with industry standards, are anticipated to be both grossly and surficially stable. Fill placed on slopes should be properly benched into competent soils per the geotechnical engineer's direction. Cut slopes should be observed by a geotechnical engineer/engineering geologist to approve the exposed conditions upon excavation.

The onsite soils are mostly granular and subject to erosion. Slopes should be landscaped shortly after construction.

6.2.6 Trench Excavation and Backfill

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (ASTM D 1557). Compaction should be achieved with a mechanical compaction device. Jetting of trench backfill is not recommended. If soils to be used as backfill have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.2.7 Shrinkage and Subsidence

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of approximately 5 to 15 percent may be considered for the materials requiring recompaction. Subsidence of up to 0.1 feet may occur.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

The site surficial soils possess "very low" ($0 \leq EI \leq 20$) expansion potential in accordance with ASTM D 4829, as noted by our soils data and data by past consultants. However, verification testing should be performed after site remedial grading.

The foundation elements for the proposed structures should bear entirely in engineered fill soils and should be designed in accordance with the 2019 CBC.

GEOTECHNICAL RECOMMENDATIONS FOR CONVENTIONALLY REINFORCED SHALLOW FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential (0≤EI≤20)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- and Two-story – 12 Three-story - 18
Minimum Foundation Width (Inches)*	One- and Two-story – 12 Three-story - 15
Minimum Slab Thickness (actual)**	4 – Actual
Minimum Slab Reinforcing**	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab
Minimum Footing Reinforcement	Two No. 4 reinforcing bars, one placed near the top and one near the bottom
Effective Plasticity Index***	NA
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum of 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete

* Code minimums per Table 1809.7 of the 2019 CBC.
**Slab thickness and reinforcement should be determined by the structural engineer.
***Effective plasticity index should be verified at the completion of rough grading.

It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and footing/beam reinforcement based on actual loading conditions.

The following criteria for design of foundations are preliminary and should be re-evaluated based on the results of additional laboratory testing of samples obtained near finish pad grade.

An allowable bearing capacity of 2,000 psf may be used for design of footings 12 inches deep and 12 inches wide. This value may be increased by 400 psf and 200 psf for each additional 12 inches in depth or width, respectively, to a maximum value of 3,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads).

For footings designed in accordance with the recommendations presented in this report, we would anticipate a maximum static settlement of less than 0.5-inch and a maximum differential static settlement of less than 0.25-inch in a 40-foot span. Seismic settlement is anticipated to be up to 1.5-inches total and 0.75-inch differential over a 40-foot span.

The passive earth pressure may be computed as an equivalent fluid having a density of 250 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarders should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek does not practice in the field of moisture vapor transmission evaluation/mitigation, since this does not fall under the geotechnical disciplines. Therefore, we recommend that a qualified person, such as the flooring contractor, structural engineer, and/or architect be consulted to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. That person (or persons) should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structures as deemed appropriate. In addition, the recommendations in this report and our services in general are not intended to address mold prevention, since we along with geotechnical consultants in general, do no practice in areas of mold prevention. If specific recommendations are desired, a professional mold prevention consultant should be contacted.

6.3.2 Miscellaneous Foundation Recommendations

- To reduce moisture penetration beneath the slab on grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.
- Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.
- Under-slab utility trenches should be compacted to project specifications. Compaction should be achieved with a mechanical compaction device. If soils to be used as backfill have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.3.3 Foundation Setbacks

Minimum setbacks for all foundations should comply with the *2019 CBC* or City of Beaumont/County of Riverside requirements, whichever is more stringent. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The following recommendations are presented:

- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least 5 feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The outside bottom edge of all footings should be set back a minimum of H/3 from the face of any descending slope. The setback should be at least 7 feet and need not to exceed 40 feet.
- The bottom of any proposed foundations for structures should be deepened so as to extend below a 1:1 projection upward from the bottom of the nearest excavation.
- The bottom of all footings for new structures near retaining walls should be deepened so as to extend below a 1:1 projection upward from the bottom inside edge of the wall foundation.

6.3.4 Retaining Wall Design and Construction

6.3.4.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical walls retaining up to six feet of compacted soils. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Retaining wall foundations should be designed in accordance with Section 6.3.1 of this report. A minimum embedment of 12 inches into engineered compacted fill and a minimum footing width of 12 inches is recommended. Structural needs may govern and should be evaluated by the project structural engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization.

The backfill material placement for all earth retention structures should meet the requirement of Section 6.3.4.4 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the wall to the base of the footing, may be designed using the active condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the at-rest condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (h:v) projection from the surcharge on the footing of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

6.3.4.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, seismic events, or adverse geologic conditions.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (h:v)	Equivalent Fluid Pressure (pcf) Native Backfill*
Level	41
2:1	64

* The design pressures assume the backfill material has an expansion index less than or equal to 20. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

6.3.4.3 Restrained Retaining Walls

Retaining walls that will be restrained prior to placing and compacting backfill material, or that have reentrant or male corners, should be designed for an at-rest equivalent fluid pressure of

62 pcf, plus any applicable surcharge loading, for native backfill and level back slope condition. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

6.3.4.4 Retaining Wall Backfill and Drainage

Retaining wall backfill should consist of materials with expansion index (EI) ≤ 20 and free of deleterious and/or oversized materials. The wall backfill should also include a minimum one-foot wide section of ¾- to 1-inch clean crushed rock (or approved equivalent). The rock should be placed immediately adjacent to the back of wall and extend up from the back drain to within approximately 12 inches of finish grade. The upper 12 inches should consist of compacted onsite materials. Presence of other materials might necessitate revision to the parameters provided and modification of wall designs. The backfill materials should be placed in lifts no greater than 8-inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. Proper surface drainage needs to be provided and maintained. Bracing of the walls during backfilling and compaction may also be necessary.

All earth retention structures should be provided with an adequate pipe and gravel back drain system to reduce the potential for hydrostatic pressure build up. As a minimum, backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one cubic foot per lineal foot of ¾- to 1-inch clean crushed rock or equivalent, wrapped in filter fabric (Mirafi 140N or approved equivalent). The drain system should be connected to a suitable outlet, as determined by the civil engineer. Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Proper surface drainage needs to be provided and maintained. Water should not be allowed to pond behind retaining walls. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

6.3.4.5 Other Design Considerations

- Retaining wall foundation elements should be designed in accordance with building code setback requirements.
- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.

- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.

6.3.5 Pool Design

The proposed swimming pool should derive support entirely from engineered fill. A minimum 12 inches of fill compacted to at least 90 percent of the soil's maximum dry density per ASTM D 1557 should be provided below the pool shell.

The pool walls should be designed for at-rest soil conditions using an equivalent fluid pressure of 62 pcf for at-rest conditions. Pool walls surcharged by adjacent structures should be designed for additional pressures. Alternatively, the pool walls may be designed as freestanding walls using the active soil state conditions provided that some lateral movement of the pool walls would be acceptable. If the active state is to be used, an equivalent fluid pressure of 41 pcf is considered suitable. These recommended pressures are based on drained conditions and using granular native fills with expansion index of less than 20. If a drain system adjacent/beneath the pool is not provided, the pool walls should then be designed for an equivalent fluid pressure of 98 pcf for the at-rest condition and 85 pcf for the active condition.

As noted above, the use of the lower (drained condition) at-rest or active soil pressures will require a subdrain system beneath/adjacent to the pool. A typical subdrain system includes a series of four-inch diameter perforated drain pipes encapsulated with at least one cubic foot of free-draining material per linear foot of pipe. The free-draining material should be encapsulated within a geotextile to prevent migration of fines into the drainage medium. The drain pipes should be routed to an acceptable discharge location, as determined by the pool designer. If desired, GeoTek can review the subdrain system once designed to determine if additional measures are warranted.

Pool decking supported on grade should be separated from the pool bond beam by a full-depth, mastic construction joint. If it is desired to extend the pool deck over the bond beam, consideration should be given to designing the deck as a structural slab supported by the pool shell. This will reduce the possibility of deck cracking occurring along the outer edge of the bond beam. We also recommend that the pool decking subgrade be "pre-saturated" prior to concrete placement. The subgrade soils should be moisture conditioned to at least 100% of the soil's optimum moisture content to a depth of 12 inches, prior to concrete placement. Testing by the geotechnical engineer is recommended to confirm that the soils have been adequately moisture treated.

Pool decking may consist of 5-inch thick concrete and the use of reinforcement is suggested. A minimum of #3 bars spaced 24 inches or 6" x 6" – W1.4/W1.4 welded wire mesh placed on center may be used. Control joints should be placed in two directions and located a distance apart approximately equal to 24 to 36 times the slab thickness. The pool designer should provide final design recommendations.

It is our recommendation that Type V cement be used for the pool construction due to the chemicals associated with the pool water.

6.3.6 Soil Corrosivity

The soil corrosivity at this site was tested in the laboratory for two representative samples collected during our field exploration. The results of the saturated resistivity testing indicate that the soil samples are "moderately corrosive" and "mildly corrosive" to buried ferrous metals, based on the guidelines provided in *Corrosion Basics: An Introduction* (Roberge, 2000). Chloride concentrations were negligible (0.0006 percent). Consideration should be given to consulting with a corrosion engineer. The laboratory test results are provided in Appendix D.

6.3.7 Soil Sulfate Content

The sulfate content was determined in the laboratory for two representative soil samples collected during our field exploration. The results (0.0012 and 0.0016 percent) indicate that the water-soluble sulfate for the tested samples were negligible, per Table 4.2.1 of ACI 318. Based upon the test results, no special concrete mix design is required for sulfate attack resistance. The laboratory test results are provided in Appendix D.

6.3.8 Pavement Design Considerations

Pavement design for proposed on-site street improvements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements. Based on traffic indices (TIs) of 5.0 and 6.0 generally associated with these types of projects and using a design R-value of 23 (Converse, 2019), the following preliminary sections were estimated:

PRELIMINARY PAVEMENT SECTIONS			
TI	R-Value	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
5.0	23	3	7
6.0	23	4	8

The TIs used in our pavement design are considered reasonable values for the proposed street areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper 12 inches) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Beaumont specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.3.9 Concrete Construction

6.3.9.1 General

Concrete construction should follow the 2019 CBC and ACI guidelines regarding design, mix placement, and curing of the concrete. If desired, we could provide quality control testing of the concrete during construction.

6.3.9.2 Concrete Mix Design

As indicated in Section 6.3.6, the site will not require a particular concrete mix design to resist sulfate attack.

6.3.9.3 Concrete Flatwork

Exterior concrete flatwork (sidewalks, driveways, patios, etc.) should have a minimum thickness of four inches. No specific reinforcement is required due to the non-structural nature. However, the use of some reinforcement should be considered. Some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in residential construction.

"Very low" expansive subgrade soils below exterior concrete flatwork should be pre-saturated to at least 100 percent of optimum moisture content. Minimum depth of pre-saturation should be 12 inches.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Beaumont/County of Riverside specifications, and under the observation and testing of GeoTek and a City/County inspector, if necessary.

6.3.9.4 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 0.125-inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent upon a wide range of variables, which are

difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

6.4 POST CONSTRUCTION CONSIDERATIONS

6.4.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decrease the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundation. This type of landscaping should be avoided.

6.4.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings. Roof leaders and downspouts should discharge onto paved surfaces sloping away from the structure or into a closed pipe system which outfalls to the street gutter pan or directly to the storm drain

system. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.5 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that foundation plans for the site be reviewed by this office prior to construction to check for conformance with the recommendations of this report. We also recommend that GeoTek representatives be present during construction of foundation and other improvements to observe and document proper implementation of the geotechnical recommendations. The owner/developer should verify that GeoTek representatives perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement including utility trenches.
- Test the fill for field density and relative compaction.
- Test the near-surface soils to verify proper moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project.

7 INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or

guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of our report is limited to the boundaries of the subject property. This update does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by our client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our fee estimate (Proposal No. P-0507021-CR) date May 24, 2021 and geotechnical engineering standards normally used on similar projects in this locality at the present.

8 LIMITATIONS

Our findings are based on site conditions observed and the stated sources. Thus, our comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty of any kind is expressed or implied. Standards of care/practice are subject to change with time.

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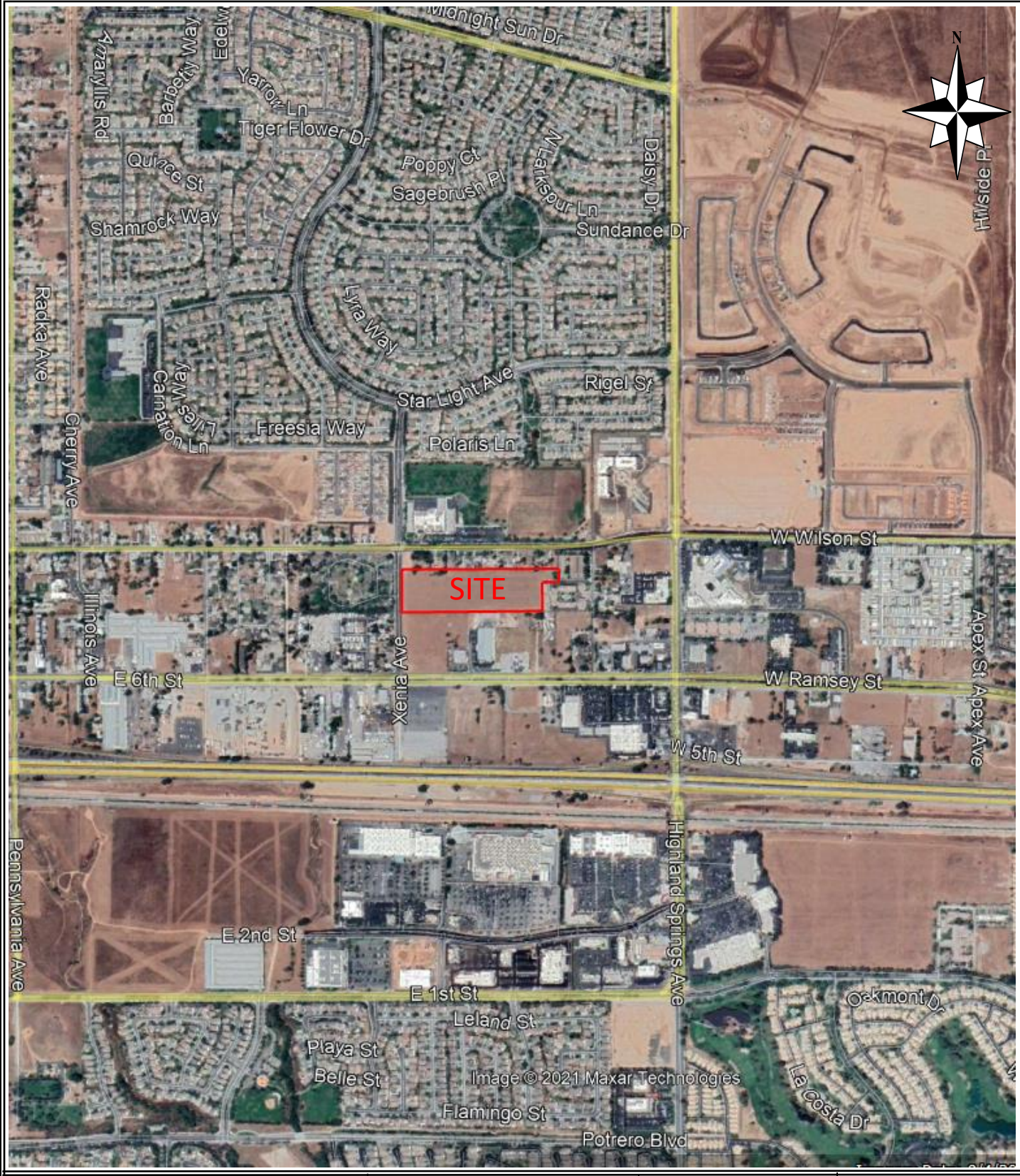
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Beaumont Land Partners
Xenia Apartment Project
Beaumont, Riverside County, California

Project No. 2784-CR

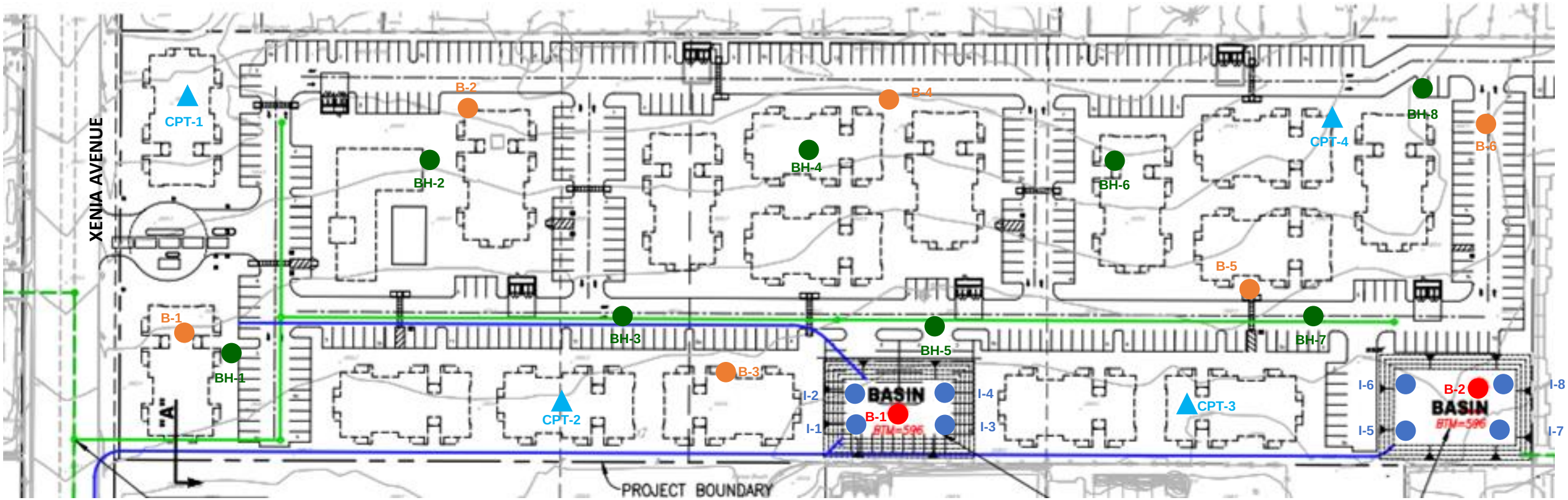
Scale:

0 0.2 mi

Figure 1

Site Location Map

GEOTEK



LEGEND

(Locations are approximate)

- B-6 — Exploratory Boring by ESSW (2006)
- B-2 — Exploratory Boring by GeoTek
- CPT-4 — CPT Sounding by GeoTek
- BH-8 — Exploratory Boring by Converse (2019)
- I-8 — Percolation Boring by GeoTek

Beaumont Land Partners
Xenia Apartment Project
Beaumont, Riverside County, California

Project No. 2784-CR

Scale:

0 — 210 ft

Figure 2

Exploration Location Map

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APPENDIX A

LOGS OF BORINGS by ESSW (2006)

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-1

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				SM			SILTY SAND: dark reddish brown, medium dense, damp, fine to medium grained, trace coarse grained
	MOD Calif.	7,6,7					
5							
	MOD Calif.	4,9,13		SC			CLAYEY SAND: dark reddish brown, stiff, damp, fine to medium grained
10							
	MOD Calif.	10,22,32					very stiff
15							
	MOD Calif.	9,12,21					dark reddish brown to light brown
20							Total Depth 19 feet No Groundwater Encountered
25							
30							
35							
40							

Graphic Trend: Blow Count / Dry Density

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-2

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend: Blow Count / Dry Density
0	Bulk			SC			CLAYEY SAND: light brown, stiff, damp, fine to medium grained, trace coarse grained	
5	MOD Calif.	5,10,11						
10	MOD Calif.	5,9,10						
15	MOD Calif.	12,16,20					light brown to white, very stiff, dry, fine to coarse grained	
20							Total Depth 14 feet No Groundwater Encountered	
25								
30								
35								
40								

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-3

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				SC			CLAYEY SAND: moderate brown to light brown, stiff, damp, fine to medium grained, trace coarse grained
5	MOD Calif.	6,10,13					
10	MOD Calif.	7,11,15					light brown
15	MOD Calif.	6,21,26					light brown to moderate brown with white minerals, very stiff, dry, fine to coarse grained, trace fine gravel
20							Total Depth 16.5 feet No Groundwater Encountered
25							
30							
35							
40							

Graphic Trend
Blow Count Dry Density

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-4

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Depth (Ft.)	Sample Type (Bulk, SPT, MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0		2,2,2		SM			SILTY SAND: dark reddish brown, loose, damp, fine to medium grained
5		4,6,8		SC			CLAYEY SAND: reddish light brown, stiff, damp, fine to medium grained, lenses of silty sand
10		6,12,14					light brown, trace coarse grained
15		6,10,12					
20		4,5,5		SM			SILTY SAND: light brown, medium dense, dry, fine to medium grained
25							Total Depth 21.5 feet No Groundwater Encountered
30							
35							
40							

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Graphic Trend
Blow Count Dry Density

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-5

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend: Blow Count / Dry Density
0						SM			SILTY SAND: light brown, medium dense, damp, fine to medium grained	
5			■	4,10,9						
						SC			CLAYEY SAND: reddish brown, firm, damp, fine to medium grained, trace coarse grained	
10		■		2,2,3						
		■		3,5,6					light brown to reddish brown, stiff	
15									Total Depth 14 feet No Groundwater Encountered	
20										
25										
30										
35										
40										

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Earth Systems
Southwest
79-811 B Country Club Dirve, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-6

Project Name: E. Side of Xenia Ave., Between 6th & 8th Sts., Beaumont, CA
File Number: 10437-03
Boring Location: See Figure 2

Drilling Date: April 21, 2006
Drilling Method: 8" Hollow Stem Auger
Drill Type: Williams CME 55 w/Auto Hammer
Logged By: Dirk Wiggins

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0	Bulk			SC/SM			SILTY SAND TO CLAYEY SAND: light brown, medium dense, damp, fine to medium grained, interbedded
5	MOD Calif.	4,6,7		SC			CLAYEY SAND: light brown, stiff, damp, fine to medium grained, few coarse grained, organic matter, white minerals
10	MOD Calif.	4,6,9					
15	MOD Calif.	5,9,15					fine to coarse grained
20	MOD Calif.	22,37,41					very stiff, dry, trace fine gravel, less clay, more silt, lenses of silty sand
25							Total Depth 21.5 feet No Groundwater Encountered
30							
35							
40							

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Graphic Trend
Blow Count Dry Density

APPENDIX B

LOGS OF BORINGS AND LABORATORY TEST RESULTS BY CONVERSE (2019)

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

Log of Boring No. BH-01

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2610 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM **SILTY SAND (SM):** fine to medium-grained, brown.		■				se
5			■		7/14/17	7	102	col
			■		11/15/18	9	114	
10			■		10/14/16	13	112	
15			■		10/20/20	11	113	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-2

Log of Boring No. BH-02

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2612 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.						
5			■	▨	11/10/12	8	103	ma
			■	▨	8/14/20	13	113	
10			■		10/12/15	13	113	
15		- fine to coarse-grained	■		10/18/21	6	109	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-3

Log of Boring No. BH-03

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2609 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.		■				ca,er,max
5			■		8/8/11	12	114	
			■		6/8/15	10	118	ds
10		- fine to coarse grained	■		8/16/19	12	119	
15		- scattered gravel up to 0.5" in largest dimension	■		20/20/23	6	112	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-4

Log of Boring No. BH-04

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2612 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.						
5			■	▨	8/8/12	11	117	ma
					8/12/15	15	111	col
10			■		7/9/14	16	116	
15			■		8/9/12	13	116	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-5

Log of Boring No. BH-05

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2608 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.		■				r,ma
5			■		8/10/12	12	109	
10		- fine to coarse-grained, scattered gravel up to 0.5" in largest dimension	■		8/12/14	12	124	
15		- scattered gravel up to 1" in largest dimension	■		23/35/40	6	117	
20			☒		24/20/23			
25		- few gravel up to 1" in largest dimension, orangish-brown	■		20/50-5"	4	107	
30		- scattered gravel up to 0.5" in largest dimension	☒		17/18/16			

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-6a

Log of Boring No. BH-05

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2608 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SAND with SILT (SP-SM):** fine to medium-grained, light brown.	■		15/25/28	3	97	
40			☒		14/17/27			
45			■		27/35/40	4	103	
50			☒		14/20/25			
		End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-6b

Log of Boring No. BH-06

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2611 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.		■				se
5			■		3/3/4	6	102	ds
10			■		9/12/15	8	107	
15			■		10/10/12	12	106	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-7

Log of Boring No. BH-07

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2607 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.						
5			■	▨	3/2/3	7	100	max
			■	▨	5/7/9	13	111	
10			■		8/12/14	14	116	
15			■		10/12/18	11	114	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-8

Log of Boring No. BH-08

Dates Drilled: 8/4/2019 Logged by: William Buckley Checked By: Mehrab Jesmani

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 2609 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM: **SILTY SAND (SM):** fine to medium-grained, brown.		■				ca,er,ma
5			■		5/6/7	10	103	
10			■		6/10/20	13	123	
15		- fine to coarse-grained, scattered gravel up to 0.5" in largest dimension	■		8/16/24	11	123	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted with an auger using the weight of the drill rig on 9/4/2019.						

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. 19-81-237-01

Drawing No. A-9

APPENDIX B

LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Borings, in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

In-Situ **Moisture Content and Dry Density**

Results of these tests performed on relatively undisturbed ring samples were used to aid in the classification and to provide quantitative measure of the *in situ* dry density and moisture content, (ASTM D2216). Data obtained from this test provides qualitative information on strength and compressibility characteristics of the site soils. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

Expansion Index

One sample was tested to evaluate the expansion potential of material encountered at the site. The test was conducted in accordance with ASTM Standard D4829. Test result is presented in the following table.

Table No. B-1, Summary of Expansion Index Test Result

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-05	0 to 5	Silty Sand (SM)	7	Very Low

Sand Equivalent

Two representative soil samples were tested in accordance with the ASTM D2419 test method to determine the sand equivalent. The test results are presented in the following table.

Table No. B-2, Sand Equivalent Test Results

Boring No.	Depth (feet)	Soil Description	Sand Equivalent
BH-01	0-5	Silty Sand (SM)	11
BH-06	0-5	Silty Sand (SM)	20

R-value

One representative bulk soil sample was tested for resistance value (R-value) in accordance with California Test Method CT301. This test is designed to provide a relative measure of soil strength for use in pavement design. The test result is shown in the following table.

Table No. B-3, R-Value Test Result

Boring No.	Depth (feet)	Soil Classification	Measured R-value
BH-05	0-5	Silty Sand (SM)	23

Soil Corrosivity Tests

Two representative soil samples were tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of the tests was to determine the corrosion potential of sites soils when placed in contact with common construction materials. The tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance to Caltrans Test Methods 643, 422 and 417. Test results are presented in the following table.

Table No. B-4, Summary of Soil Corrosivity Test Results

Boring No.	Depth (feet)	pH	Soluble Sulfates (CA 417) (% by weight)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
BH-03	0-5	7.0	0.0038	35	10,158
BH-08	0-5	6.9	0.0036	35	6,826

Collapse Tests

To evaluate the moisture sensitivity (collapse/swell potential) of the encountered soils, two collapse tests were performed in accordance with the ASTM Standard D5333 laboratory procedure. The samples were loaded to approximately 2 kips per square foot (ksf), allowed to stabilize under load, and then submerged. The test results are presented in the following table.

Table No. B-5, Collapse Test Results

Boring No.	Depth (feet)	Soil Classification	Percent Swell (+) Percent Collapse (-)	Collapse Potential
BH-01	5.0-6.5	Silty Sand (SM)	-2.5	Moderate
BH-04	7.5-9.0	Silty Sand (SM)	-0.1	Slight

Grain-Size Analyses

To assist in classification of soils, mechanical grain-size analyses were performed on four select samples in accordance with the ASTM Standard D422 test method. Grain-size curves are shown in Drawing No. B-1, *Grain Size Distribution Results*.

Maximum Dry Density and Optimum Moisture Content Test

Laboratory maximum dry density-optimum moisture content relationship test were performed on two representative bulk samples. These tests were conducted in accordance with the ASTM Standard D1557 test method. The test results are presented in Drawing No. B-2, *Moisture-Density Relationship Results,* and is summarized in the following table.

Table No B-6, Summary of Moisture-Density Relationship Results

Boring No.	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Density (lb/cft)
BH-03	0-5	Silty Sand (SM), Brown	7.5	133.5
BH-07	5-10	Silty Sand (SM), Brown	7.8	133.3

Direct Shear Test

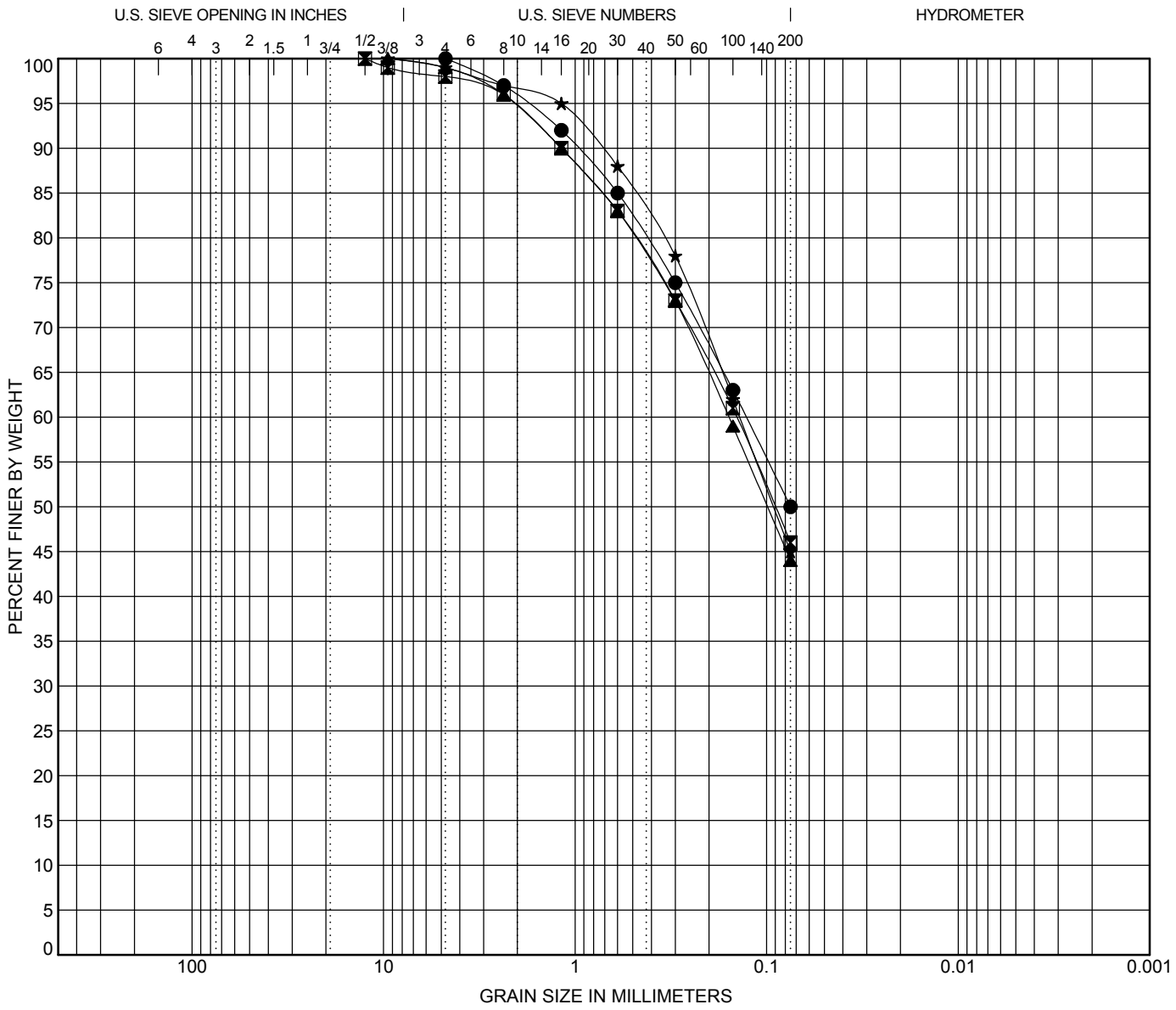
Two direct shear tests were performed on relatively undisturbed samples in soaked moisture condition in accordance with ASTM D3080. For these tests, three samples contained in brass sampler rings were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.025 inch/minute. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawings No. B-3 and B-4*, Direct Shear Test Results,* and the following table.

Table No. B-7, Summary of Direct Shear Test Results

Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-03	7.5-9.0	Silty Sand (SM)	35	120
BH-06	5.0-6.5	Silty Sand (SM)	31	60

Sample Storage

Soil samples presently stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	**BH-02**	**5-10**	**SILTY SAND (SM)**					
⊠	**BH-04**	**5-10**	**SILTY SAND (SM)**					
▲	**BH-05**	**0-5**	**SILTY SAND (SM)**					
★	**BH-08**	**0-5**	**SILTY SAND (SM)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-02**	**5-10**	**4.75**	**0.128**			**0.0**	**50.0**	**50.0**	
⊠	**BH-04**	**5-10**	**12.5**	**0.143**			**2.0**	**52.0**	**46.0**	
▲	**BH-05**	**0-5**	**9.5**	**0.158**			**1.0**	**55.0**	**44.0**	
★	**BH-08**	**0-5**	**9.5**	**0.138**			**1.0**	**54.0**	**45.0**	

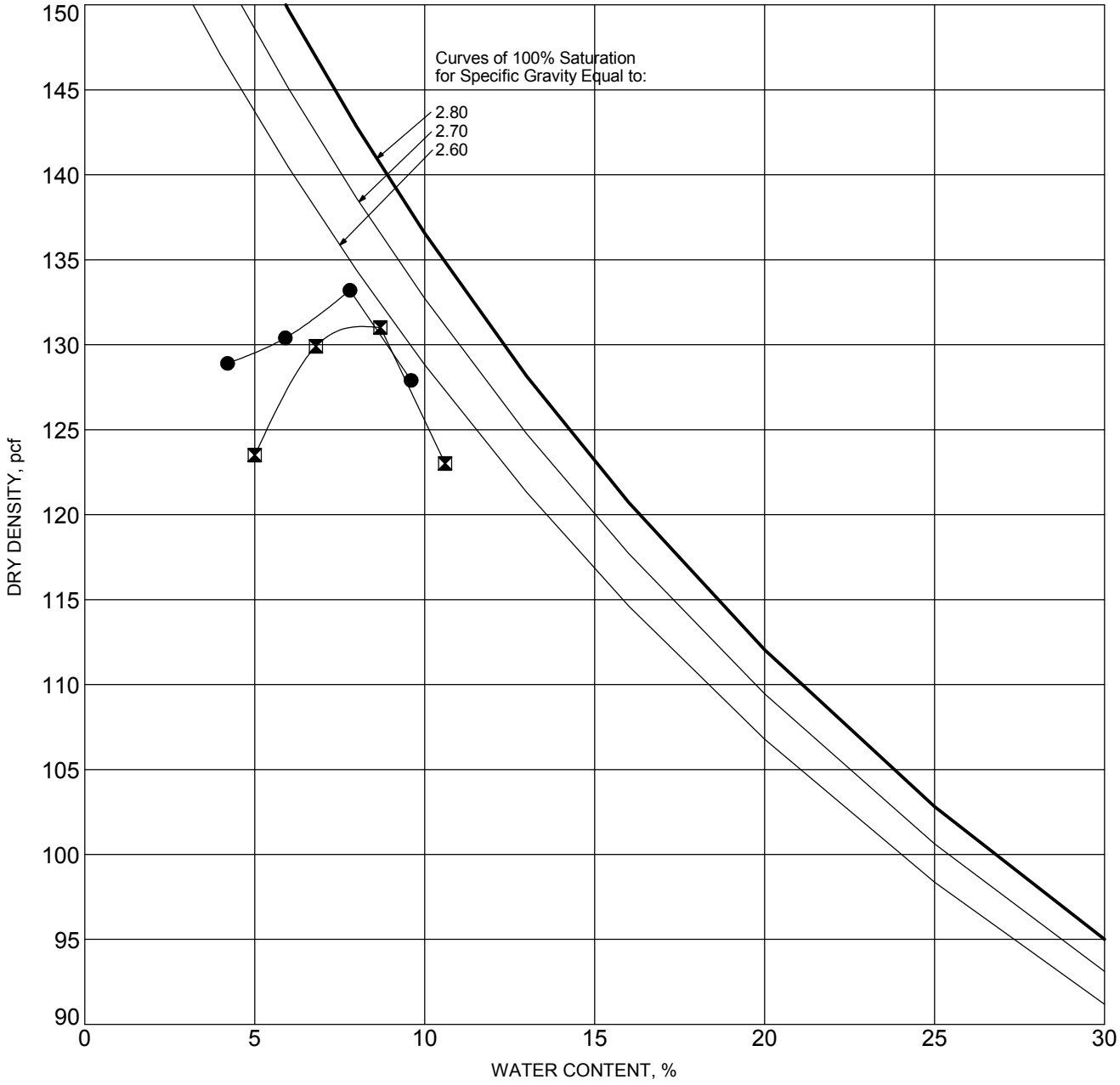
GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. **19-81-237-01**

Drawing No. **B-1**



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	**BH-03**	**0-5**	**SILTY SAND (SM), BROWN**	**D1557 - A**	**7.5**	**133.5**
⊠	**BH-07**	**5-10**	**SILTY SAND (SM), BROWN**	**D1557 - A**	**7.8**	**133.3**

MOISTURE-DENSITY RELATIONSHIP RESULTS

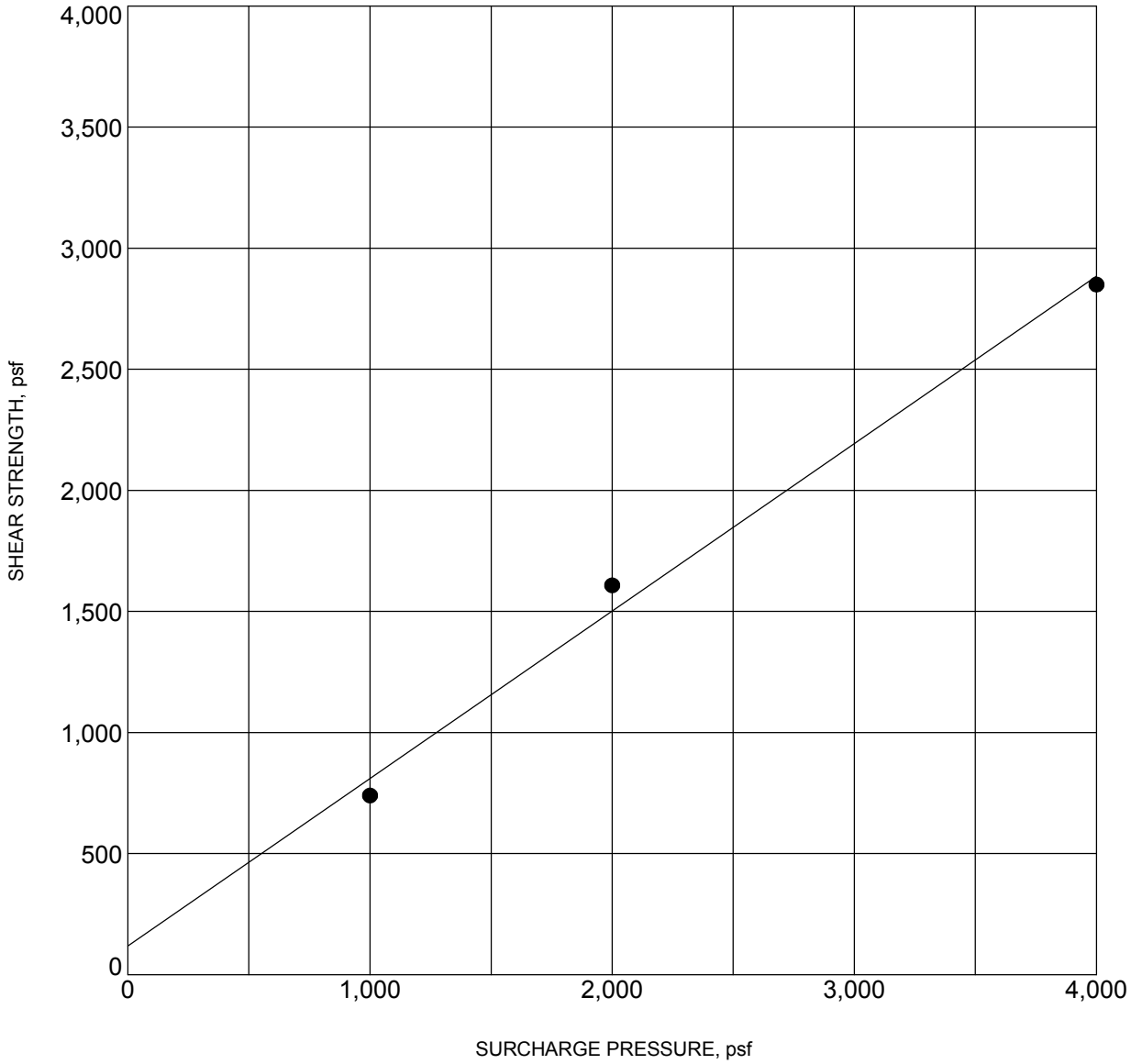
Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. **19-81-237-01**

Drawing No. **B-2**

Project ID: 19-81-237-01.GPJ; Template: COMPACTION



BORING NO.	:	**BH-03**	DEPTH (ft)	:	**7.5-9.0**
DESCRIPTION	:	**SILTY SAND (SM)**			
COHESION (psf)	:	**120**	FRICTION ANGLE (degrees):		**35**
MOISTURE CONTENT (%)	:	**10.0**	DRY DENSITY (pcf)	:	**118.0**

NOTE: Ultimate Strength.

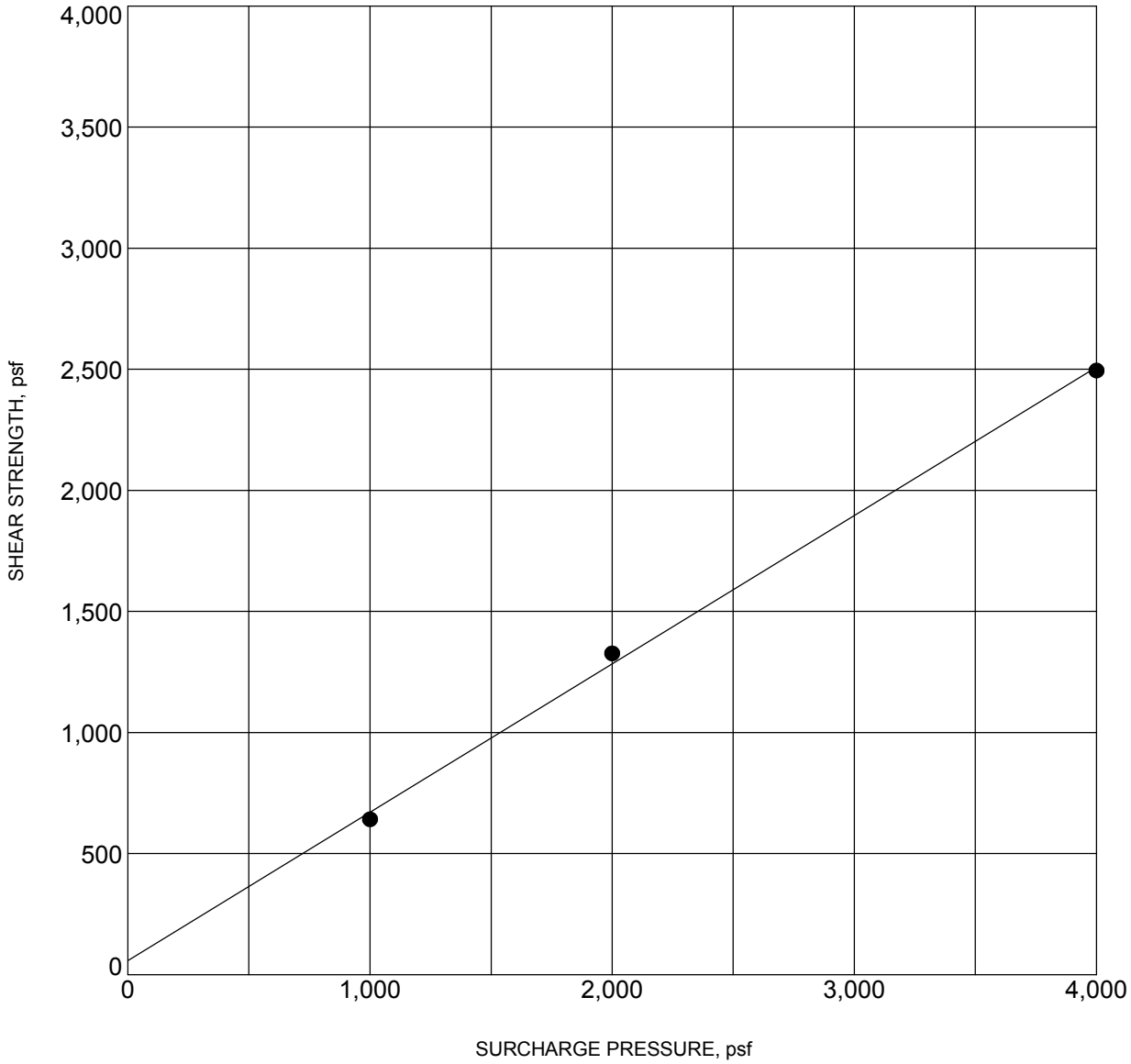
DIRECT SHEAR TEST RESULTS

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. **19-81-237-01**

Drawing No. **B-3**



BORING NO.	:	**BH-06**	DEPTH (ft)	:	**5.0-6.5**
DESCRIPTION	:	**SILTY SAND (SM)**			
COHESION (psf)	:	**60**	FRICTION ANGLE (degrees):		**32**
MOISTURE CONTENT (%)	:	**6.0**	DRY DENSITY (pcf)	:	**102.0**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Approximately 10.93-Acre Site
Southeast of Xenia Avenue and 8th Street
City of Beaumont, Riverside County, California
For: Pardee Homes

Project No. **19-81-237-01**

Drawing No. **B-4**

APPENDIX C

LOGS OF BORINGS AND CPT SOUNDINGS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The ring sampler is driven into the ground in accordance with ASTM Test Method D 3550. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the logs of borings. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)

These are plastic bag samples which are normally airtight and contain less than five pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – BORING

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of borings:

SOILS

USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium

GEOLOGIC

B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
……..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
———	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the logs of borings).

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/14/2021

Boring No.: B-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			MD, EI, SH, SR
		7 9 11		SM	Silty f Sand, brown, slight moisture	6.0	111.9	
		10 12 17			becomes moist	9.0	115.3	
5		13 14 14				14.3	115.7	HC
		10 14 16				12.9	120.3	
10		21 42 43			contains trace gravel	7.2	126.7	
15		21 24 32				7.0	120.7	
20		23 50/6			**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/14/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: B-2 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			EI, SR
		25 21 22		SM	Silty f-m Sand, light brown to brown, slight moisture	6.1	115.8	
		15 23 25			becomes moist, trace gravel	8.1	125.6	
5		9 11 12				6.8	117.7	
		7 9 12			contains trace clay	16.1	114.8	HC
10		11 17 18			Silty f Sand with clay, dark brown, moist	13.9	125.1	HC
15		9 17 22		ML	fine Sandy Silt, dark brown, slight moisture			
20		13 23 37		SM	Silty f-m Sand, medium brown, slight moisture	8.2	118.7	
					BORING TERMINATED AT 20 FEET No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/15/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-1 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/15/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-2 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/15/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-3 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/15/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-4 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/16/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-5 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/16/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-6 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/16/2021

Boring No.: I-7

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Beaumont Land Partners	**DRILLER:**	2R Drilling	**LOGGED BY:**	Franklin Sullivan
PROJECT NAME:	Xenia Apt Project	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Adrian
PROJECT NO.:	2784-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	6/16/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	**Boring No.: I-8** / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Alluvium:** Silty f-m Sand, light brown to brown, slight moisture			
5					**BORING TERMINATED AT 5 FEET**			
10								
15								
20								
25								
30								

LEGEND

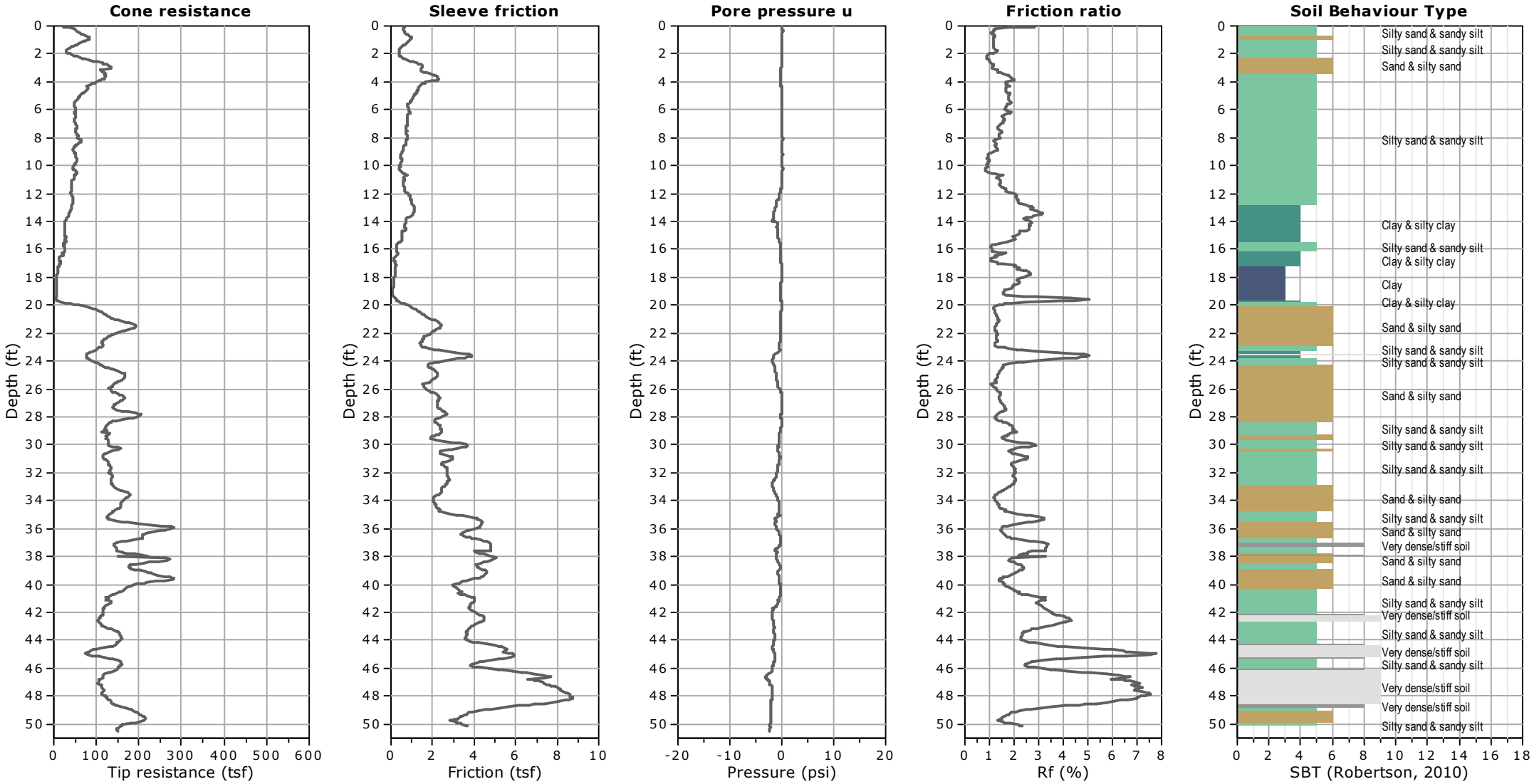
Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

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

Project: GeoTek / Xenia Site
Location: Beaumont, CA

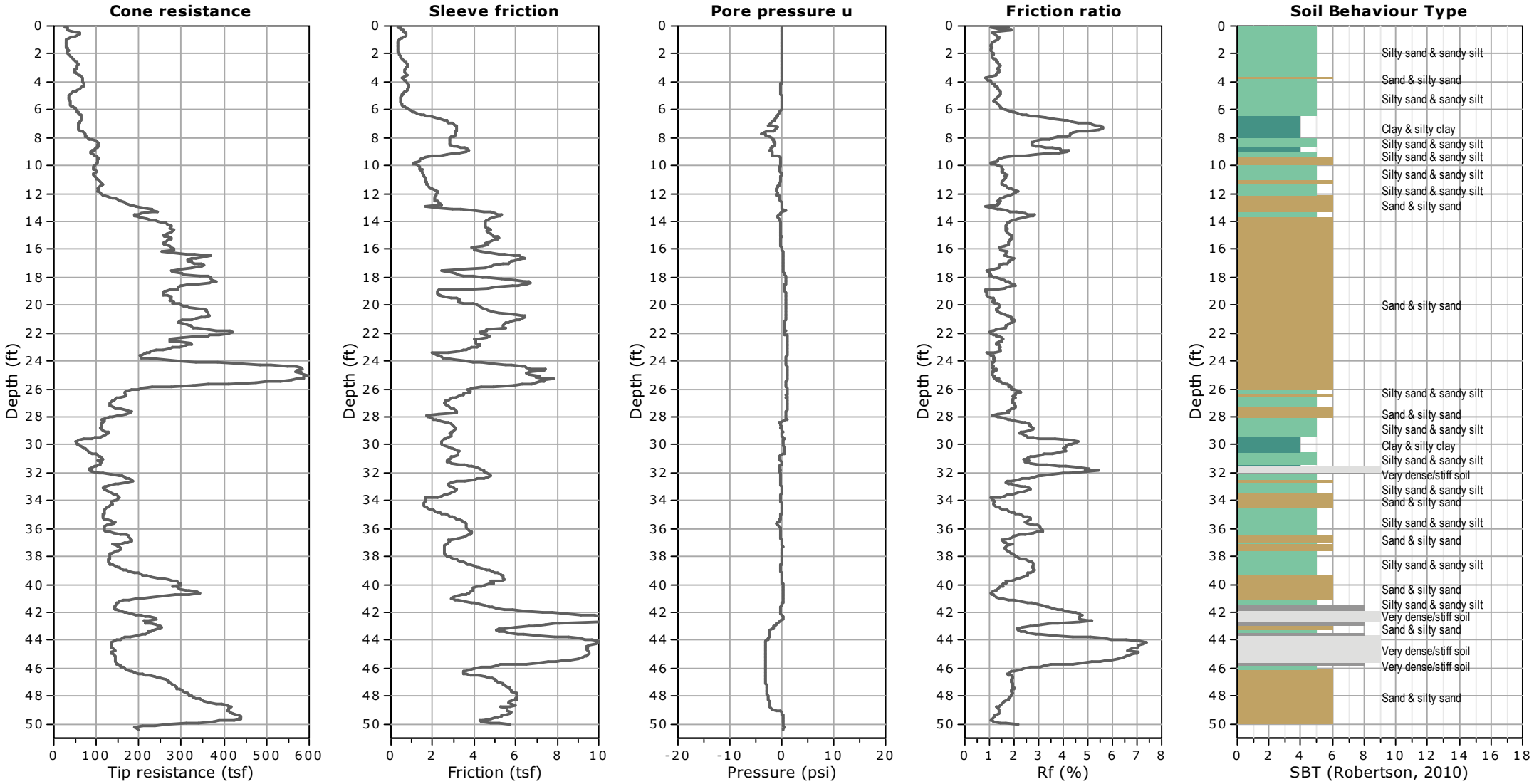
CPT-1
Total depth: 50.54 ft, Date: 6/15/2021



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

Project: **GeoTek / Xenia Site**
Location: **Beaumont, CA**

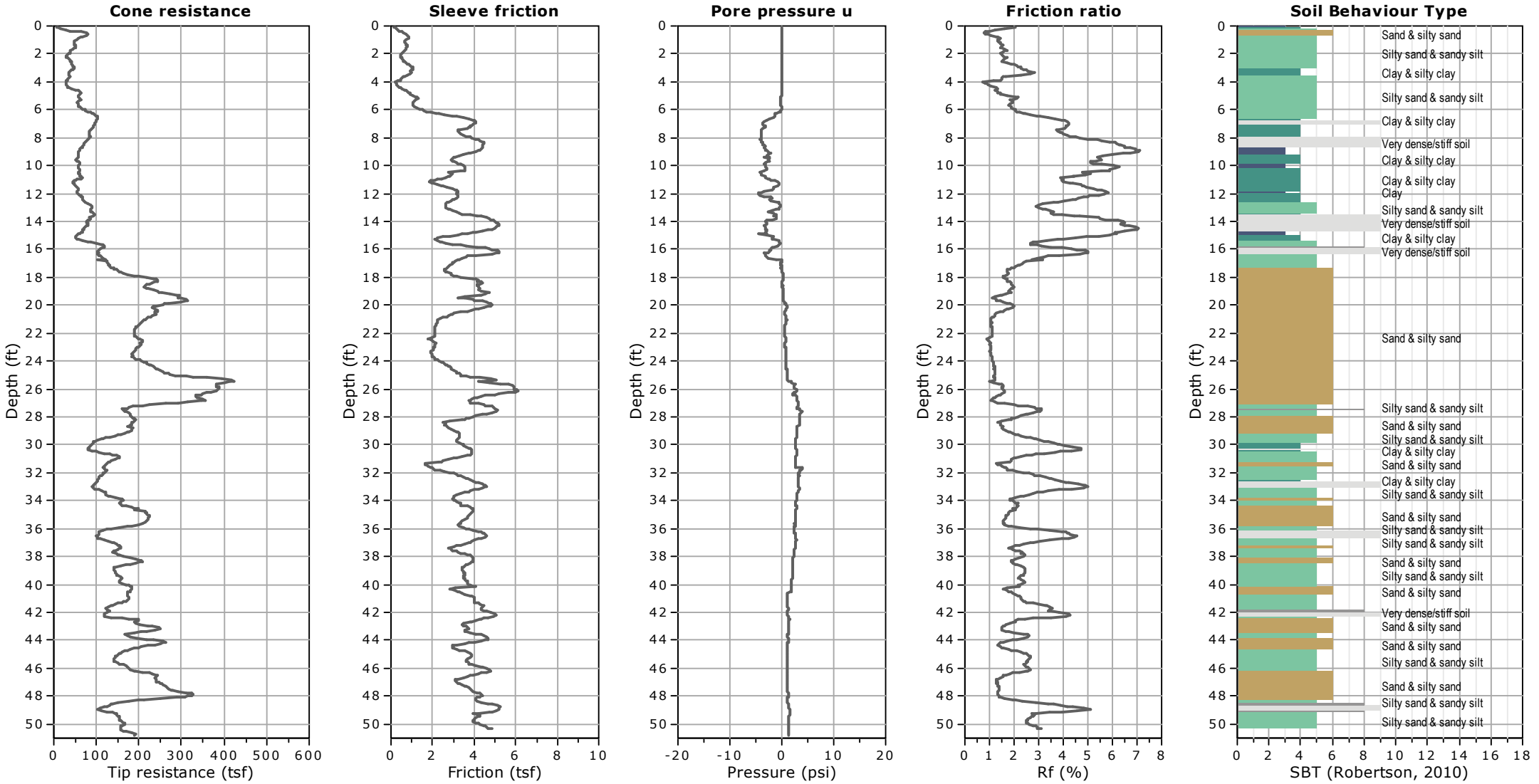
CPT-2
Total depth: 50.42 ft, Date: 6/15/2021



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

Project: GeoTek / Xenia Site
Location: Beaumont, CA

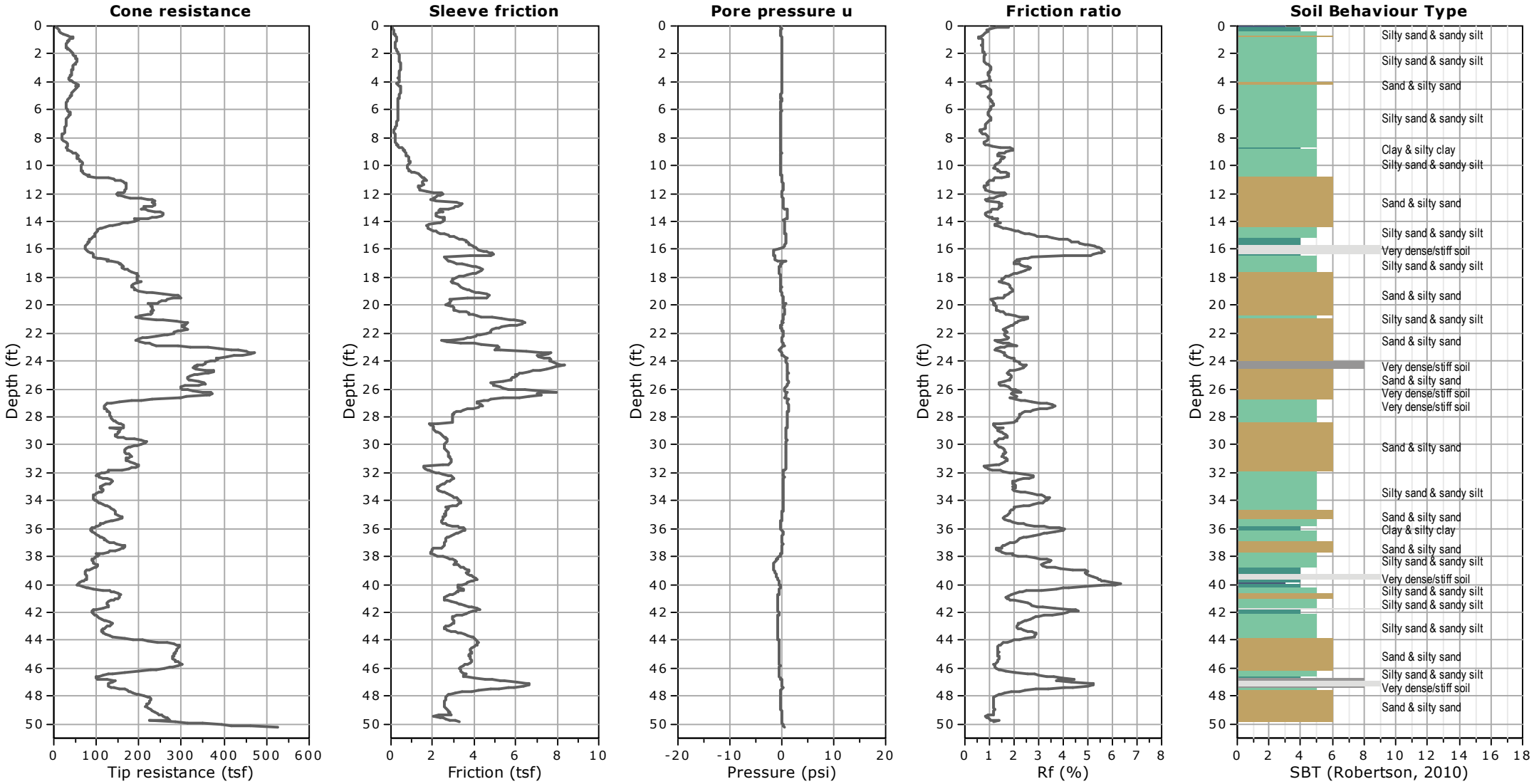
CPT-3
Total depth: 50.76 ft, Date: 6/15/2021



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

Project: GeoTek / Xenia Site
Location: Beaumont, CA

CPT-4
Total depth: 50.21 ft, Date: 6/15/2021



APPENDIX D

LABORATORY TEST RESULTS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

In Situ Moisture Content and Unit Weight

The field moisture content was measured in the laboratory on selected samples collected during the field investigation. The field moisture content is determined as a percentage of the dry unit weight. The dry density was measured in the laboratory on selected ring samples. The results are shown on the logs of exploratory borings in Appendix C.

Moisture-Density Relationship

Laboratory testing was performed on a selected sample collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil types were determined in general accordance with test method ASTM Test Procedure D 1557. The results are included herein.

Direct Shear

Direct shear testing was performed on remolded samples of the surficial soils according to ASTM Test Method D 3080. The test results are presented herein.

Expansion Index

Expansion Index testing was performed on a selected soil sample collected from the site. Testing was performed in general accordance with ASTM Test Method D 4829. The test results are presented herein.

Collapse

Collapse tests were conducted in accordance with ASTM D2435. The results of these tests are presented herein.

Sulfate Content, Resistivity and Chloride Content

Testing to determine the water-soluble sulfate content was performed by others in general accordance with ASTM D4327. Resistivity testing was completed by others in general accordance with ASTM G187. Testing to determine the chloride content was performed by others in general accordance with ASTM D4327. pH testing was completed by others in general accordance with ASTM D4972. The results of the testing are provided below.

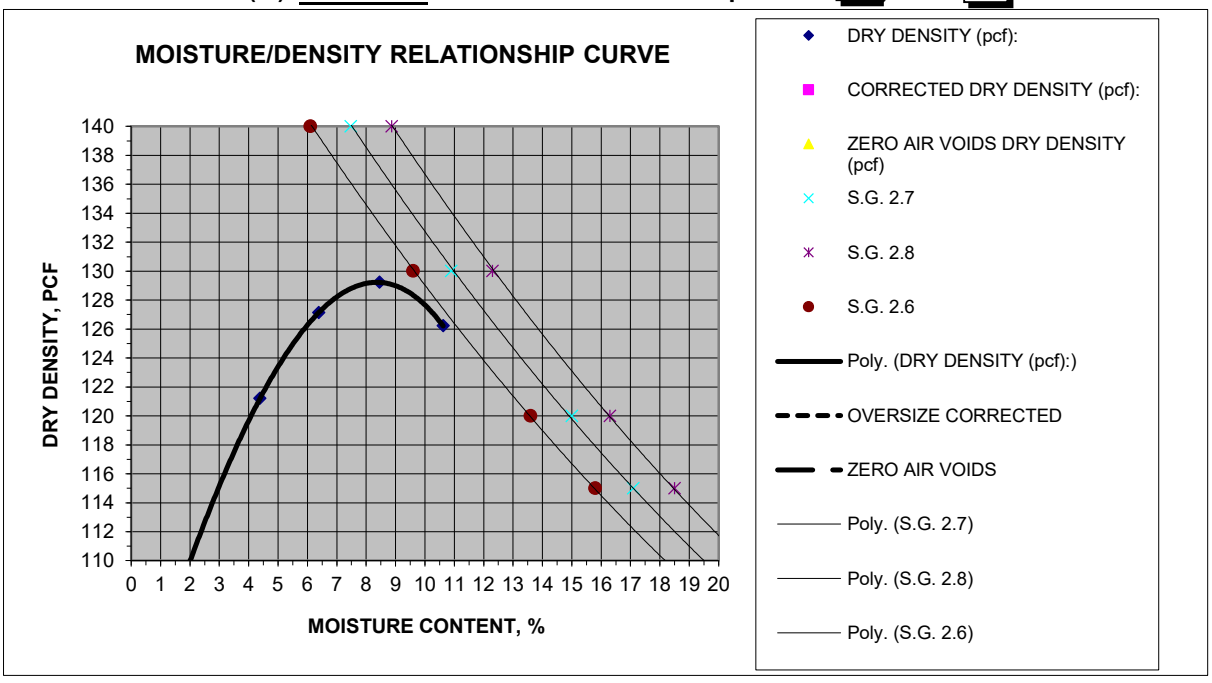
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	Beaumont Land Partners	**Job No.:**	2784-CR
Project:	Xenia Apartments	**Lab No.:**	Corona
Location:	Beaumont		
Material Type:	Brown Silty Sand		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B1 @ 0-5'		
	-		
Sampled By:	FS	**Date Sampled:**	6/14/2021
Received By:	RJ	**Date Received:**	6/14/2021
Tested By:	RL	**Date Tested:**	6/28/2021
Reviewed By:	RJ	**Date Reviewed:**	6/30/2021

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 3.9 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	129.5	**@ Optimum Moisture, %**	8.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

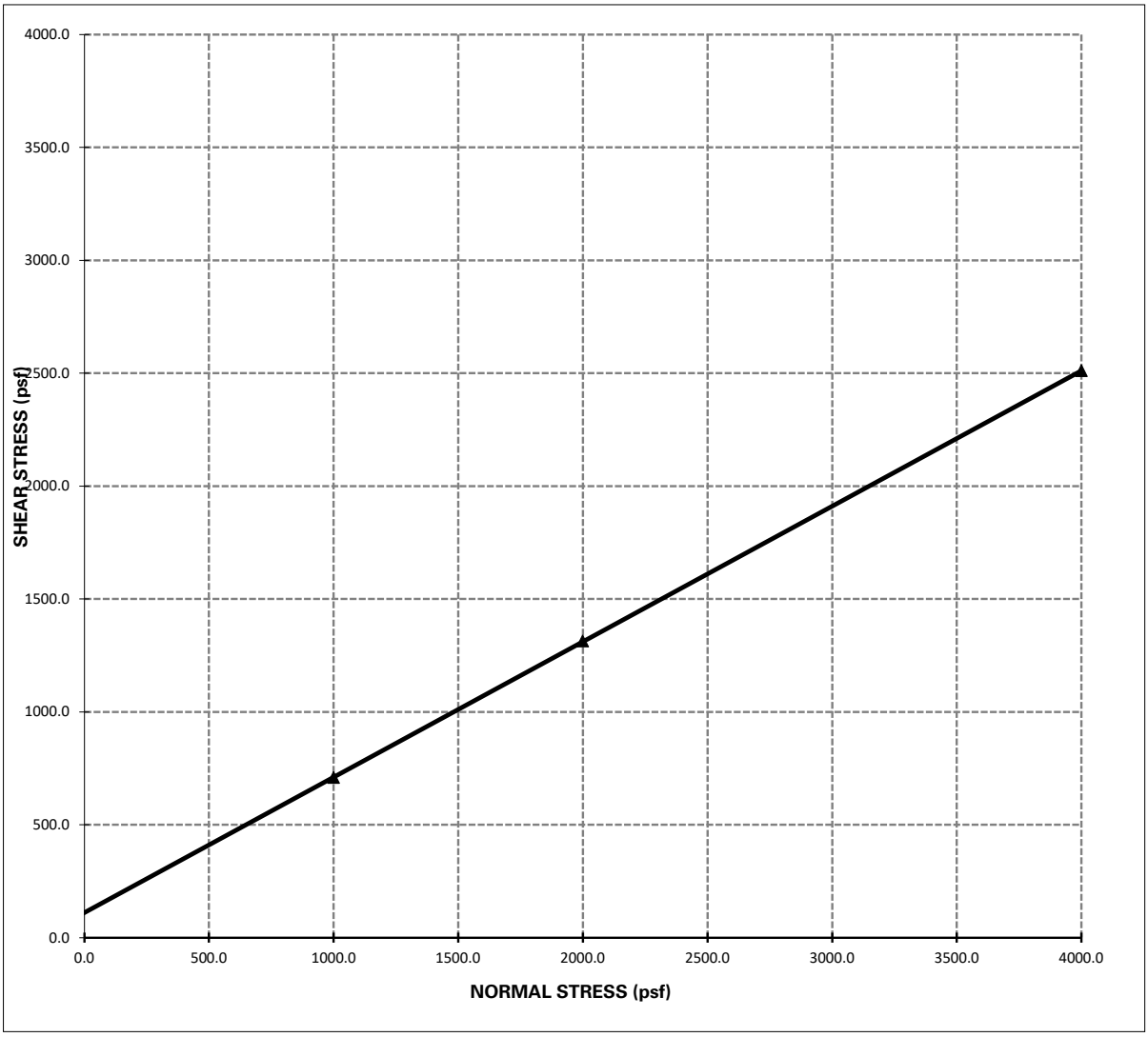
Classification:

Unified Soils Classification:

AASHTO Soils Classification:

DIRECT SHEAR TEST

Project Name:	Beaumont Land Partners	***Sample Location:***	B1 @ 0-5'
Project Number:	2784-CR	***Date Tested:***	7/1/2021



Shear Strength: Φ = 31 °, C = 111 psf

Notes:
1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
2 - The above reflect direct shear strength at saturated conditions.
3 - The tests were run at a shear rate of 0.035 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Beaumont Land Partners	***Tested/ Checked By:***	CD Lab No Corona
Project Number:	2784-CR	***Date Tested:***	6/23/2021
Project Location:	Xenia Apartments Project	***Sample Source:***	B1 @ 0-5'
		Sample Description:	

Ring #:_____ Ring Dia. : 4.01" Ring Ht.1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	780.8
B	Weight of ring (gm)	365.5
C	Net weight of sample (gm)	**415.3**
D	Wet Density, lb / ft3 (C*0.3016)	**125.3**
E	Dry Density, lb / ft3 (D/1.F)	**115.0**

SATURATION DETERMINATION

F	Moisture Content, %	8.9
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**51.7**

READINGS

DATE	TIME	READING	
6/23/2021		0.3410	Initial
6/23/2021		0.3390	10 min/Dry
6/24/2021		0.3440	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
804.3	**14.6**

EXPANSION INDEX = 5

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Beaumont Land Partners	***Tested/ Checked By:***	CD Lab No Corona
Project Number:	2784-CR	***Date Tested:***	6/24/2021
Project Location:	Xenia Apartments Project	***Sample Source:***	B2 @ 0-5'
		Sample Description:	

Ring #:_____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	781.9
B	Weight of ring (gm)	365.4
C	Net weight of sample (gm)	**416.5**
D	Wet Density, lb / ft3 (C*0.3016)	**125.6**
E	Dry Density, lb / ft3 (D/1.F)	**115.5**

SATURATION DETERMINATION

F	Moisture Content, %	8.8
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**51.7**

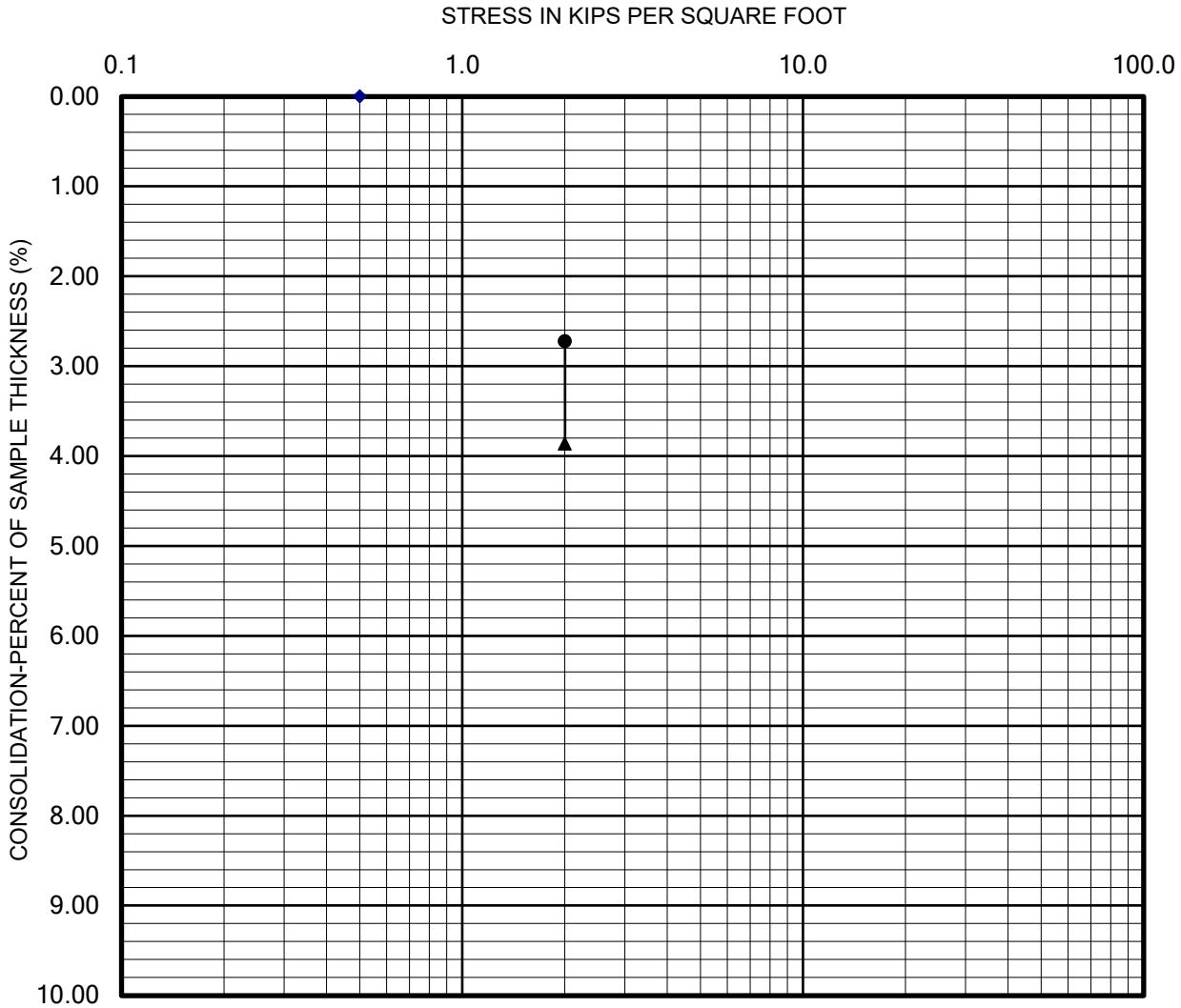
READINGS

DATE	TIME	READING	
6/24/2021		0.2290	Initial
6/24/2021		0.2290	10 min/Dry
6/25/2021		0.2390	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
810.3	**15.6**

EXPANSION INDEX = 10



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

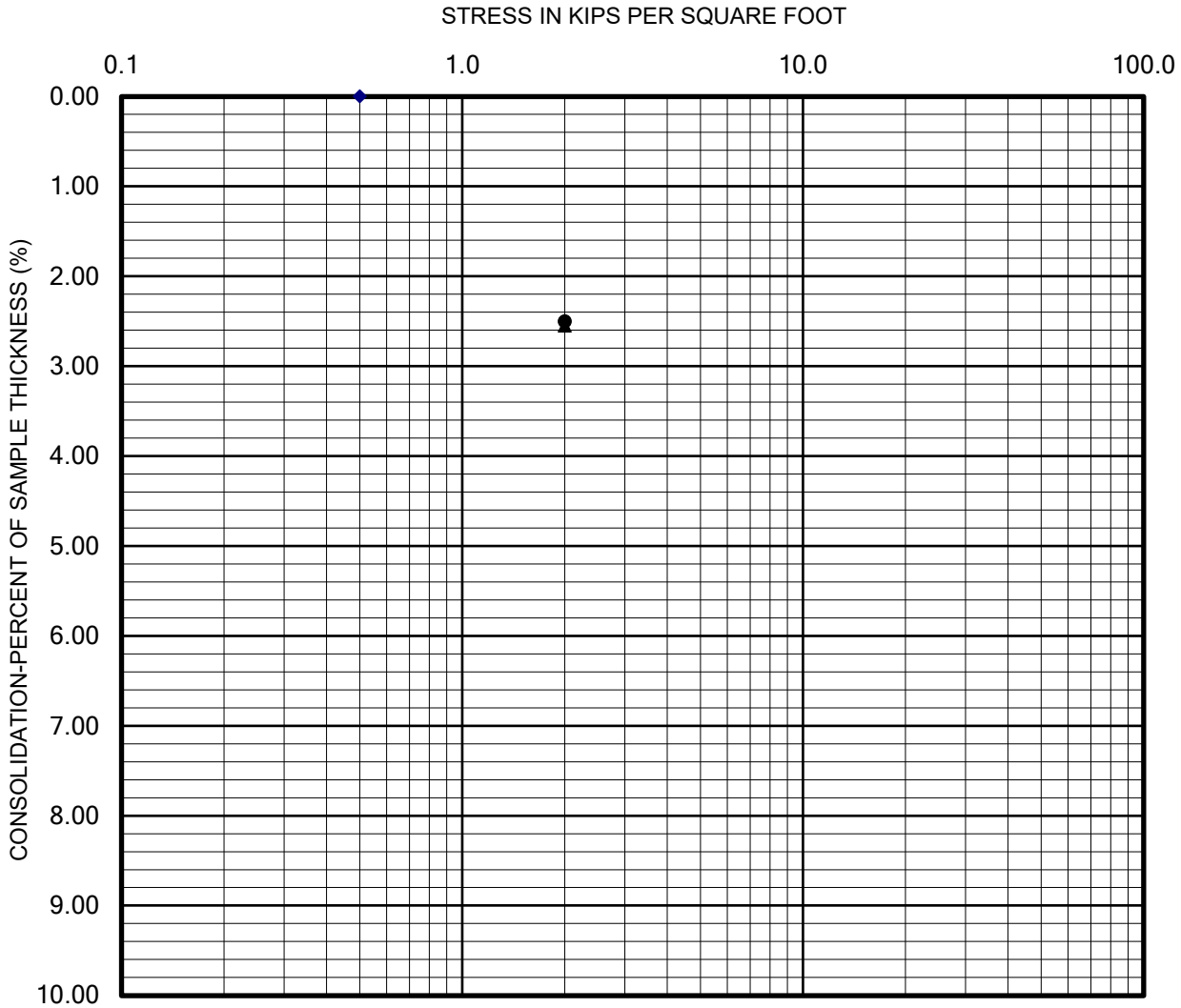
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-1 @ 6 feet

CHECKED BY: RJ	Lab: Corona
PROJECT NO.: 2784-CR	Date: 7-1-21



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

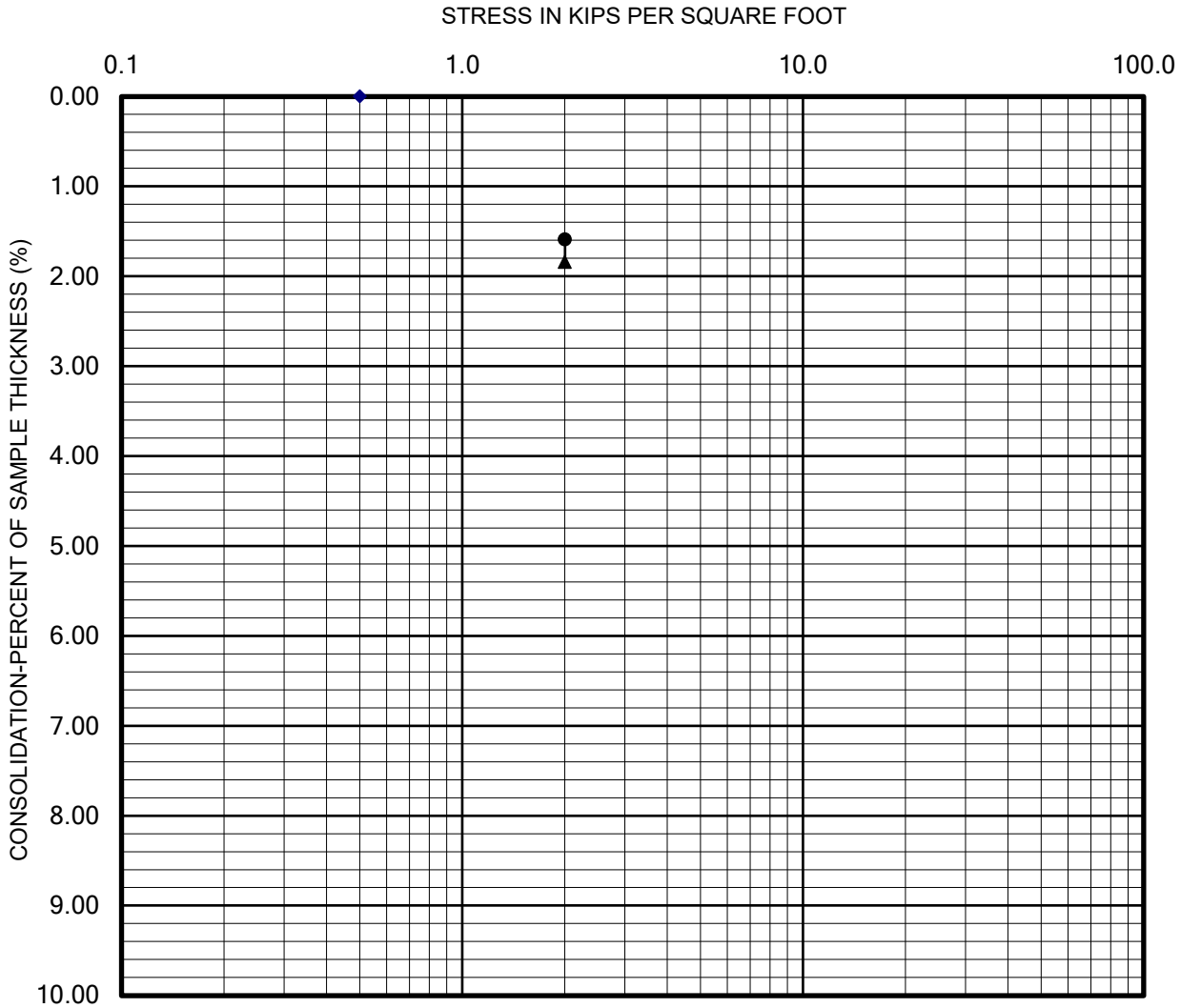
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-2 @ 7 feet

CHECKED BY: RJ	Lab: Corona
PROJECT NO.: 2784-CR	Date:7-1-21



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-2 @ 10 feet

CHECKED BY: RJ	Lab: Corona
PROJECT NO.: 2784-CR	Date:7-1-21

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: Xenia Apartment Project, Beaumont
Client Job Number: 2484-CR Beaumont Land Project
Project X Job Number: S210701B
July 6, 2021

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM D4972	ASTM G200	SM 4500-S2-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^{--}	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
2784-CR B-1	0-5	12.2	0.0012	5.7	0.0006	40,200	9,380	7.2	118	<0.01	14.0	22.7	0.04	49.5	4.8	51.2	246.5	2.8	0.3
2784-CR B-2	0-5	16.4	0.0016	5.6	0.0006	66,330	12,730	8.3	175	<0.01	4.2	34.2	0.03	63.8	4.3	56.5	266.5	1.9	0.6

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

APPENDIX E

PERCOLATION/INFILTRATION TEST DATA

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-1**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	44.25	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40.25	in
Total Test Hole Depth, D_T =	60.25	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	16	in
$\Delta H = \Delta D = H_O - H_F$ =	4	in
$H_{avg} = (H_O+H_F)/2$ =	18	in

I_t = 2.4 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-2**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	45.75	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40.5	in
Total Test Hole Depth, D_T =	60.5	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	14.75	in
$\Delta H = \Delta D = H_O - H_F$ =	5.25	in
$H_{avg} = (H_O+H_F)/2$ =	17.375	in

I_t = 3.3 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-3**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	44.63	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	42.75	in
Total Test Hole Depth, D_T =	62.75	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	18.12	in
$\Delta H = \Delta D = H_O - H_F$ =	1.88	in
$H_{avg} = (H_O+H_F)/2$ =	19.06	in

I_t = 1.1 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-4**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	46	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	43.5	in
Total Test Hole Depth, D_T =	63.5	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	17.5	in
$\Delta H = \Delta D = H_O - H_F$ =	2.5	in
$H_{avg} = (H_O+H_F)/2$ =	18.75	in

I_t = 1.4 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-5**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	48.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	42.25	in
Total Test Hole Depth, D_T =	62.25	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	13.75	in
$\Delta H = \Delta D = H_O - H_F$ =	6.25	in
$H_{avg} = (H_O+H_F)/2$ =	16.88	in

I_t = 4.0 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-6**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	44.3	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40.5	in
Total Test Hole Depth, D_T =	60.5	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	16.2	in
$\Delta H = \Delta D = H_O - H_F$ =	3.8	in
$H_{avg} = (H_O+H_F)/2$ =	18.1	in

I_t = 2.3 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-7**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10	min
Final Depth to Water, D_F =	42.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40.5	in
Total Test Hole Depth, D_T =	60.5	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	18	in
$\Delta H = \Delta D = H_O - H_F$ =	2	in
$H_{avg} = (H_O+H_F)/2$ =	19	in

I_t = 1.1 **Inches per Hour**

GEOTEK

Client:	**Beaumont Land Partners**
Project:	**Xenia Apartments**
Project No:	**2784-CR**
Date:	**7/7/2021**

Boring No. **I-8**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	30	min
Final Depth to Water, D_F =	46.38	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	43.63	in
Total Test Hole Depth, D_T =	63.63	in

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	17.25	in
$\Delta H = \Delta D = H_O - H_F$ =	2.75	in
$Havg = (H_O+H_F)/2$ =	18.63	in

I_t = 0.5 **Inches per Hour**

GEOTEK

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	**Project No:**	2784-CR	**Date:**	6/16/21
Test Hole No:	I-1	**Tested By:**	F. Sullivan		
Depth of Test Hole, D_T:	5.02'	**USCS Soil Classification:**	SM		

Test Hole Dimensions (inches)			**Length**	**Width**	
Diameter (if round)=	8	**Sides (if rectangular)=**			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	9:00	9:25	25	40.25	50.25	10	Y
2	9:25	9:50	25	40.25	50	9.25	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:50	10:00	10	40.25	44.75	4.5	2.22
2	10:00	10:14	10	40.25	44.5	4.25	2.35
3	10:14	10:24	10	40.25	44.5	4.25	2.35
4	10:24	10:34	10	40.25	44.25	4.0	2.5
5	10:34	10:44	10	40.25	45.11	4.86	2.06
6	10:44	10:54	10	40.25	44.25	4.0	2.5
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	Project No:	2794-CR	Date:	6/16/21
Test Hole No:	I-2	Tested By:	F. Sullivan		
Depth of Test Hole, D_T:	5.04'	USCS Soil Classification:	SM		
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)=	8	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	9:15	9:40	25	40.5	54.5	14.5	Y
2	9:40	10:05	25	40.5	53.5	13.0	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	10:05	10:15	10	40.5	46	5.5	1.82
2	10:15	10:25	10	40.5	45.75	5.25	1.90
3	10:25	10:35	10	40.5	46	5.5	1.82
4	10:35	10:45	10	40.5	45.75	5.25	1.90
5	10:45	10:55	10	40.5	45	4.5	2.22
6	10:55	11:05	10	40.5	45.75	5.25	1.90
7							
8							
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11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt project, Beaumont	Project No:	2784-CR	Date:	6/16/21
Test Hole No:	I-3	Tested By:	F. Sullivan		
Depth of Test Hole, D_T:	5.23'	USCS Soil Classification:	SM		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	8	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:48	11:13	25	42.75	49	6.25	Y
2	11:13	11:38	25	42.75	48.75	6.0	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:48	11:58	10	42.75	44.5	1.75	5.71
2	11:58	12:08	10	42.75	45.25	2.5	4.0
3	12:08	12:18	10	42.75	45.0	2.25	4.44
4	12:18	12:28	10	42.75	44.75	2.0	5.0
5	12:28	12:38	10	42.75	45.25	2.5	4.0
6	12:38	12:48	10	42.75	44.63	1.88	5.32
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9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	**Project No:**	2784-Cr	**Date:**	6/16/21
Test Hole No:	I-4	**Tested By:**	F. Sullivan		
Depth of Test Hole, D_f:	5.29'	**USCS Soil Classification:**	SM		
Test Hole Dimensions (inches)				**Length**	**Width**
Diameter (if round)=	8	**Sides (if rectangular)=**			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	12:16	12:41	25	43.5	50	6.5	Y
2	12:41	1:06	25	43.5	49.88	6.38	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	1:06	1:16	10	43.5	46.63	3.13	3.19
2	1:16	1:26	10	43.5	46.5	3.0	3.33
3	1:26	1:36	10	43.5	46.25	2.75	3.64
4	1:36	1:46	10	43.5	46.5	3	3.33
5	1:46	1:56	10	43.5	46.5	3	3.33
6	1:56	2:06	10	43.5	46.0	2.5	4
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	**Project No:**	2784-Cr	**Date:**	6/17/21
Test Hole No:	I-5	**Tested By:**	F. Sullivan		
Depth of Test Hole, D_T:	5.19'	**USCS Soil Classification:**	SM		
Test Hole Dimensions (inches)			**Length**	**Width**	
Diameter (if round)=	8	**Sides (if rectangular)=**			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	9:39	9:04	25	42.25	61.75	19.5	Y
2	9:04	9:29	25	42.25	61.5	19.25	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:29	9:39	10	42.25	47.75	5.5	1.82
2	9:39	9:49	10	42.25	49.5	7.25	1.38
3	9:49	9:59	10	42.25	49.13	6.88	1.45
4	9:59	10:09	10	42.25	48.75	6.5	1.54
5	10:09	10:19	10	42.25	48.63	6.38	1.57
6	10:19	10:29	10	42.25	48.5	6.25	1.6
7							
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12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	Project No:	2784-Cr	Date:	6/17/21
Test Hole No:	I-6	Tested By:	F. Sullivan		
Depth of Test Hole, D_T:	5.04	USCS Soil Classification:	SM		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	8	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:42	9:07	25	40.5	53.4	12.9	Y
2	9:07	9:32	25	40.5	53.88	13.3	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:32	9:42	10	40.5	45.38	4.88	2.05
2	9:42	9:52	10	40.5	45.38	4.88	2.05
3	9:52	10:02	10	40.5	44.25	3.75	2.67
4	10:02	10:12	10	40.5	46.25	5.75	1.74
5	10:12	10:22	10	40.5	44.5	4.0	2.5
6	10:22	10:32	10	40.5	44.3	3.80	2.63
7							
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10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	**Project No:**	2784-Cr	**Date:**	6/17/21
Test Hole No:	I-7	**Tested By:**	F. Sullivan		
Depth of Test Hole, D_T:	5.04'	**USCS Soil Classification:**	SM		
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)=	8	**Sides (if rectangular)=**			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:20	10:45	25	40.5	48.38	7.88	Y
2	10:45	11:10	25	40.5	48	7.5	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:10	11:20	10	40.5	43.25	2.75	3.64
2	11:20	11:30	10	40.5	43.38	2.88	3.47
3	11:30	11:40	10	40.5	43.5	3.0	3.33
4	11:40	11:50	10	40.5	42.88	2.38	4.20
5	11:50	12:00	10	40.5	43.5	3.0	3.33
6	12:00	12:10	10	40.5	42.5	2.0	5.0
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Xenia Apt Project, Beaumont	Project No:	2784-Cr	Date:	7/7/21
Test Hole No:	I-8	Tested By:	F. Sullivan		
Depth of Test Hole, D_T:	5.30'	USCS Soil Classification:	SM		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	8	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:49	9:14	25	43.63	45.26	1.63	N
2	9:14	9:39	25	43.63	45.13	1.5	N

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:39	10:09	30	43.63	46.76	3.13	9.58
2	10:09	10:39	30	43.63	46.51	2.88	10.42
3	10:39	11:09	30	43.63	47.13	3.5	8.57
4	11:09	11:39	30	43.63	46.13	2.5	12.0
5	11:39	12:09	30	43.63	46.76	3.13	9.58
6	12:09	12:39	30	43.63	46.51	2.88	10.42
7	12:39	1:09	30	43.63	46.88	3.25	9.23
8	1:09	1:39	30	43.63	46.88	3.25	9.23
9	1:39	2:09	30	43.63	46.13	2.5	12.0
10	2:09	2:39	30	43.63	46.13	2.5	12.0
11	2:39	3:09	30	43.63	46.63	3.0	10.0
12	3:09	3:39	30	43.63	46.38	2.75	10.91
13							
14							
15							

COMMENTS:

APPENDIX F

SEISMIC SETTLEMENT ANALYSES

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

GeoTek, Inc.
1548 N. Maple Street
Corona, CA 92878
951-710-1160, www.geotekusa.com

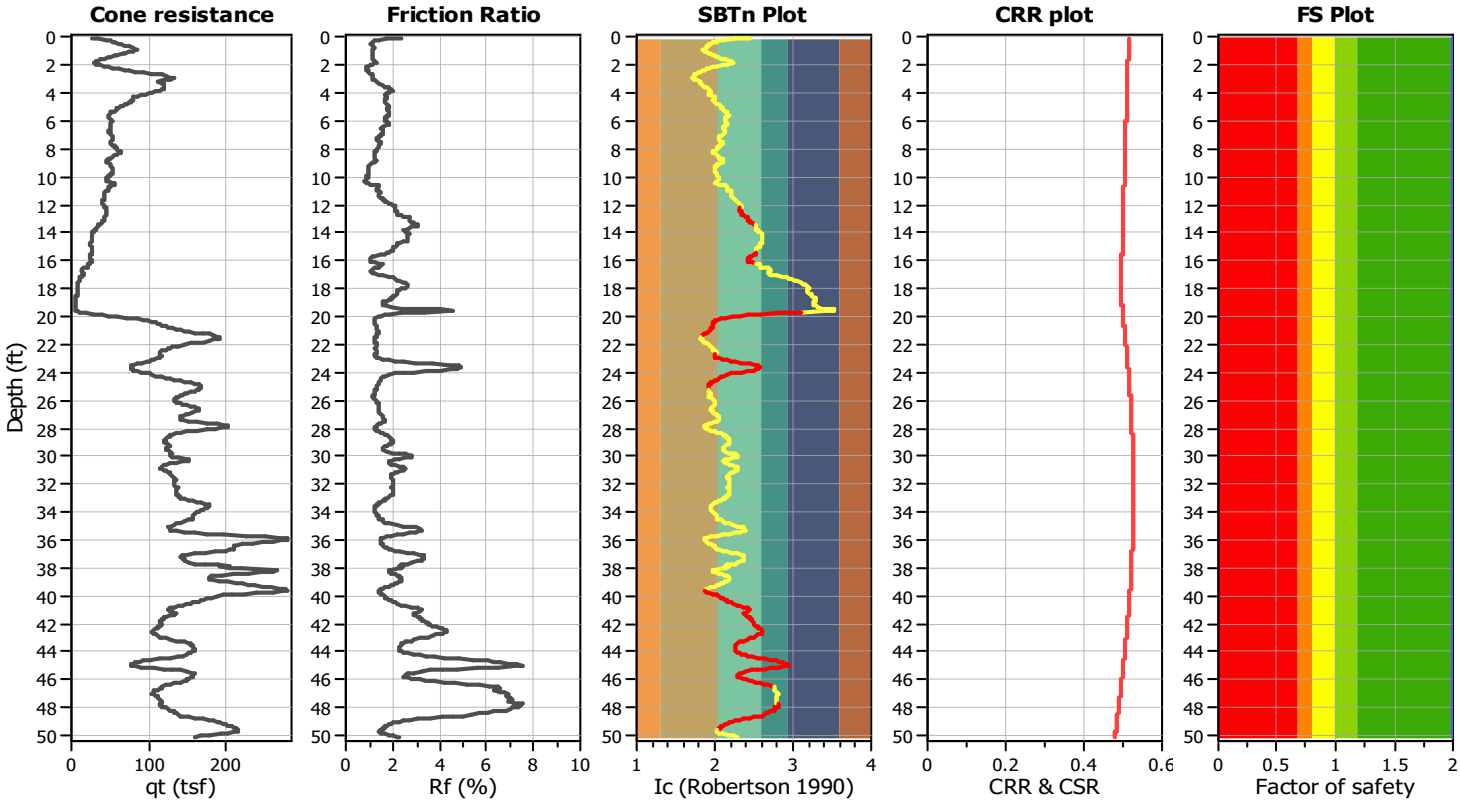
LIQUEFACTION ANALYSIS REPORT

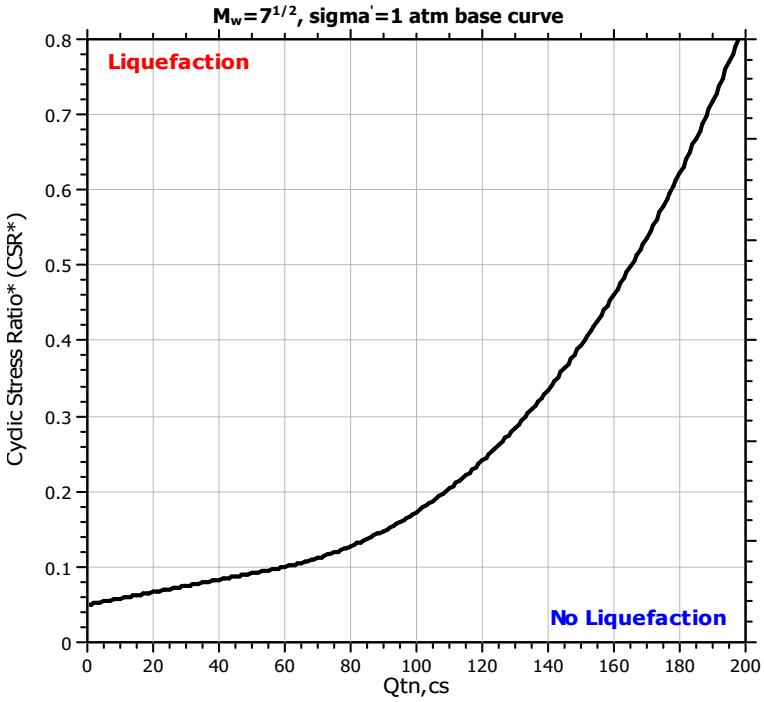
Project title : Xenia Site **Location : Beaumont, California**

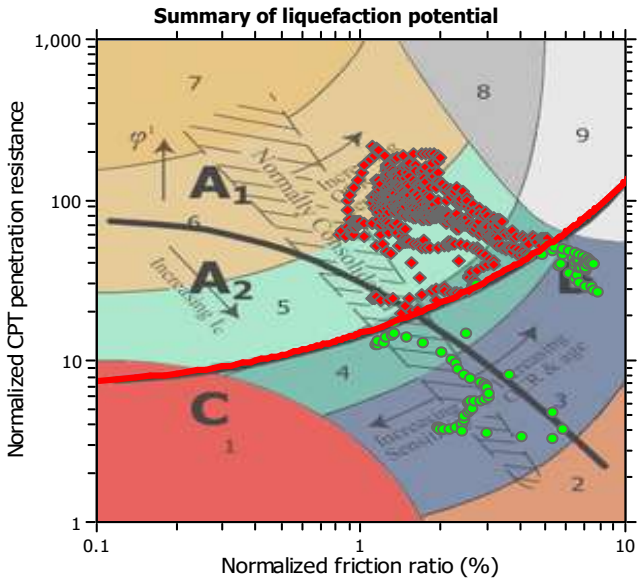
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	100.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	100.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.13	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.90	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

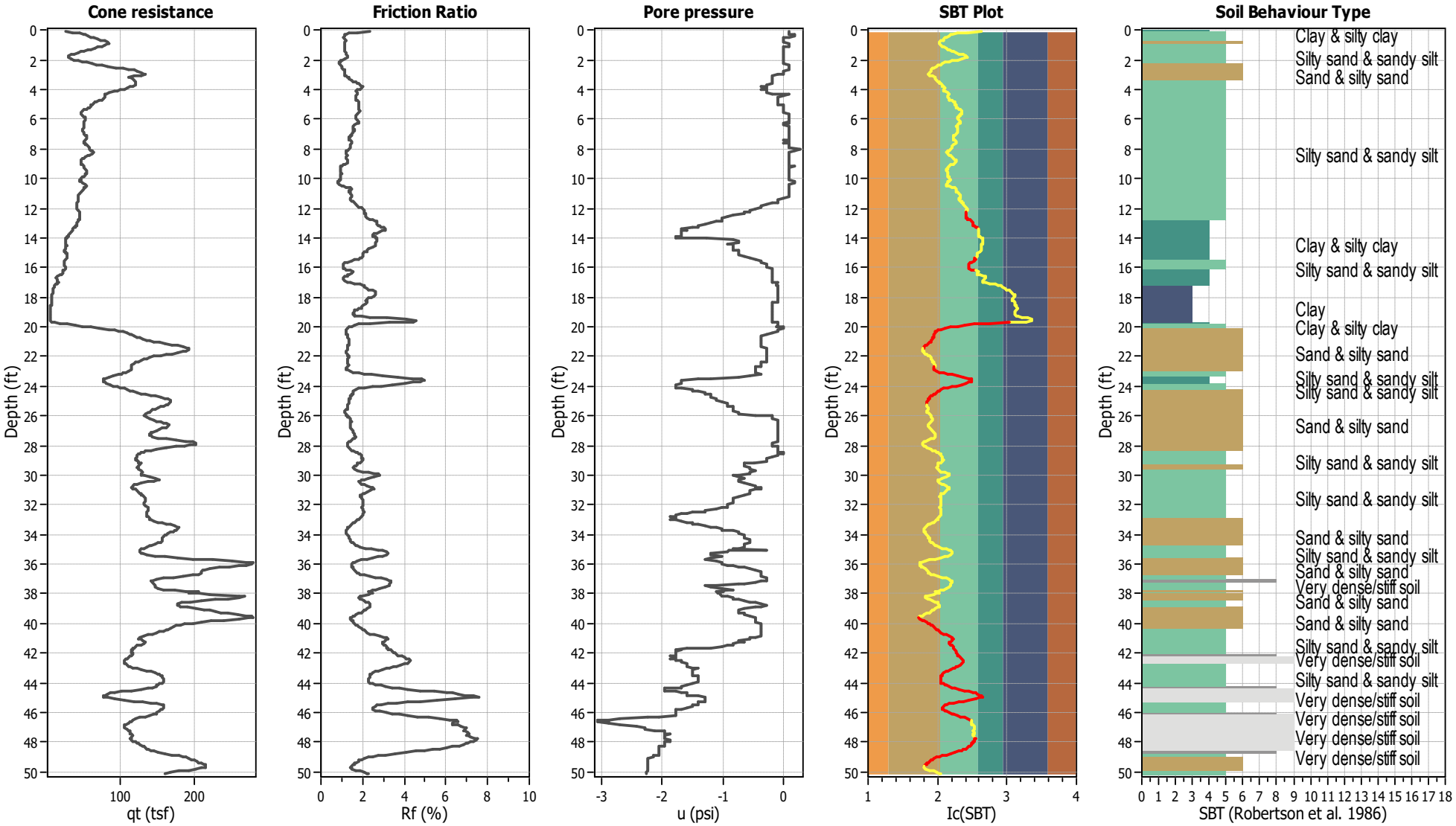






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



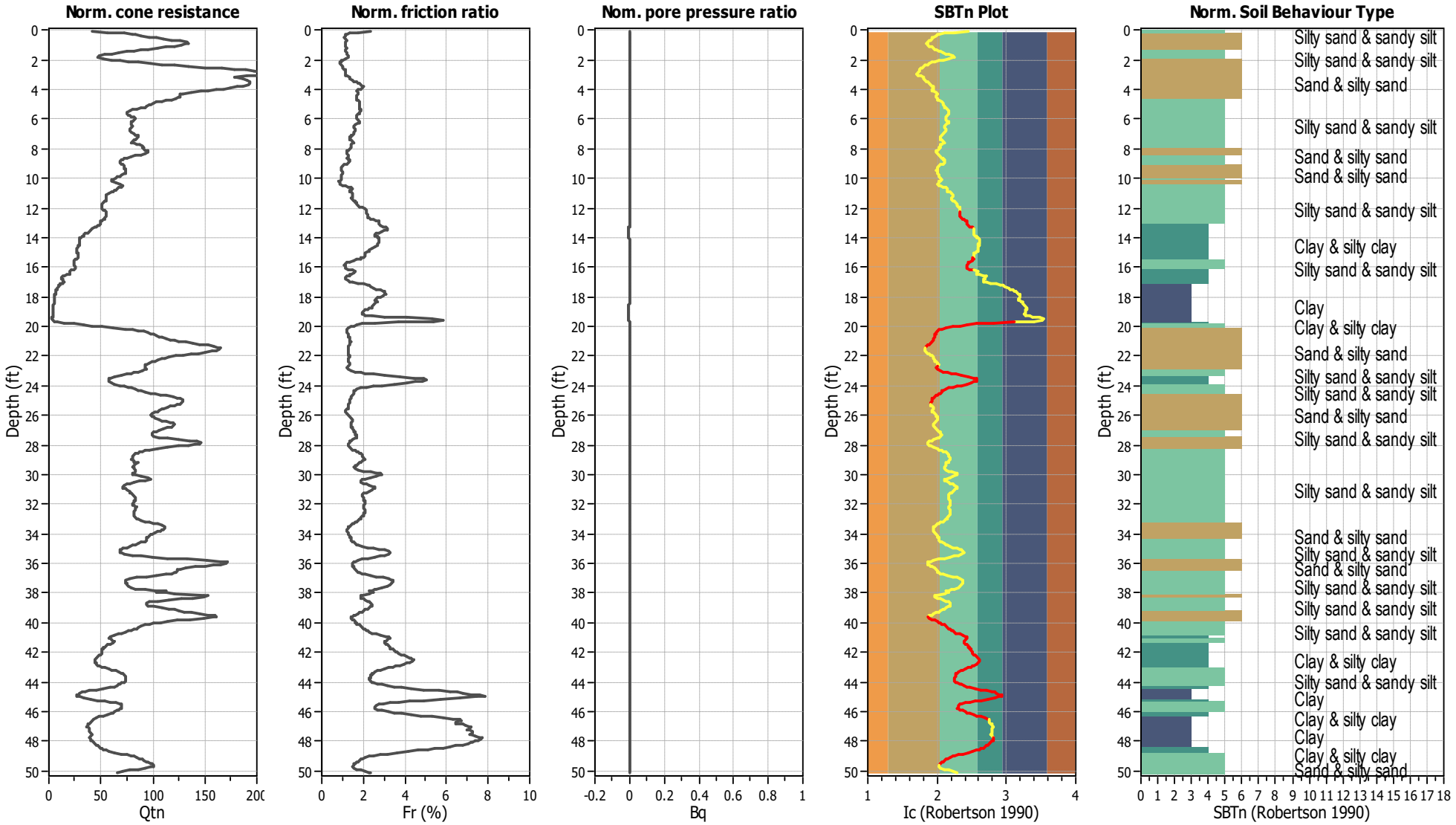
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



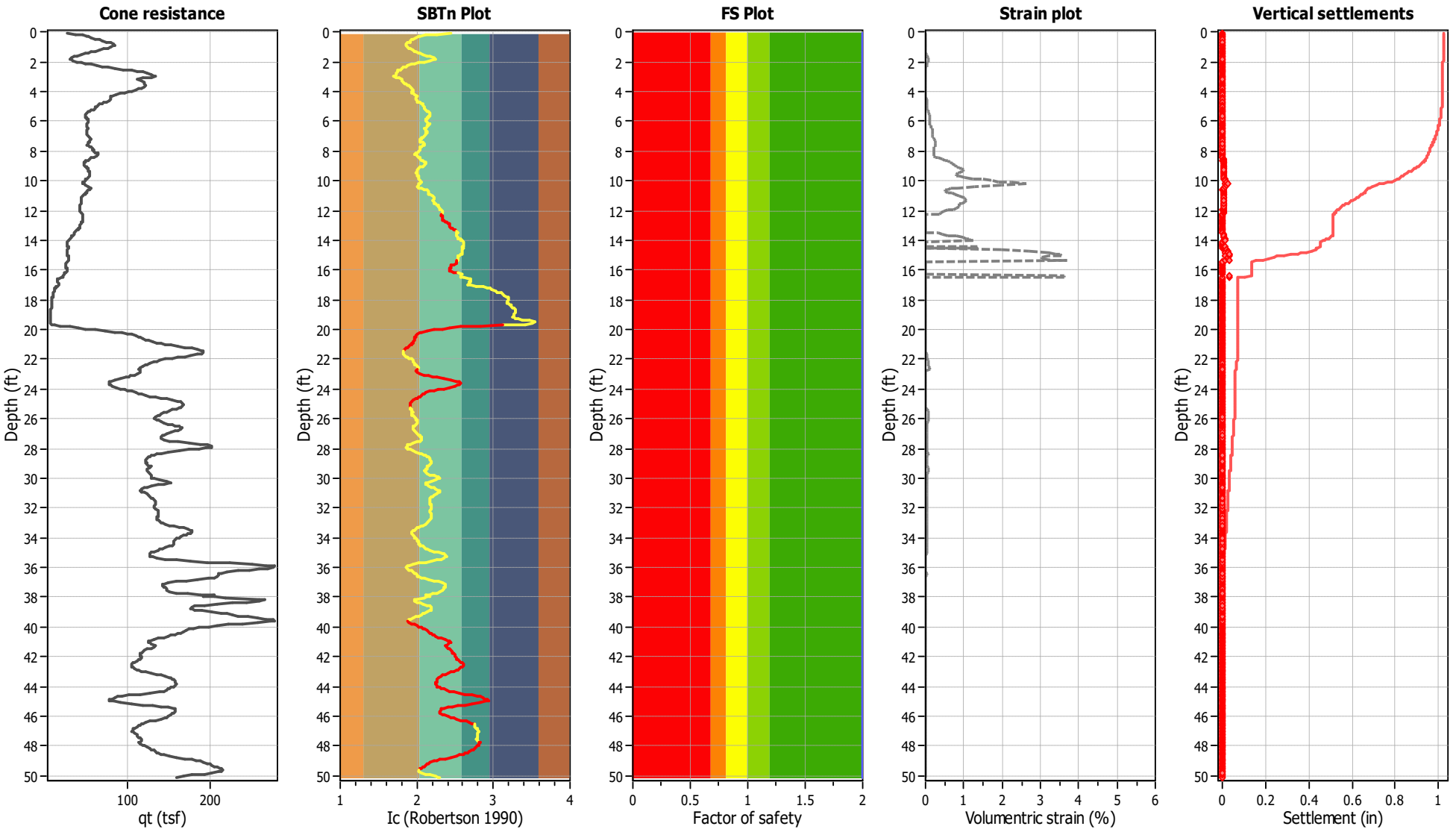
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.08	2.44	41.38	2.62	108.40	27	512	0.51	0.001	0.00	11.89	0.00	0.000
0.14	2.26	56.36	1.77	99.83	23	549	0.51	0.001	0.00	11.89	0.00	0.000
0.20	2.11	71.95	1.43	102.93	22	582	0.51	0.001	0.00	11.89	0.00	0.000
0.27	2.04	80.23	1.34	107.48	23	592	0.51	0.002	0.00	11.89	0.00	0.000
0.33	2.02	83.38	1.32	110.11	23	600	0.51	0.002	0.00	11.89	0.00	0.000
0.40	1.98	88.57	1.29	114.53	24	611	0.51	0.003	0.00	11.89	0.00	0.000
0.47	1.95	96.36	1.27	122.23	25	636	0.51	0.003	0.00	11.89	0.00	0.000
0.54	1.93	103.20	1.25	129.46	26	663	0.51	0.004	0.00	11.89	0.00	0.000
0.60	1.92	110.04	1.25	137.41	28	699	0.51	0.004	0.00	11.89	0.00	0.000
0.67	1.91	117.58	1.24	145.89	29	736	0.51	0.004	0.00	11.89	0.00	0.000
0.75	1.88	126.27	1.23	154.76	31	768	0.51	0.005	0.00	11.89	0.00	0.000
0.82	1.86	132.41	1.21	160.43	32	786	0.51	0.005	0.00	11.89	0.00	0.000
0.89	1.86	134.40	1.20	161.91	32	789	0.51	0.005	0.00	11.89	0.00	0.000
0.93	1.86	132.20	1.21	159.76	32	781	0.51	0.006	0.00	11.89	0.00	0.000
1.00	1.87	127.00	1.22	154.88	31	764	0.51	0.007	0.00	11.89	0.00	0.000
1.08	1.89	120.74	1.23	148.77	30	743	0.51	0.008	0.00	11.89	0.00	0.000
1.12	1.92	112.39	1.25	140.33	28	714	0.51	0.009	0.01	11.89	0.00	0.000
1.20	1.94	104.24	1.26	131.84	27	683	0.51	0.010	0.01	11.89	0.01	0.000
1.27	1.97	95.34	1.28	122.44	25	647	0.51	0.012	0.01	11.89	0.01	0.000
1.34	1.99	88.88	1.30	115.51	24	619	0.51	0.015	0.01	11.89	0.01	0.000
1.38	2.02	81.98	1.32	108.47	23	592	0.51	0.017	0.01	11.89	0.01	0.000
1.45	2.05	75.58	1.35	102.16	22	566	0.51	0.021	0.02	11.89	0.02	0.000
1.52	2.09	67.58	1.40	94.65	20	532	0.51	0.026	0.03	11.89	0.02	0.000
1.58	2.13	60.37	1.46	88.16	19	499	0.51	0.034	0.04	11.89	0.03	0.000
1.66	2.18	53.32	1.56	83.09	19	470	0.51	0.046	0.05	11.89	0.04	0.000
1.73	2.22	48.56	1.66	80.82	18	452	0.51	0.057	0.06	11.89	0.06	0.000
1.81	2.24	46.35	1.73	80.22	18	444	0.51	0.067	0.07	11.89	0.06	0.001
1.85	2.22	47.65	1.68	80.01	18	447	0.51	0.068	0.08	11.89	0.07	0.000
1.92	2.17	52.39	1.54	80.80	18	458	0.51	0.067	0.08	11.89	0.07	0.001
1.99	2.09	60.14	1.41	84.71	18	477	0.51	0.062	0.07	11.89	0.06	0.000
2.07	2.03	68.13	1.33	90.84	19	498	0.51	0.057	0.06	11.89	0.05	0.000
2.11	1.98	76.77	1.29	98.92	20	525	0.51	0.049	0.05	11.89	0.04	0.000
2.17	1.93	86.41	1.26	108.57	22	557	0.51	0.043	0.04	11.89	0.03	0.000
2.25	1.89	97.99	1.23	120.30	24	598	0.51	0.037	0.03	11.89	0.03	0.000
2.32	1.86	108.53	1.21	130.89	26	638	0.51	0.032	0.02	11.89	0.02	0.000
2.36	1.83	120.53	1.18	142.82	28	687	0.51	0.027	0.02	11.89	0.02	0.000
2.44	1.81	133.56	1.16	155.15	30	738	0.51	0.024	0.01	11.89	0.01	0.000
2.52	1.78	149.94	1.13	168.97	32	799	0.51	0.021	0.01	11.89	0.01	0.000
2.58	1.76	166.18	1.10	182.13	35	861	0.51	0.019	0.01	11.89	0.01	0.000
2.66	1.75	178.76	1.08	192.74	37	914	0.51	0.017	0.01	11.89	0.01	0.000
2.69	1.74	189.46	1.07	203.28	39	965	0.51	0.016	0.01	11.89	0.01	0.000
2.77	1.74	197.35	1.07	210.64	40	1001	0.51	0.015	0.01	11.89	0.01	0.000
2.84	1.73	206.49	1.04	215.41	41	1030	0.51	0.015	0.01	11.89	0.01	0.000
2.92	1.71	212.37	1.02	215.61	40	1041	0.51	0.015	0.01	11.89	0.01	0.000
2.96	1.70	215.16	1.00	215.16	40	1040	0.51	0.016	0.01	11.89	0.01	0.000
3.03	1.73	205.06	1.04	214.09	40	1024	0.51	0.017	0.01	11.89	0.01	0.000
3.10	1.77	190.46	1.11	212.21	41	1003	0.51	0.018	0.01	11.89	0.01	0.000
3.18	1.81	178.16	1.16	207.28	40	987	0.51	0.019	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
3.22	1.81	179.36	1.17	209.31	41	998	0.51	0.019	0.01	11.89	0.01	0.000
3.29	1.81	186.14	1.16	216.54	42	1031	0.51	0.019	0.01	11.89	0.01	0.000
3.36	1.82	191.13	1.18	224.82	44	1076	0.51	0.018	0.01	11.89	0.01	0.000
3.44	1.85	192.87	1.20	231.19	45	1121	0.51	0.017	0.01	11.89	0.01	0.000
3.51	1.87	193.12	1.22	234.67	46	1153	0.51	0.017	0.01	11.89	0.01	0.000
3.55	1.88	193.71	1.23	237.46	47	1179	0.51	0.016	0.01	11.89	0.00	0.000
3.63	1.90	193.66	1.23	238.92	48	1196	0.51	0.016	0.01	11.89	0.00	0.000
3.70	1.91	191.95	1.24	238.66	48	1207	0.51	0.016	0.01	11.89	0.00	0.000
3.77	1.93	187.19	1.25	234.81	48	1203	0.51	0.017	0.01	11.89	0.01	0.000
3.84	1.94	181.68	1.26	229.75	47	1190	0.51	0.018	0.01	11.89	0.01	0.000
3.88	1.95	175.03	1.27	222.26	45	1158	0.51	0.019	0.01	11.89	0.01	0.000
3.95	1.94	167.98	1.26	212.46	43	1101	0.51	0.021	0.01	11.89	0.01	0.000
4.03	1.93	160.87	1.26	202.57	41	1043	0.51	0.025	0.01	11.89	0.01	0.000
4.07	1.93	153.32	1.26	193.07	39	994	0.51	0.028	0.01	11.89	0.01	0.000
4.14	1.95	146.42	1.27	185.88	38	968	0.51	0.030	0.01	11.89	0.01	0.000
4.22	1.98	136.27	1.29	175.72	36	934	0.51	0.034	0.02	11.89	0.01	0.000
4.29	2.00	129.12	1.31	168.52	35	907	0.51	0.037	0.02	11.89	0.02	0.000
4.34	2.00	125.77	1.31	164.85	34	892	0.51	0.040	0.02	11.89	0.02	0.000
4.41	1.99	126.77	1.30	164.86	34	885	0.51	0.042	0.02	11.89	0.02	0.000
4.48	1.99	126.71	1.30	164.18	34	877	0.51	0.044	0.02	11.89	0.02	0.000
4.56	1.99	125.00	1.30	162.35	34	870	0.51	0.046	0.02	11.89	0.02	0.000
4.60	2.00	122.30	1.31	159.72	33	861	0.51	0.048	0.03	11.89	0.02	0.000
4.67	2.01	118.69	1.32	156.34	33	849	0.51	0.051	0.03	11.89	0.02	0.000
4.76	2.04	113.23	1.34	151.66	32	835	0.51	0.056	0.03	11.89	0.03	0.000
4.82	2.06	108.13	1.36	147.51	31	821	0.51	0.060	0.04	11.89	0.03	0.000
4.87	2.08	103.73	1.39	143.78	31	805	0.51	0.065	0.04	11.89	0.03	0.000
4.94	2.08	100.72	1.40	140.72	30	791	0.51	0.071	0.04	11.89	0.04	0.000
5.01	2.09	98.12	1.40	137.82	30	775	0.51	0.077	0.05	11.89	0.04	0.000
5.08	2.09	96.36	1.41	135.84	29	765	0.51	0.083	0.05	11.89	0.04	0.000
5.12	2.10	94.46	1.42	134.05	29	756	0.51	0.088	0.06	11.89	0.05	0.000
5.19	2.11	92.00	1.43	131.87	29	745	0.51	0.095	0.06	11.89	0.05	0.000
5.27	2.12	88.44	1.46	128.80	28	729	0.51	0.105	0.07	11.89	0.06	0.001
5.35	2.14	84.84	1.48	125.79	28	713	0.51	0.118	0.08	11.89	0.07	0.001
5.38	2.16	81.14	1.52	123.03	27	697	0.51	0.130	0.09	11.89	0.07	0.000
5.45	2.17	77.99	1.55	120.60	27	683	0.51	0.146	0.10	11.89	0.08	0.001
5.53	2.18	75.63	1.56	117.76	26	666	0.51	0.166	0.12	11.89	0.10	0.001
5.60	2.17	74.77	1.54	115.52	26	654	0.51	0.185	0.14	11.89	0.11	0.001
5.68	2.16	74.97	1.53	114.33	25	648	0.51	0.199	0.15	11.89	0.12	0.001
5.72	2.15	76.01	1.51	114.48	25	649	0.51	0.200	0.15	11.89	0.12	0.001
5.79	2.14	77.55	1.49	115.45	25	655	0.51	0.199	0.15	11.89	0.12	0.001
5.87	2.13	79.49	1.47	116.84	26	662	0.51	0.195	0.14	11.89	0.12	0.001
5.91	2.12	81.69	1.45	118.68	26	672	0.51	0.186	0.14	11.89	0.11	0.001
5.98	2.12	82.64	1.45	119.94	26	679	0.51	0.183	0.13	11.89	0.11	0.001
6.05	2.13	82.13	1.47	120.73	26	684	0.51	0.182	0.13	11.89	0.10	0.001
6.13	2.15	80.07	1.51	120.86	27	685	0.51	0.186	0.13	11.89	0.11	0.001
6.20	2.16	79.16	1.53	121.01	27	686	0.51	0.190	0.13	11.89	0.11	0.001
6.24	2.16	78.71	1.52	119.92	27	680	0.51	0.201	0.14	11.89	0.11	0.001
6.31	2.14	79.30	1.49	118.21	26	670	0.51	0.219	0.16	11.89	0.13	0.001

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
6.39	2.13	79.49	1.46	115.98	25	657	0.51	0.246	0.19	11.89	0.15	0.001
6.46	2.11	80.38	1.43	114.96	25	649	0.51	0.266	0.20	11.89	0.16	0.001
6.50	2.10	80.18	1.42	114.21	25	645	0.51	0.279	0.22	11.89	0.17	0.001
6.57	2.11	79.33	1.44	113.92	25	644	0.51	0.288	0.22	11.89	0.18	0.002
6.65	2.12	78.07	1.45	113.55	25	643	0.51	0.299	0.23	11.89	0.18	0.002
6.72	2.13	77.51	1.46	113.34	25	642	0.51	0.309	0.24	11.89	0.19	0.002
6.80	2.13	77.56	1.46	113.29	25	642	0.51	0.318	0.25	11.89	0.20	0.002
6.84	2.12	78.26	1.45	113.68	25	644	0.51	0.318	0.25	11.89	0.20	0.001
6.91	2.11	79.40	1.44	114.18	25	646	0.51	0.322	0.25	11.89	0.20	0.002
6.98	2.10	81.34	1.41	115.00	25	648	0.51	0.324	0.25	11.89	0.20	0.002
7.06	2.08	83.59	1.39	115.95	25	650	0.51	0.329	0.25	11.89	0.20	0.002
7.10	2.06	85.38	1.37	116.83	25	651	0.51	0.331	0.25	11.89	0.20	0.001
7.17	2.05	86.12	1.36	116.95	25	649	0.51	0.344	0.26	11.89	0.21	0.002
7.24	2.05	85.91	1.35	116.16	25	643	0.51	0.368	0.29	11.89	0.23	0.002
7.32	2.05	85.16	1.35	114.95	24	636	0.51	0.400	0.32	11.89	0.25	0.002
7.36	2.05	83.70	1.36	113.55	24	630	0.51	0.424	0.34	11.89	0.27	0.001
7.43	2.07	81.70	1.38	112.97	24	632	0.51	0.427	0.34	11.89	0.27	0.002
7.51	2.09	80.19	1.41	112.91	24	636	0.51	0.427	0.34	11.89	0.26	0.003
7.57	2.10	79.78	1.42	113.39	25	640	0.51	0.423	0.33	11.89	0.26	0.002
7.61	2.09	81.53	1.40	114.12	25	641	0.51	0.424	0.33	11.89	0.26	0.001
7.69	2.07	84.47	1.37	115.99	25	647	0.51	0.415	0.32	11.89	0.25	0.002
7.77	2.05	87.31	1.36	118.32	25	656	0.51	0.399	0.30	11.89	0.24	0.002
7.84	2.04	89.38	1.35	120.26	25	664	0.51	0.385	0.29	11.89	0.23	0.002
7.88	2.04	90.93	1.34	121.89	26	674	0.51	0.362	0.27	11.89	0.21	0.001
7.95	2.04	90.20	1.35	121.37	26	676	0.51	0.366	0.27	11.89	0.21	0.002
8.03	2.03	91.32	1.33	121.67	26	680	0.51	0.365	0.27	11.89	0.21	0.002
8.09	2.01	92.36	1.32	121.60	25	680	0.51	0.372	0.28	11.89	0.22	0.002
8.17	1.98	95.30	1.29	123.31	26	687	0.51	0.363	0.27	11.89	0.21	0.002
8.23	1.98	95.78	1.29	123.48	25	689	0.51	0.364	0.27	11.89	0.21	0.002
8.27	1.98	94.83	1.29	122.61	25	688	0.51	0.372	0.28	11.89	0.22	0.001
8.34	2.00	92.12	1.31	120.24	25	682	0.51	0.395	0.30	11.89	0.23	0.002
8.41	2.02	88.16	1.32	116.57	24	669	0.51	0.444	0.35	11.89	0.27	0.002
8.49	2.04	83.52	1.34	112.00	24	650	0.51	0.526	0.43	11.89	0.33	0.003
8.56	2.05	79.23	1.36	107.40	23	628	0.50	0.642	0.55	11.89	0.42	0.004
8.63	2.06	75.82	1.37	103.73	22	611	0.50	0.763	0.68	11.89	0.52	0.004
8.66	2.08	73.15	1.39	101.50	22	600	0.50	0.851	0.77	11.89	0.59	0.002
8.73	2.09	70.97	1.41	100.08	22	595	0.50	0.913	0.83	11.89	0.64	0.005
8.80	2.11	69.26	1.43	99.35	22	593	0.50	0.950	0.87	11.89	0.66	0.005
8.87	2.11	68.31	1.44	98.43	21	591	0.50	0.997	0.92	11.89	0.70	0.006
8.94	2.10	68.45	1.42	97.36	21	588	0.50	1.048	0.98	11.89	0.75	0.006
9.01	2.08	69.50	1.39	96.53	21	586	0.50	1.091	1.05	11.89	0.80	0.007
9.09	2.05	71.01	1.36	96.27	20	585	0.50	1.125	1.10	11.89	0.84	0.008
9.12	2.03	72.10	1.33	96.03	20	582	0.50	1.176	1.16	11.89	0.88	0.004
9.19	2.02	71.96	1.32	95.12	20	577	0.50	1.261	1.27	11.89	0.96	0.008
9.27	2.01	72.04	1.31	94.72	20	576	0.50	1.306	1.32	11.89	1.01	0.009
9.34	2.00	72.59	1.31	95.18	20	581	0.50	1.273	1.28	11.89	0.97	0.009
9.41	2.00	73.48	1.31	95.90	20	586	0.50	1.230	1.23	11.89	0.93	0.008
9.45	1.99	74.19	1.30	96.64	20	592	0.50	1.181	1.18	11.89	0.89	0.004

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
9.52	2.00	74.33	1.31	97.18	20	599	0.50	1.121	1.11	11.89	0.84	0.007
9.59	2.01	74.37	1.31	97.60	20	606	0.50	1.073	1.05	11.89	0.79	0.006
9.66	2.01	73.89	1.32	97.24	20	607	0.50	1.079	1.06	11.89	0.80	0.007
9.73	2.02	72.35	1.32	95.55	20	600	0.50	1.176	1.18	11.89	0.88	0.007
9.81	2.02	70.29	1.33	93.28	20	590	0.50	1.328	1.36	11.89	1.02	0.009
9.84	2.03	68.12	1.33	90.70	19	576	0.50	1.556	1.65	11.89	1.24	0.006
9.91	2.03	66.16	1.33	88.27	19	564	0.50	1.820	1.99	11.89	1.49	0.012
9.98	2.04	63.95	1.35	86.08	18	554	0.50	2.075	2.32	11.89	1.74	0.014
10.05	2.06	61.91	1.37	84.51	18	549	0.50	2.260	2.56	11.89	1.92	0.017
10.13	2.06	60.49	1.37	82.70	18	540	0.50	2.575	3.00	11.89	2.24	0.020
10.20	2.05	59.92	1.36	81.29	17	532	0.50	2.903	3.46	11.89	2.58	0.023
10.24	2.03	60.97	1.34	81.53	17	532	0.50	2.933	3.52	11.89	2.62	0.013
10.31	2.02	64.09	1.32	84.86	18	553	0.50	2.307	2.65	11.89	1.97	0.016
10.38	2.01	68.44	1.32	90.10	19	588	0.50	1.602	1.72	11.89	1.28	0.011
10.46	2.02	71.63	1.32	94.88	20	624	0.50	1.147	1.15	11.89	0.86	0.007
10.53	2.05	71.52	1.36	97.06	21	648	0.50	0.947	0.91	11.89	0.68	0.006
10.60	2.09	69.60	1.41	98.09	21	662	0.50	0.857	0.80	11.89	0.59	0.005
10.64	2.14	67.53	1.48	99.78	22	673	0.50	0.786	0.70	11.89	0.52	0.002
10.71	2.15	66.20	1.51	100.04	22	676	0.50	0.784	0.69	11.89	0.51	0.004
10.77	2.16	64.63	1.52	98.01	22	665	0.50	0.874	0.79	11.89	0.58	0.005
10.85	2.15	63.34	1.50	95.31	21	650	0.50	1.007	0.95	11.89	0.70	0.006
10.92	2.16	62.06	1.52	94.14	21	644	0.50	1.081	1.03	11.89	0.76	0.006
10.96	2.18	60.16	1.56	93.97	21	641	0.50	1.128	1.06	11.89	0.78	0.004
11.04	2.20	57.46	1.61	92.80	21	630	0.50	1.269	1.20	11.89	0.88	0.008
11.11	2.22	55.23	1.66	91.77	21	620	0.50	1.417	1.35	11.89	0.99	0.009
11.16	2.22	54.59	1.67	91.29	21	618	0.50	1.473	1.41	11.89	1.03	0.006
11.23	2.22	54.73	1.66	90.96	21	619	0.50	1.475	1.42	11.89	1.03	0.008
11.30	2.22	54.73	1.65	90.46	21	620	0.50	1.496	1.45	11.89	1.06	0.009
11.36	2.21	54.76	1.65	90.21	20	621	0.50	1.500	1.46	11.89	1.06	0.009
11.43	2.22	54.78	1.66	90.86	21	627	0.50	1.445	1.39	11.89	1.01	0.008
11.51	2.23	54.53	1.69	92.14	21	635	0.50	1.367	1.29	11.89	0.93	0.009
11.58	2.24	53.84	1.74	93.40	21	640	0.50	1.323	1.22	11.89	0.88	0.007
11.62	2.26	52.71	1.79	94.22	22	640	0.50	1.338	1.21	11.89	0.87	0.004
11.69	2.27	51.73	1.83	94.59	22	640	0.50	1.367	1.22	11.89	0.88	0.008
11.76	2.28	51.11	1.86	95.02	22	641	0.50	1.373	1.21	11.89	0.87	0.008
11.84	2.29	50.79	1.90	96.40	23	648	0.50	1.316	1.14	11.89	0.82	0.008
11.91	2.31	50.54	1.95	98.65	23	658	0.50	1.223	1.02	11.89	0.73	0.006
11.95	2.32	50.86	2.02	102.71	24	677	0.50	1.055	0.83	11.89	0.60	0.003
12.03	2.33	51.50	2.06	106.25	25	696	0.50	0.915	0.69	11.89	0.49	0.004
12.10	2.34	52.56	2.07	108.83	26	716	0.50	0.804	0.59	11.89	0.42	0.004
12.18	2.33	53.46	2.05	109.57	26	727	0.50	0.751	0.54	11.89	0.39	0.003
12.22	2.32	54.41	2.02	109.91	26	736	0.50	0.711	0.52	11.89	0.37	0.002
12.29	2.32	54.73	2.01	110.15	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.37	2.32	54.74	2.02	110.53	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.40	2.33	54.79	2.03	111.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.48	2.33	54.69	2.05	112.04	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.55	2.33	54.44	2.06	112.16	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.62	2.34	54.01	2.08	112.53	0	0	0.50	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
12.69	2.35	53.60	2.12	113.57	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.73	2.36	53.09	2.20	116.63	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.81	2.39	52.09	2.30	120.08	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.89	2.41	50.94	2.43	123.63	0	0	0.50	0.000	0.00	11.89	0.00	0.000
12.93	2.43	50.18	2.51	126.14	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.00	2.43	49.72	2.54	126.42	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.08	2.43	49.19	2.56	125.94	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.15	2.44	48.18	2.61	125.90	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.22	2.46	47.02	2.70	126.93	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.26	2.48	45.85	2.81	128.93	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.33	2.50	43.63	2.99	130.64	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.40	2.53	41.52	3.16	131.38	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.48	2.54	40.02	3.26	130.31	0	0	0.50	0.000	0.00	11.89	0.00	0.000
13.52	2.53	40.06	3.16	126.67	33	740	0.50	0.911	0.50	11.89	0.35	0.001
13.59	2.52	38.87	3.15	122.32	32	720	0.50	1.078	0.62	11.89	0.43	0.004
13.67	2.52	37.06	3.14	116.51	30	689	0.50	1.402	0.85	11.89	0.59	0.006
13.75	2.53	35.25	3.16	111.43	29	660	0.50	1.838	1.17	11.89	0.81	0.007
13.78	2.53	34.08	3.19	108.68	28	643	0.50	2.188	1.44	11.89	0.99	0.004
13.86	2.54	33.05	3.29	108.65	29	636	0.50	2.380	1.55	11.89	1.07	0.010
13.94	2.57	31.74	3.47	110.01	29	630	0.50	2.566	1.62	11.89	1.12	0.010
13.98	2.58	30.94	3.58	110.78	30	626	0.50	2.699	1.68	11.89	1.16	0.006
14.05	2.60	29.85	3.72	111.14	30	619	0.50	2.959	1.82	11.89	1.25	0.010
14.13	2.60	29.28	3.77	110.50	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.20	2.60	28.99	3.79	109.83	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.27	2.60	28.99	3.77	109.40	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.31	2.60	29.03	3.76	109.23	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.38	2.60	28.94	3.77	109.05	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.46	2.60	29.18	3.73	108.85	29	620	0.50	3.178	2.00	11.89	1.36	0.013
14.53	2.60	29.19	3.73	108.97	29	623	0.50	3.123	1.96	11.89	1.33	0.012
14.57	2.60	28.67	3.76	107.82	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.65	2.60	27.62	3.75	103.55	28	595	0.50	4.368	2.92	11.89	1.97	0.019
14.72	2.59	26.73	3.71	99.08	27	575	0.50	5.650	3.99	11.89	2.70	0.023
14.79	2.59	26.40	3.64	96.18	26	565	0.50	6.501	4.78	11.89	3.22	0.026
14.83	2.59	26.38	3.65	96.20	26	566	0.50	6.468	4.75	11.89	3.20	0.015
14.90	2.59	26.20	3.64	95.29	26	564	0.50	6.778	5.04	11.89	3.39	0.030
14.98	2.57	26.57	3.52	93.51	25	564	0.50	6.832	5.24	11.89	3.52	0.032
15.05	2.55	27.41	3.33	91.36	24	568	0.50	6.610	5.28	11.89	3.55	0.031
15.09	2.53	28.34	3.22	91.13	24	578	0.50	5.907	4.78	11.89	3.20	0.015
15.17	2.53	28.45	3.22	91.63	24	583	0.50	5.634	4.53	11.89	3.03	0.029
15.24	2.53	28.35	3.23	91.47	24	584	0.50	5.679	4.57	11.89	3.05	0.026
15.32	2.53	28.12	3.21	90.17	24	580	0.50	6.076	4.98	11.89	3.32	0.032
15.36	2.52	28.30	3.09	87.36	23	573	0.50	6.650	5.72	11.89	3.70	0.016
15.43	2.52	27.13	3.13	84.91	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.51	2.52	25.83	3.11	80.21	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.58	2.51	24.49	3.05	74.68	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.65	2.48	24.27	2.84	68.85	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.69	2.45	24.12	2.68	64.66	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.76	2.44	24.19	2.60	62.99	0	0	0.50	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
15.84	2.44	24.29	2.58	62.58	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.88	2.43	24.75	2.56	63.31	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.96	2.43	24.89	2.56	63.63	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.03	2.43	24.99	2.55	63.71	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.10	2.44	24.91	2.58	64.37	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.14	2.48	23.97	2.81	67.46	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.21	2.54	22.11	3.26	72.09	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.28	2.58	20.80	3.62	75.20	0	0	0.50	0.000	0.00	11.89	0.00	0.000
16.36	2.58	20.51	3.55	72.87	19	470	0.50	40.188	41.47	11.89	3.61	0.034
16.44	2.57	19.73	3.53	69.56	19	452	0.50	58.174	63.59	11.89	3.61	0.034
16.47	2.61	17.30	3.83	66.21	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.55	2.67	14.39	4.44	63.85	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.62	2.70	12.80	4.74	60.60	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.70	2.70	12.43	4.72	58.63	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.76	2.70	12.58	4.65	58.54	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.80	2.68	13.18	4.51	59.35	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.88	2.68	13.87	4.46	61.81	0	0	0.50	0.000	0.00	0.00	0.00	0.000
16.96	2.67	14.56	4.42	64.28	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.00	2.71	14.08	4.79	67.44	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.07	2.78	12.77	5.58	71.21	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.15	2.86	11.19	6.66	74.59	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.22	2.92	10.20	7.48	76.27	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.26	2.95	9.48	8.00	75.84	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.33	2.98	8.89	8.47	75.26	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.41	3.03	8.14	9.24	75.29	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.48	3.06	7.75	9.77	75.64	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.52	3.10	7.27	10.58	76.98	0	0	0.50	0.000	0.00	0.00	0.00	0.000
17.60	3.12	7.12	10.92	77.79	0	0	0.49	0.000	0.00	0.00	0.00	0.000
17.67	3.13	7.00	11.12	77.88	0	0	0.49	0.000	0.00	0.00	0.00	0.000
17.74	3.15	6.67	11.53	76.95	0	0	0.49	0.000	0.00	0.00	0.00	0.000
17.82	3.17	6.25	12.10	75.64	0	0	0.49	0.000	0.00	0.00	0.00	0.000
17.86	3.19	5.88	12.59	73.96	0	0	0.49	0.000	0.00	0.00	0.00	0.000
17.93	3.20	5.67	12.73	72.22	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.01	3.19	5.59	12.61	70.50	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.05	3.19	5.55	12.46	69.16	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.12	3.18	5.56	12.25	68.09	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.20	3.18	5.48	12.31	67.41	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.27	3.20	5.30	12.63	67.02	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.34	3.22	5.08	13.12	66.58	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.39	3.23	4.89	13.39	65.47	0	0	0.49	0.000	0.00	0.00	0.00	0.000
18.46	3.24	4.72	13.57	64.06	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.53	3.25	4.50	13.85	62.34	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.60	3.26	4.28	14.25	61.02	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.64	3.28	4.10	14.63	59.95	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.72	3.29	3.94	14.96	58.91	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.79	3.30	3.80	15.06	57.27	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.86	3.29	3.70	15.02	55.63	0	0	0.50	0.000	0.00	0.00	0.00	0.000
18.90	3.28	3.70	14.75	54.49	0	0	0.50	0.000	0.00	0.00	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
18.98	3.27	3.74	14.48	54.13	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.06	3.27	3.78	14.30	54.05	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.12	3.26	3.82	14.14	54.03	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.16	3.27	3.79	14.35	54.34	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.24	3.28	3.71	14.72	54.68	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.32	3.33	3.61	15.89	57.45	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.39	3.38	3.52	17.44	61.30	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.43	3.47	3.34	20.31	67.85	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.51	3.54	3.27	22.77	74.45	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.57	3.51	3.72	21.85	81.35	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.65	3.41	4.76	18.21	86.59	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.69	3.12	8.24	10.96	90.26	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.77	2.82	14.56	6.12	89.01	0	0	0.50	0.000	0.00	0.00	0.00	0.000
19.84	2.58	23.87	3.56	84.88	0	0	0.50	0.000	0.00	11.89	0.00	0.000
19.91	2.43	32.99	2.53	83.47	0	0	0.50	0.000	0.00	11.89	0.00	0.000
19.98	2.33	41.37	2.03	84.03	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.01	2.23	51.38	1.68	86.44	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.09	2.14	62.32	1.48	92.08	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.16	2.07	73.32	1.38	100.83	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.24	2.03	80.51	1.34	107.71	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.28	2.01	86.32	1.32	113.72	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.35	2.00	91.01	1.30	118.76	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.43	1.99	95.43	1.30	123.64	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.50	1.98	98.46	1.29	127.05	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.54	1.98	100.72	1.29	129.75	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.61	1.97	102.82	1.29	132.31	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.69	1.97	105.47	1.28	135.40	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.75	1.96	108.95	1.28	139.25	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.83	1.95	113.03	1.27	143.74	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.90	1.94	116.97	1.27	148.11	0	0	0.50	0.000	0.00	11.89	0.00	0.000
20.94	1.94	121.01	1.26	152.67	0	0	0.50	0.000	0.00	11.89	0.00	0.000
21.01	1.93	125.24	1.26	157.39	0	0	0.50	0.000	0.00	11.89	0.00	0.000
21.08	1.92	131.15	1.25	163.82	0	0	0.50	0.000	0.00	11.89	0.00	0.000
21.16	1.90	138.40	1.24	171.21	0	0	0.50	0.000	0.00	11.89	0.00	0.000
21.23	1.88	145.43	1.22	177.87	0	0	0.50	0.000	0.00	11.89	0.00	0.000
21.26	1.86	152.73	1.21	184.23	0	0	0.51	0.000	0.00	11.89	0.00	0.000
21.34	1.84	158.48	1.19	189.00	0	0	0.51	0.000	0.00	11.89	0.00	0.000
21.41	1.83	163.06	1.18	192.78	0	0	0.51	0.000	0.00	11.89	0.00	0.000
21.48	1.82	164.85	1.18	193.95	0	0	0.51	0.000	0.00	11.89	0.00	0.000
21.56	1.82	164.22	1.17	192.87	0	0	0.51	0.000	0.00	11.89	0.00	0.000
21.63	1.82	161.66	1.18	190.20	37	1703	0.51	0.099	0.05	11.89	0.03	0.000
21.67	1.83	157.17	1.18	186.07	36	1675	0.51	0.103	0.05	11.89	0.03	0.000
21.74	1.84	150.44	1.20	179.99	35	1638	0.51	0.110	0.06	11.89	0.03	0.000
21.81	1.86	143.55	1.21	173.55	34	1600	0.51	0.118	0.06	11.89	0.04	0.000
21.85	1.88	136.28	1.22	166.86	33	1564	0.51	0.126	0.07	11.89	0.04	0.000
21.92	1.90	129.07	1.24	160.08	32	1531	0.51	0.135	0.08	11.89	0.04	0.000
22.00	1.93	121.52	1.26	152.59	31	1491	0.51	0.147	0.09	11.89	0.05	0.000
22.08	1.94	115.92	1.27	146.73	30	1455	0.51	0.159	0.10	11.89	0.06	0.001

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
22.12	1.95	111.97	1.27	142.24	29	1420	0.51	0.172	0.11	11.89	0.06	0.000
22.19	1.96	108.64	1.27	138.39	28	1390	0.51	0.185	0.12	11.89	0.07	0.001
22.27	1.96	105.09	1.28	134.44	28	1362	0.51	0.199	0.14	11.89	0.08	0.001
22.34	1.97	102.15	1.29	131.38	27	1344	0.51	0.210	0.15	11.89	0.08	0.001
22.38	1.99	99.24	1.30	128.56	27	1329	0.51	0.219	0.16	11.89	0.09	0.000
22.45	2.00	96.35	1.31	125.92	26	1319	0.51	0.226	0.16	11.89	0.09	0.001
22.53	2.02	93.65	1.32	123.65	26	1312	0.51	0.232	0.17	11.89	0.09	0.001
22.61	2.02	92.64	1.32	122.57	26	1306	0.51	0.237	0.18	11.89	0.10	0.001
22.64	2.01	92.39	1.32	121.59	25	1290	0.51	0.249	0.19	11.89	0.10	0.000
22.72	2.00	92.72	1.31	121.21	25	1280	0.51	0.258	0.19	11.89	0.11	0.001
22.79	2.00	92.91	1.30	121.11	0	0	0.51	0.000	0.00	11.89	0.00	0.000
22.87	2.00	93.30	1.30	121.74	0	0	0.51	0.000	0.00	11.89	0.00	0.000
22.91	2.01	92.68	1.31	121.71	0	0	0.51	0.000	0.00	11.89	0.00	0.000
22.97	2.04	89.31	1.35	120.41	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.04	2.09	85.52	1.41	120.58	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.12	2.16	81.44	1.52	123.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.19	2.20	79.04	1.62	128.33	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.23	2.27	75.30	1.81	136.40	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.31	2.35	69.86	2.13	148.95	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.38	2.45	63.71	2.65	168.64	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.46	2.52	59.37	3.14	186.48	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.50	2.56	57.80	3.44	198.76	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.57	2.57	57.61	3.52	202.57	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.64	2.57	57.44	3.51	201.56	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.72	2.56	57.33	3.43	196.45	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.76	2.54	57.92	3.24	187.50	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.83	2.49	59.83	2.93	175.60	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.90	2.43	63.59	2.51	159.72	0	0	0.51	0.000	0.00	11.89	0.00	0.000
23.98	2.35	68.11	2.13	144.87	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.05	2.28	72.03	1.86	134.15	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.09	2.22	75.87	1.67	126.35	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.17	2.16	79.54	1.53	122.00	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.24	2.12	83.22	1.45	120.36	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.28	2.09	86.41	1.40	121.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
24.35	2.08	89.19	1.39	123.55	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.42	2.06	92.93	1.37	126.89	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.50	2.04	97.47	1.35	131.21	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.57	2.02	102.16	1.33	135.63	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.61	2.00	107.87	1.31	141.04	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.69	1.98	113.28	1.29	146.25	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.75	1.96	119.18	1.28	151.99	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.83	1.94	123.66	1.26	156.33	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.90	1.93	126.72	1.26	159.21	0	0	0.52	0.000	0.00	11.89	0.00	0.000
24.94	1.92	128.49	1.25	160.80	0	0	0.52	0.000	0.00	11.89	0.00	0.000
25.01	1.92	128.76	1.25	160.92	0	0	0.52	0.000	0.00	11.89	0.00	0.000
25.08	1.92	128.38	1.25	160.24	0	0	0.52	0.000	0.00	11.89	0.00	0.000
25.15	1.91	127.25	1.25	158.62	0	0	0.52	0.000	0.00	11.89	0.00	0.000
25.23	1.91	125.94	1.24	156.72	0	0	0.52	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
25.26	1.91	123.94	1.24	154.18	0	0	0.52	0.000	0.00	11.89	0.00	0.000
25.34	1.92	120.95	1.25	150.86	30	1601	0.52	0.155	0.09	11.89	0.05	0.000
25.41	1.93	117.19	1.25	146.91	30	1575	0.52	0.163	0.10	11.89	0.05	0.000
25.48	1.94	113.46	1.26	143.12	29	1554	0.52	0.171	0.11	11.89	0.06	0.000
25.56	1.94	110.64	1.27	140.12	29	1534	0.52	0.179	0.12	11.89	0.06	0.001
25.60	1.94	108.44	1.26	136.73	28	1488	0.52	0.198	0.13	11.89	0.07	0.000
25.67	1.93	106.35	1.26	133.75	27	1452	0.52	0.215	0.15	11.89	0.08	0.001
25.74	1.93	104.16	1.26	130.99	27	1424	0.52	0.231	0.16	11.89	0.08	0.001
25.81	1.95	102.12	1.27	129.58	26	1432	0.52	0.227	0.16	11.89	0.08	0.001
25.88	1.97	99.28	1.28	127.42	26	1437	0.52	0.226	0.16	11.89	0.08	0.001
25.95	1.98	98.43	1.29	127.08	26	1448	0.52	0.222	0.16	11.89	0.08	0.001
26.00	1.99	97.86	1.30	127.11	26	1462	0.52	0.215	0.15	11.89	0.08	0.000
26.06	1.99	99.42	1.30	129.15	27	1488	0.52	0.204	0.14	11.89	0.07	0.001
26.14	2.00	100.30	1.31	130.91	27	1520	0.52	0.192	0.13	11.89	0.07	0.001
26.20	2.00	102.61	1.31	134.17	28	1565	0.52	0.176	0.12	11.89	0.06	0.000
26.28	2.00	105.76	1.31	138.11	29	1611	0.52	0.162	0.11	11.89	0.05	0.000
26.35	1.99	109.06	1.30	141.86	29	1650	0.52	0.152	0.10	11.89	0.05	0.000
26.39	1.98	112.83	1.29	145.75	30	1681	0.52	0.145	0.09	11.89	0.04	0.000
26.45	1.97	116.39	1.28	149.28	31	1706	0.52	0.140	0.08	11.89	0.04	0.000
26.53	1.96	119.52	1.27	152.38	31	1729	0.52	0.135	0.08	11.89	0.04	0.000
26.60	1.95	121.17	1.27	154.02	31	1742	0.52	0.133	0.08	11.89	0.04	0.000
26.64	1.95	121.24	1.27	154.09	31	1744	0.52	0.133	0.08	11.89	0.04	0.000
26.72	1.96	119.87	1.27	152.69	31	1738	0.52	0.135	0.08	11.89	0.04	0.000
26.78	1.96	117.48	1.28	150.29	31	1726	0.52	0.138	0.08	11.89	0.04	0.000
26.85	1.98	114.14	1.29	147.07	30	1710	0.52	0.142	0.09	11.89	0.04	0.000
26.92	1.99	110.32	1.30	143.61	30	1697	0.52	0.146	0.09	11.89	0.04	0.000
26.99	2.01	106.30	1.32	140.19	29	1686	0.52	0.150	0.09	11.89	0.05	0.000
27.07	2.03	102.99	1.34	137.52	29	1678	0.52	0.152	0.10	11.89	0.05	0.000
27.14	2.04	100.81	1.35	135.78	29	1672	0.52	0.154	0.10	11.89	0.05	0.000
27.17	2.05	99.73	1.35	134.94	29	1670	0.52	0.155	0.10	11.89	0.05	0.000
27.25	2.05	99.13	1.36	134.60	29	1673	0.52	0.155	0.10	11.89	0.05	0.000
27.33	2.06	98.71	1.36	134.56	29	1681	0.52	0.154	0.10	11.89	0.05	0.000
27.36	2.06	99.19	1.37	135.52	29	1697	0.52	0.150	0.10	11.89	0.05	0.000
27.44	2.06	101.25	1.36	137.78	29	1724	0.52	0.144	0.09	11.89	0.04	0.000
27.51	2.04	106.25	1.34	142.43	30	1764	0.52	0.136	0.08	11.89	0.04	0.000
27.58	2.00	114.47	1.31	149.72	31	1810	0.52	0.128	0.07	11.89	0.04	0.000
27.65	1.96	125.33	1.27	159.61	33	1859	0.52	0.120	0.07	11.89	0.03	0.000
27.72	1.92	135.02	1.25	168.47	34	1898	0.52	0.114	0.06	11.89	0.03	0.000
27.76	1.89	142.73	1.23	175.29	35	1926	0.52	0.110	0.06	11.89	0.03	0.000
27.83	1.87	145.89	1.22	177.53	35	1927	0.52	0.110	0.06	11.89	0.03	0.000
27.91	1.86	145.56	1.21	176.34	35	1906	0.52	0.114	0.06	11.89	0.03	0.000
27.98	1.87	140.40	1.22	170.74	34	1858	0.52	0.122	0.06	11.89	0.03	0.000
28.05	1.88	133.62	1.23	163.86	33	1808	0.52	0.132	0.07	11.89	0.03	0.000
28.09	1.91	124.30	1.24	154.66	31	1749	0.52	0.144	0.08	11.89	0.04	0.000
28.17	1.95	114.57	1.27	145.38	30	1704	0.52	0.156	0.10	11.89	0.05	0.000
28.24	2.00	104.09	1.30	135.81	28	1664	0.52	0.168	0.11	11.89	0.05	0.000
28.32	2.04	97.09	1.34	130.17	27	1646	0.52	0.174	0.12	11.89	0.06	0.000
28.35	2.07	92.32	1.38	127.12	27	1641	0.52	0.176	0.12	11.89	0.06	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
28.43	2.10	89.35	1.41	126.12	27	1653	0.52	0.173	0.12	11.89	0.06	0.001
28.50	2.12	86.84	1.45	126.16	28	1672	0.52	0.168	0.11	11.89	0.05	0.000
28.58	2.14	85.35	1.48	126.61	28	1689	0.52	0.164	0.11	11.89	0.05	0.000
28.61	2.15	83.86	1.51	126.81	28	1698	0.52	0.162	0.11	11.89	0.05	0.000
28.69	2.17	82.13	1.54	126.21	28	1696	0.52	0.163	0.11	11.89	0.05	0.000
28.76	2.17	81.11	1.55	126.02	28	1697	0.52	0.164	0.11	11.89	0.05	0.000
28.84	2.18	80.04	1.57	125.86	28	1699	0.52	0.164	0.11	11.89	0.05	0.000
28.88	2.19	80.30	1.58	126.83	28	1713	0.52	0.160	0.11	11.89	0.05	0.000
28.95	2.18	81.07	1.57	127.49	29	1726	0.52	0.158	0.10	11.89	0.05	0.000
29.02	2.19	79.53	1.60	127.12	29	1723	0.52	0.159	0.10	11.89	0.05	0.000
29.09	2.17	81.50	1.55	126.70	28	1721	0.52	0.160	0.11	11.89	0.05	0.000
29.16	2.16	82.24	1.53	125.57	28	1707	0.52	0.165	0.11	11.89	0.05	0.000
29.22	2.13	85.36	1.47	125.10	27	1693	0.52	0.169	0.12	11.89	0.05	0.000
29.30	2.13	83.78	1.46	122.70	27	1664	0.52	0.179	0.13	11.89	0.06	0.001
29.34	2.13	81.90	1.47	119.98	26	1629	0.52	0.191	0.14	11.89	0.06	0.000
29.41	2.12	81.48	1.45	117.93	26	1598	0.52	0.203	0.15	11.89	0.07	0.001
29.49	2.11	81.00	1.44	116.25	25	1575	0.53	0.214	0.16	11.89	0.07	0.001
29.53	2.11	81.63	1.43	116.47	25	1576	0.53	0.214	0.16	11.89	0.07	0.000
29.60	2.11	82.19	1.44	118.37	26	1610	0.53	0.201	0.15	11.89	0.07	0.001
29.67	2.13	83.41	1.48	123.04	27	1687	0.53	0.176	0.12	11.89	0.05	0.000
29.75	2.17	83.65	1.55	129.96	29	1795	0.53	0.148	0.09	11.89	0.04	0.000
29.82	2.22	82.94	1.66	137.75	31	1902	0.53	0.127	0.07	11.89	0.03	0.000
29.86	2.26	81.87	1.78	145.72	34	1994	0.53	0.113	0.06	11.89	0.03	0.000
29.93	2.28	81.16	1.86	151.07	35	2052	0.53	0.106	0.05	11.89	0.02	0.000
30.01	2.29	80.92	1.90	154.14	36	2087	0.53	0.102	0.05	11.89	0.02	0.000
30.05	2.28	82.82	1.85	153.56	36	2094	0.53	0.102	0.05	11.89	0.02	0.000
30.13	2.24	87.97	1.72	151.01	35	2093	0.53	0.102	0.05	11.89	0.02	0.000
30.20	2.18	94.85	1.57	148.64	33	2078	0.53	0.104	0.06	11.89	0.02	0.000
30.27	2.14	98.65	1.48	145.77	32	2029	0.53	0.111	0.06	11.89	0.03	0.000
30.35	2.12	98.07	1.44	141.61	31	1963	0.53	0.120	0.07	11.89	0.03	0.000
30.38	2.12	93.25	1.45	134.80	29	1871	0.53	0.137	0.09	11.89	0.04	0.000
30.46	2.13	87.81	1.47	129.23	28	1806	0.53	0.151	0.10	11.89	0.04	0.000
30.54	2.16	81.91	1.52	124.63	28	1754	0.53	0.164	0.11	11.89	0.05	0.000
30.62	2.19	77.79	1.59	123.62	28	1747	0.53	0.167	0.11	11.89	0.05	0.000
30.65	2.22	74.81	1.67	125.02	28	1763	0.53	0.163	0.11	11.89	0.05	0.000
30.73	2.25	72.80	1.76	128.27	30	1799	0.53	0.155	0.10	11.89	0.04	0.000
30.80	2.28	71.33	1.86	132.54	31	1843	0.53	0.145	0.09	11.89	0.04	0.000
30.88	2.30	70.81	1.91	135.23	32	1873	0.53	0.140	0.08	11.89	0.03	0.000
30.91	2.29	71.80	1.90	136.37	32	1892	0.53	0.136	0.08	11.89	0.03	0.000
30.99	2.28	73.56	1.84	135.72	32	1900	0.53	0.135	0.08	11.89	0.03	0.000
31.06	2.26	75.64	1.77	134.05	31	1894	0.53	0.137	0.08	11.89	0.03	0.000
31.13	2.23	77.35	1.69	131.07	30	1868	0.53	0.142	0.09	11.89	0.04	0.000
31.20	2.21	78.34	1.64	128.17	29	1836	0.53	0.150	0.10	11.89	0.04	0.000
31.24	2.19	79.32	1.58	125.72	28	1804	0.53	0.157	0.10	11.89	0.04	0.000
31.31	2.18	80.01	1.56	124.69	28	1792	0.53	0.161	0.11	11.89	0.05	0.000
31.39	2.17	80.89	1.54	124.74	28	1795	0.53	0.161	0.11	11.89	0.05	0.000
31.46	2.17	81.61	1.54	125.66	28	1811	0.53	0.157	0.11	11.89	0.04	0.000
31.50	2.17	82.36	1.54	127.18	28	1835	0.53	0.152	0.10	11.89	0.04	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.57	2.17	82.84	1.55	128.37	29	1856	0.53	0.148	0.10	11.89	0.04	0.000
31.65	2.18	82.96	1.56	129.19	29	1872	0.53	0.145	0.09	11.89	0.04	0.000
31.72	2.18	82.67	1.57	129.42	29	1879	0.53	0.144	0.09	11.89	0.04	0.000
31.76	2.18	82.11	1.57	129.21	29	1878	0.53	0.145	0.09	11.89	0.04	0.000
31.84	2.19	81.36	1.58	128.82	29	1876	0.53	0.146	0.09	11.89	0.04	0.000
31.92	2.19	81.25	1.58	128.47	29	1874	0.53	0.146	0.09	11.89	0.04	0.000
31.97	2.19	80.49	1.59	128.12	29	1871	0.53	0.147	0.10	11.89	0.04	0.000
32.04	2.19	81.11	1.58	128.21	29	1876	0.53	0.147	0.10	11.89	0.04	0.000
32.11	2.18	81.78	1.57	128.39	29	1881	0.53	0.146	0.09	11.89	0.04	0.000
32.19	2.17	83.42	1.55	128.99	29	1892	0.53	0.145	0.09	11.89	0.04	0.000
32.23	2.17	83.93	1.54	129.42	29	1900	0.53	0.143	0.09	11.89	0.04	0.000
32.30	2.17	83.50	1.55	129.74	29	1909	0.53	0.142	0.09	11.89	0.04	0.000
32.37	2.18	82.96	1.57	130.17	29	1919	0.53	0.140	0.09	11.89	0.04	0.000
32.45	2.19	82.51	1.58	130.42	29	1927	0.53	0.139	0.09	11.89	0.04	0.000
32.49	2.19	82.44	1.58	130.32	29	1927	0.53	0.140	0.09	11.89	0.04	0.000
32.56	2.18	82.28	1.58	129.69	29	1921	0.53	0.141	0.09	11.89	0.04	0.000
32.64	2.18	82.01	1.57	128.83	29	1911	0.53	0.144	0.09	11.89	0.04	0.000
32.71	2.18	81.75	1.57	128.06	29	1903	0.53	0.146	0.09	11.89	0.04	0.000
32.75	2.18	81.90	1.56	127.44	28	1895	0.53	0.148	0.10	11.89	0.04	0.000
32.82	2.17	82.50	1.54	126.95	28	1889	0.53	0.149	0.10	11.89	0.04	0.000
32.89	2.15	83.52	1.51	126.35	28	1880	0.53	0.152	0.10	11.89	0.04	0.000
32.97	2.14	84.43	1.49	125.83	28	1870	0.53	0.154	0.10	11.89	0.04	0.000
33.01	2.13	85.81	1.46	125.61	28	1861	0.53	0.157	0.11	11.89	0.04	0.000
33.08	2.11	88.19	1.43	126.35	27	1861	0.53	0.157	0.11	11.89	0.04	0.000
33.16	2.08	92.07	1.39	128.27	28	1868	0.53	0.156	0.11	11.89	0.04	0.000
33.24	2.06	96.20	1.36	130.87	28	1877	0.53	0.155	0.10	11.89	0.04	0.000
33.28	2.03	100.63	1.33	134.15	28	1890	0.53	0.152	0.10	11.89	0.04	0.000
33.36	2.01	104.62	1.31	137.23	29	1899	0.53	0.151	0.10	11.89	0.04	0.000
33.43	1.98	108.47	1.29	140.17	29	1901	0.53	0.151	0.10	11.89	0.04	0.000
33.50	1.96	110.82	1.28	141.71	29	1891	0.53	0.153	0.10	11.89	0.04	0.000
33.54	1.95	111.92	1.27	142.04	29	1872	0.53	0.158	0.10	11.89	0.04	0.000
33.61	1.94	111.59	1.26	141.04	29	1847	0.53	0.164	0.11	11.89	0.04	0.000
33.68	1.94	110.35	1.26	139.14	28	1817	0.53	0.172	0.11	11.89	0.04	0.000
33.75	1.94	108.75	1.26	137.15	28	1794	0.53	0.179	0.12	11.89	0.05	0.000
33.79	1.94	106.77	1.26	135.04	27	1777	0.53	0.184	0.13	11.89	0.05	0.000
33.87	1.95	104.60	1.27	132.97	27	1769	0.53	0.187	0.13	11.89	0.05	0.000
33.94	1.97	101.99	1.28	130.62	27	1763	0.53	0.190	0.13	11.89	0.05	0.000
34.03	1.98	99.99	1.29	128.92	27	1763	0.53	0.190	0.14	11.89	0.05	0.001
34.07	1.99	98.24	1.30	127.59	26	1766	0.53	0.190	0.14	11.89	0.05	0.000
34.14	2.00	96.68	1.31	126.59	26	1776	0.53	0.188	0.13	11.89	0.05	0.000
34.22	2.01	95.25	1.32	125.74	26	1785	0.53	0.185	0.13	11.89	0.05	0.000
34.25	2.02	94.62	1.33	125.56	26	1795	0.53	0.182	0.13	11.89	0.05	0.000
34.33	2.02	94.52	1.33	125.64	26	1803	0.53	0.181	0.13	11.89	0.05	0.000
34.40	2.03	94.57	1.33	125.80	26	1809	0.53	0.180	0.13	11.89	0.05	0.000
34.47	2.03	93.70	1.34	125.41	26	1818	0.53	0.178	0.13	11.89	0.05	0.000
34.55	2.05	92.03	1.35	124.65	26	1830	0.53	0.175	0.12	11.89	0.05	0.000
34.59	2.08	89.14	1.39	123.54	26	1848	0.53	0.170	0.12	11.89	0.05	0.000
34.66	2.10	85.99	1.42	121.76	26	1846	0.53	0.171	0.12	11.89	0.05	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
34.74	2.12	83.07	1.45	120.31	26	1844	0.53	0.172	0.12	11.89	0.05	0.000
34.78	2.14	80.71	1.49	120.05	26	1856	0.53	0.170	0.12	11.89	0.04	0.000
34.86	2.18	78.14	1.56	122.06	27	1903	0.53	0.159	0.11	11.89	0.04	0.000
34.93	2.23	74.53	1.70	126.85	29	1977	0.53	0.144	0.09	11.89	0.03	0.000
35.01	2.28	71.61	1.86	133.05	31	2050	0.53	0.132	0.08	11.89	0.03	0.000
35.05	2.33	69.26	2.04	141.17	34	2133	0.53	0.120	0.06	11.89	0.02	0.000
35.12	2.36	68.54	2.16	148.22	36	2208	0.53	0.110	0.06	11.89	0.02	0.000
35.19	2.38	68.18	2.26	154.11	38	2271	0.53	0.104	0.05	11.89	0.02	0.000
35.27	2.38	68.54	2.29	156.93	38	2308	0.53	0.100	0.05	11.89	0.02	0.000
35.31	2.38	69.56	2.27	157.94	38	2331	0.53	0.098	0.04	11.89	0.02	0.000
35.38	2.36	73.01	2.16	157.82	38	2366	0.53	0.095	0.04	11.89	0.02	0.000
35.46	2.31	79.98	1.96	157.08	37	2418	0.53	0.091	0.04	11.89	0.02	0.000
35.53	2.26	88.45	1.78	157.02	36	2468	0.53	0.088	0.04	11.89	0.02	0.000
35.57	2.19	99.78	1.59	158.48	36	2511	0.53	0.085	0.04	11.89	0.02	0.000
35.64	2.11	114.13	1.44	163.87	36	2551	0.53	0.082	0.04	11.89	0.01	0.000
35.71	2.02	132.97	1.33	176.39	37	2596	0.52	0.080	0.04	11.89	0.01	0.000
35.78	1.95	151.49	1.27	192.03	39	2636	0.52	0.077	0.03	11.89	0.01	0.000
35.86	1.90	164.86	1.23	203.59	41	2663	0.52	0.076	0.03	11.89	0.01	0.000
35.93	1.87	171.42	1.22	208.76	41	2669	0.52	0.076	0.03	11.89	0.01	0.000
35.97	1.87	171.03	1.21	207.55	41	2641	0.52	0.078	0.03	11.89	0.01	0.000
36.05	1.87	165.74	1.22	201.81	40	2585	0.52	0.081	0.04	11.89	0.01	0.000
36.12	1.88	158.88	1.23	194.64	39	2522	0.52	0.085	0.04	11.89	0.01	0.000
36.16	1.90	150.20	1.24	185.96	37	2457	0.52	0.090	0.04	11.89	0.01	0.000
36.23	1.93	141.06	1.25	176.99	36	2403	0.52	0.095	0.05	11.89	0.02	0.000
36.30	1.96	131.77	1.27	167.93	34	2352	0.52	0.100	0.05	11.89	0.02	0.000
36.38	1.98	125.94	1.29	162.41	34	2326	0.52	0.102	0.06	11.89	0.02	0.000
36.42	1.99	123.58	1.30	160.48	33	2326	0.52	0.103	0.06	11.89	0.02	0.000
36.49	2.00	122.91	1.31	160.48	33	2348	0.52	0.101	0.05	11.89	0.02	0.000
36.57	2.01	122.09	1.32	160.90	34	2388	0.52	0.097	0.05	11.89	0.02	0.000
36.64	2.03	120.96	1.33	161.25	34	2431	0.52	0.094	0.05	11.89	0.02	0.000
36.68	2.05	118.27	1.36	160.72	34	2472	0.52	0.091	0.05	11.89	0.02	0.000
36.76	2.10	112.30	1.41	158.56	34	2507	0.52	0.088	0.05	11.89	0.02	0.000
36.83	2.16	102.94	1.52	156.31	35	2534	0.52	0.086	0.04	11.89	0.02	0.000
36.90	2.22	93.38	1.67	156.23	36	2547	0.52	0.086	0.04	11.89	0.01	0.000
36.94	2.29	84.55	1.88	158.60	37	2550	0.52	0.086	0.04	11.89	0.01	0.000
37.02	2.34	78.32	2.07	161.97	39	2553	0.52	0.086	0.04	11.89	0.01	0.000
37.10	2.37	74.38	2.21	164.74	40	2555	0.52	0.086	0.04	11.89	0.01	0.000
37.17	2.38	73.22	2.26	165.46	40	2556	0.52	0.086	0.04	11.89	0.01	0.000
37.21	2.37	73.56	2.24	165.04	40	2557	0.52	0.086	0.04	11.89	0.01	0.000
37.29	2.37	74.21	2.22	164.75	40	2564	0.52	0.086	0.04	11.89	0.01	0.000
37.36	2.36	75.13	2.19	164.40	40	2573	0.52	0.085	0.04	11.89	0.01	0.000
37.44	2.36	75.66	2.17	164.10	40	2579	0.52	0.085	0.04	11.89	0.01	0.000
37.48	2.36	75.70	2.17	163.95	40	2580	0.52	0.085	0.04	11.89	0.01	0.000
37.55	2.34	75.97	2.08	158.02	38	2517	0.52	0.089	0.04	11.89	0.01	0.000
37.62	2.30	79.00	1.93	152.26	36	2472	0.52	0.093	0.05	11.89	0.02	0.000
37.70	2.26	83.77	1.77	148.50	34	2449	0.52	0.095	0.05	11.89	0.02	0.000
37.74	2.21	92.47	1.64	151.95	34	2523	0.52	0.090	0.05	11.89	0.02	0.000
37.81	2.17	101.86	1.54	156.94	35	2602	0.52	0.084	0.04	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
37.88	2.12	113.00	1.45	163.87	36	2681	0.52	0.080	0.04	11.89	0.01	0.000
37.96	2.18	103.84	1.56	161.70	36	2692	0.52	0.079	0.04	11.89	0.01	0.000
37.99	2.14	112.14	1.49	166.90	37	2759	0.52	0.075	0.04	11.89	0.01	0.000
38.06	2.10	121.08	1.43	172.54	37	2813	0.52	0.073	0.03	11.89	0.01	0.000
38.12	1.99	148.33	1.30	192.89	40	2893	0.52	0.069	0.03	11.89	0.01	0.000
38.19	1.97	153.14	1.28	196.38	40	2880	0.52	0.070	0.03	11.89	0.01	0.000
38.27	1.97	149.22	1.29	191.86	40	2831	0.52	0.072	0.03	11.89	0.01	0.000
38.35	2.00	138.83	1.31	181.69	38	2762	0.52	0.076	0.04	11.89	0.01	0.000
38.42	2.04	126.89	1.35	170.90	36	2695	0.52	0.080	0.04	11.89	0.01	0.000
38.46	2.09	115.11	1.40	161.19	35	2623	0.52	0.084	0.04	11.89	0.01	0.000
38.53	2.13	105.13	1.47	154.04	34	2563	0.52	0.089	0.05	11.89	0.01	0.000
38.60	2.17	97.05	1.54	149.50	33	2519	0.52	0.092	0.05	11.89	0.02	0.000
38.68	2.18	94.23	1.58	148.47	33	2511	0.52	0.093	0.05	11.89	0.02	0.000
38.75	2.19	93.34	1.59	148.60	33	2519	0.52	0.092	0.05	11.89	0.02	0.000
38.79	2.19	94.04	1.59	149.65	34	2538	0.52	0.091	0.05	11.89	0.02	0.000
38.86	2.19	95.85	1.58	151.42	34	2571	0.52	0.089	0.05	11.89	0.01	0.000
38.93	2.16	101.20	1.53	154.90	34	2624	0.52	0.085	0.04	11.89	0.01	0.000
39.00	2.13	108.40	1.47	159.30	35	2677	0.52	0.082	0.04	11.89	0.01	0.000
39.07	2.10	115.38	1.42	163.78	35	2717	0.52	0.080	0.04	11.89	0.01	0.000
39.14	2.08	120.46	1.39	167.16	36	2739	0.52	0.079	0.04	11.89	0.01	0.000
39.18	2.06	124.95	1.36	170.09	36	2748	0.52	0.078	0.04	11.89	0.01	0.000
39.25	2.03	129.70	1.34	173.20	36	2748	0.52	0.078	0.04	11.89	0.01	0.000
39.33	2.00	136.96	1.30	178.55	37	2747	0.52	0.079	0.04	11.89	0.01	0.000
39.40	1.96	145.56	1.27	185.44	38	2745	0.52	0.079	0.04	11.89	0.01	0.000
39.47	1.92	153.32	1.25	191.79	39	2741	0.52	0.079	0.04	11.89	0.01	0.000
39.50	1.89	159.27	1.23	196.07	39	2717	0.52	0.081	0.04	11.89	0.01	0.000
39.57	1.87	161.00	1.22	196.20	39	2674	0.52	0.083	0.04	11.89	0.01	0.000
39.64	1.87	157.81	1.22	191.82	0	0	0.52	0.000	0.00	11.89	0.00	0.000
39.72	1.89	148.39	1.23	182.42	0	0	0.52	0.000	0.00	11.89	0.00	0.000
39.79	1.93	135.13	1.26	169.70	0	0	0.52	0.000	0.00	11.89	0.00	0.000
39.86	1.97	123.84	1.28	158.84	0	0	0.52	0.000	0.00	11.89	0.00	0.000
39.90	2.00	114.43	1.31	149.83	0	0	0.52	0.000	0.00	11.89	0.00	0.000
39.97	2.02	107.67	1.33	143.07	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.05	2.05	100.80	1.36	136.86	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.13	2.08	96.02	1.39	133.16	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.16	2.10	92.15	1.43	131.35	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.24	2.13	89.26	1.46	130.56	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.31	2.15	86.45	1.51	130.33	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.39	2.17	84.42	1.55	130.46	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.43	2.19	82.23	1.59	130.48	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.50	2.21	79.78	1.63	130.40	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.57	2.23	76.87	1.68	129.23	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.65	2.25	73.67	1.75	128.71	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.71	2.28	70.45	1.84	129.64	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.75	2.32	66.67	2.00	133.55	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.83	2.36	63.07	2.20	138.68	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.90	2.41	59.43	2.42	143.87	0	0	0.51	0.000	0.00	11.89	0.00	0.000
40.96	2.43	58.45	2.51	146.86	0	0	0.51	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
41.03	2.44	57.57	2.58	148.46	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.09	2.42	58.88	2.51	147.77	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.16	2.41	60.01	2.45	146.96	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.23	2.39	62.22	2.33	144.97	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.30	2.38	62.94	2.28	143.30	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.34	2.39	61.56	2.31	142.33	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.42	2.41	59.13	2.41	142.63	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.49	2.43	56.48	2.54	143.63	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.56	2.45	54.67	2.64	144.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.64	2.46	53.65	2.69	144.46	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.70	2.46	53.00	2.73	144.45	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.74	2.47	52.20	2.78	145.20	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.81	2.48	51.43	2.86	147.14	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.89	2.49	50.95	2.94	149.81	0	0	0.51	0.000	0.00	11.89	0.00	0.000
41.96	2.50	50.96	2.99	152.14	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.00	2.50	51.21	3.00	153.64	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.08	2.51	50.98	3.05	155.50	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.15	2.52	50.27	3.14	158.05	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.19	2.54	48.89	3.30	161.44	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.27	2.56	47.55	3.45	163.96	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.35	2.58	46.23	3.59	166.19	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.42	2.60	45.17	3.71	167.58	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.46	2.61	44.25	3.81	168.65	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.54	2.61	43.78	3.85	168.59	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.61	2.61	43.84	3.81	167.10	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.69	2.60	44.20	3.73	164.98	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.72	2.58	45.00	3.60	161.86	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.80	2.56	46.02	3.44	158.16	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.87	2.54	47.48	3.23	153.56	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.95	2.51	48.82	3.07	149.80	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.98	2.49	50.76	2.88	146.18	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.06	2.45	53.39	2.67	142.77	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.13	2.41	57.27	2.43	138.99	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.21	2.37	60.83	2.24	136.40	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.25	2.34	64.47	2.08	134.35	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.32	2.31	67.38	1.97	132.90	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.39	2.29	70.01	1.88	131.87	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.47	2.28	71.41	1.84	131.40	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.51	2.27	72.20	1.82	131.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.58	2.27	72.78	1.81	131.37	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.66	2.26	73.40	1.79	131.20	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.73	2.26	73.86	1.77	130.83	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.77	2.25	74.19	1.76	130.38	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.84	2.25	74.19	1.76	130.37	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.93	2.26	73.84	1.77	130.80	0	0	0.51	0.000	0.00	11.89	0.00	0.000
44.00	2.27	72.51	1.82	131.71	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.03	2.29	70.29	1.90	133.58	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.11	2.32	68.32	2.01	137.32	0	0	0.50	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
44.18	2.35	66.76	2.15	143.45	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.25	2.39	65.34	2.31	151.07	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.33	2.43	62.47	2.55	159.07	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.40	2.48	58.67	2.84	166.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.44	2.55	52.72	3.32	174.83	0	0	0.50	0.000	0.00	11.89	0.00	0.000
44.51	2.63	45.61	4.04	184.20	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.59	2.72	39.01	4.93	192.50	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.63	2.79	34.46	5.73	197.53	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.71	2.83	31.98	6.22	198.79	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.79	2.86	30.11	6.63	199.54	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.82	2.89	28.41	7.10	201.82	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.90	2.93	27.07	7.59	205.55	0	0	0.50	0.000	0.00	0.00	0.00	0.000
44.97	2.94	26.65	7.84	208.98	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.02	2.90	28.93	7.22	209.03	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.09	2.82	33.41	6.14	205.15	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.16	2.72	39.88	4.94	196.93	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.23	2.62	47.03	3.94	185.32	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.32	2.54	53.06	3.28	174.09	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.36	2.47	59.11	2.76	162.93	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.43	2.40	64.08	2.39	153.19	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.51	2.35	68.04	2.14	145.72	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.54	2.33	69.66	2.02	140.95	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.62	2.31	70.21	1.96	137.62	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.69	2.30	70.14	1.92	134.67	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.76	2.30	69.46	1.92	133.07	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.83	2.31	68.29	1.95	133.43	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.87	2.33	66.90	2.04	136.39	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.95	2.36	65.49	2.17	142.43	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.03	2.40	63.46	2.38	151.26	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.10	2.44	61.90	2.58	159.46	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.14	2.48	59.73	2.82	168.28	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.21	2.52	56.50	3.15	178.24	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.29	2.58	52.69	3.59	188.91	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.33	2.64	48.57	4.10	199.36	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.40	2.69	45.44	4.60	208.85	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.47	2.73	43.38	5.01	217.54	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.55	2.75	42.33	5.28	223.69	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.62	2.76	42.04	5.34	224.42	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.66	2.75	41.28	5.30	218.70	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.74	2.76	40.04	5.35	214.24	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.81	2.77	38.70	5.48	211.95	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.86	2.79	37.84	5.72	216.29	0	0	0.49	0.000	0.00	0.00	0.00	0.000
46.92	2.80	37.48	5.84	219.09	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.00	2.81	36.84	6.04	222.36	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.06	2.81	37.39	5.99	224.04	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.14	2.80	38.36	5.87	225.01	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.21	2.79	39.54	5.71	225.82	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.25	2.79	39.59	5.76	228.16	0	0	0.49	0.000	0.00	0.00	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.32	2.80	39.38	5.86	230.70	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.40	2.80	39.80	5.84	232.26	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.47	2.79	40.45	5.75	232.65	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.51	2.78	41.39	5.61	232.38	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.58	2.79	41.17	5.67	233.62	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.66	2.80	40.46	5.83	235.87	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.73	2.81	39.55	6.03	238.39	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.78	2.82	39.22	6.13	240.25	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.85	2.82	39.75	6.05	240.56	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.92	2.80	40.75	5.89	240.07	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.99	2.79	42.04	5.68	238.89	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.03	2.77	43.00	5.54	238.39	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.11	2.77	43.58	5.47	238.25	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.18	2.75	44.54	5.31	236.45	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.26	2.74	45.79	5.09	233.14	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.30	2.71	47.26	4.82	227.93	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.37	2.69	48.28	4.61	222.35	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.45	2.67	49.21	4.37	214.90	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.52	2.64	50.65	4.07	206.21	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.59	2.60	52.36	3.78	197.72	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.63	2.56	54.71	3.44	188.10	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.70	2.51	58.07	3.05	177.24	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.77	2.44	63.21	2.61	164.89	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.84	2.37	69.50	2.21	153.58	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.92	2.31	74.62	1.95	145.82	0	0	0.48	0.000	0.00	11.89	0.00	0.000
48.96	2.26	78.58	1.78	139.77	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.03	2.22	81.39	1.66	135.52	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.10	2.18	84.69	1.56	132.50	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.18	2.15	87.41	1.50	131.33	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.22	2.13	89.78	1.46	131.35	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.29	2.11	91.65	1.44	131.60	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.37	2.09	93.88	1.41	131.93	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.44	2.07	95.83	1.38	132.34	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.48	2.05	98.05	1.36	133.20	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.56	2.04	99.50	1.34	133.78	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.63	2.03	100.35	1.33	133.84	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.67	2.02	100.09	1.32	132.30	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.74	2.03	97.42	1.33	129.98	27	2435	0.48	0.117	0.08	11.89	0.01	0.000
49.82	2.06	92.91	1.36	126.50	27	2428	0.48	0.117	0.08	11.89	0.01	0.000
49.89	2.11	86.38	1.43	123.91	27	2475	0.48	0.113	0.08	11.89	0.01	0.000
49.97	2.18	77.44	1.56	120.69	27	2481	0.48	0.112	0.08	11.89	0.01	0.000
50.01	2.24	70.92	1.71	121.32	28	2512	0.48	0.109	0.07	11.89	0.01	0.000
50.09	2.28	66.05	1.86	123.07	29	2537	0.48	0.107	0.07	11.89	0.01	0.000
50.13	2.29	65.68	1.90	124.54	29	2563	0.48	0.105	0.07	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)

Total estimated settlement: 1.02

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
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

GeoTek, Inc.
1548 N. Maple Street
Corona, CA 92878
951-710-1160, www.geotekusa.com

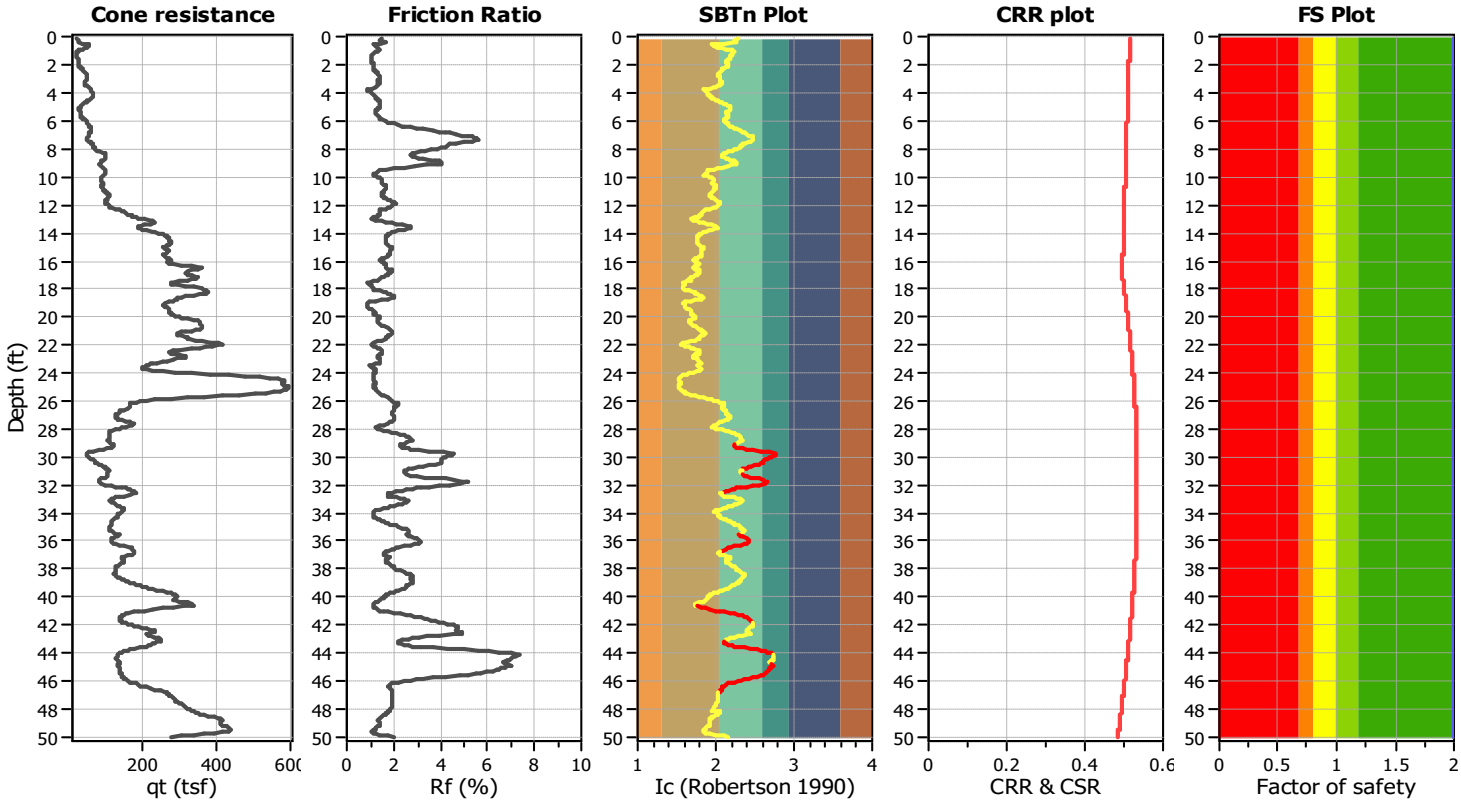
LIQUEFACTION ANALYSIS REPORT

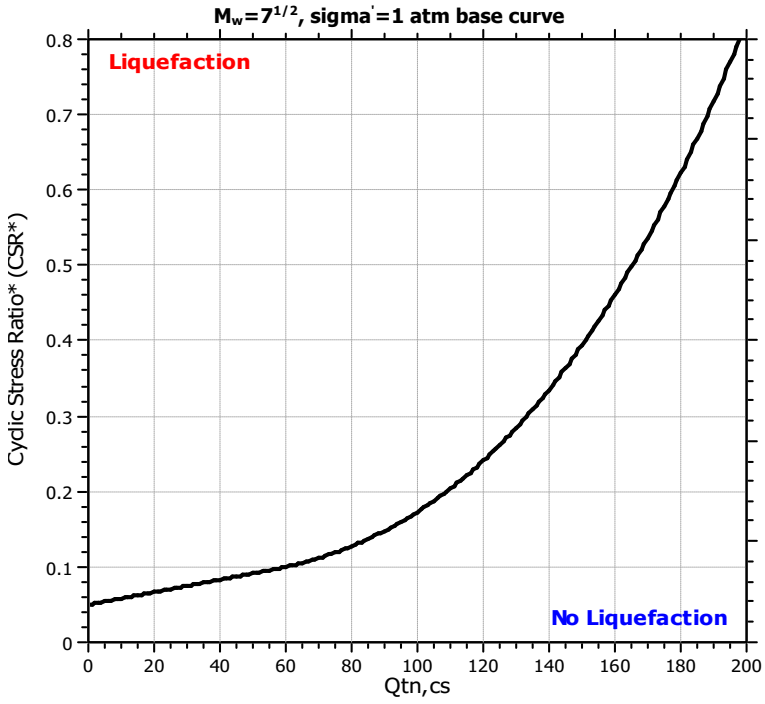
Project title : Xenia Site **Location : Beaumont, California**

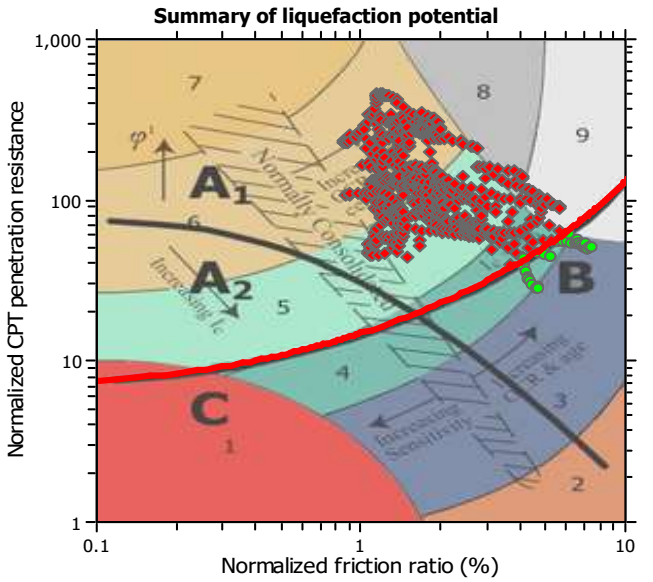
CPT file : CPT-2

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	100.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	100.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.13	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.90	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

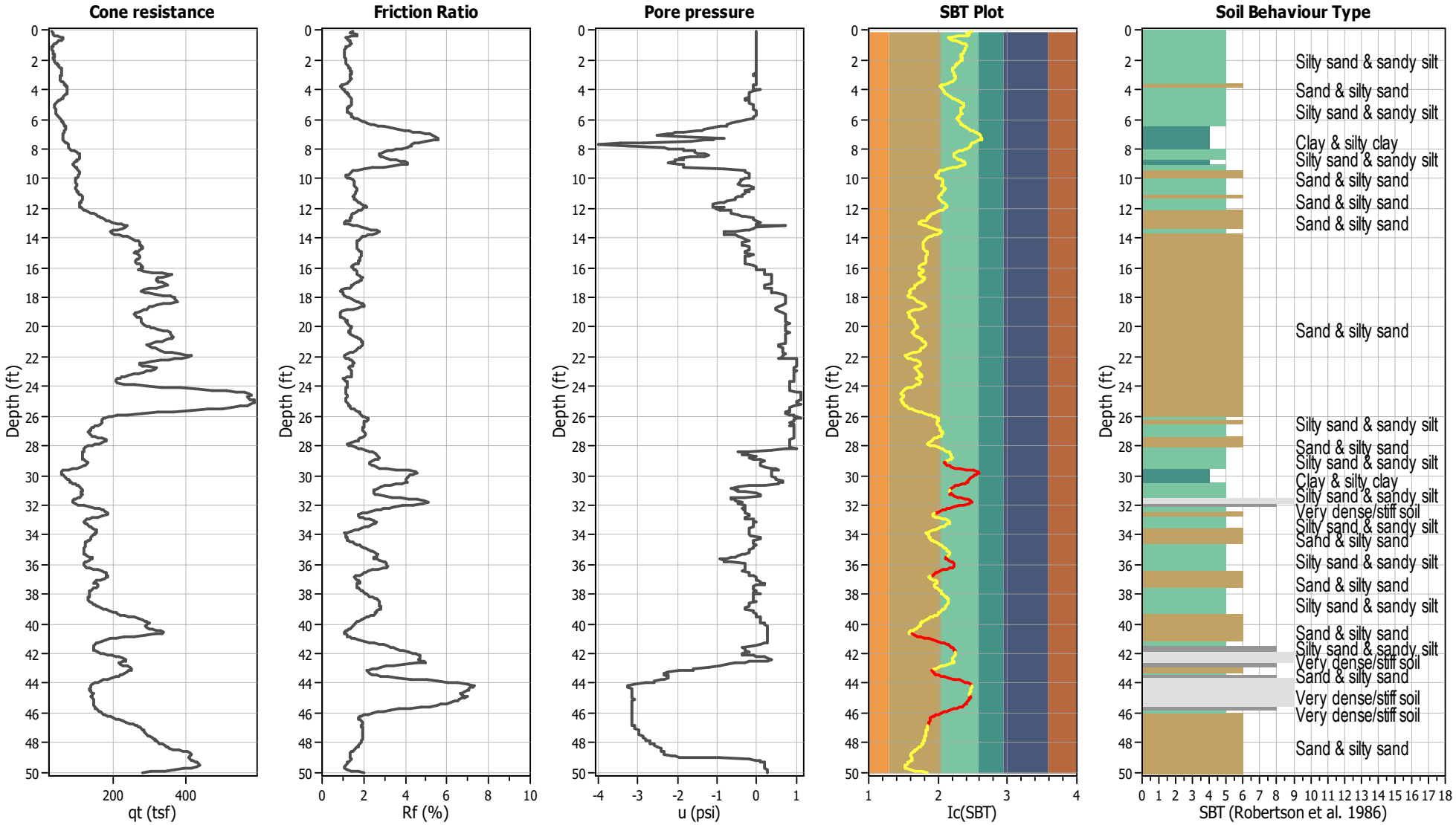






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



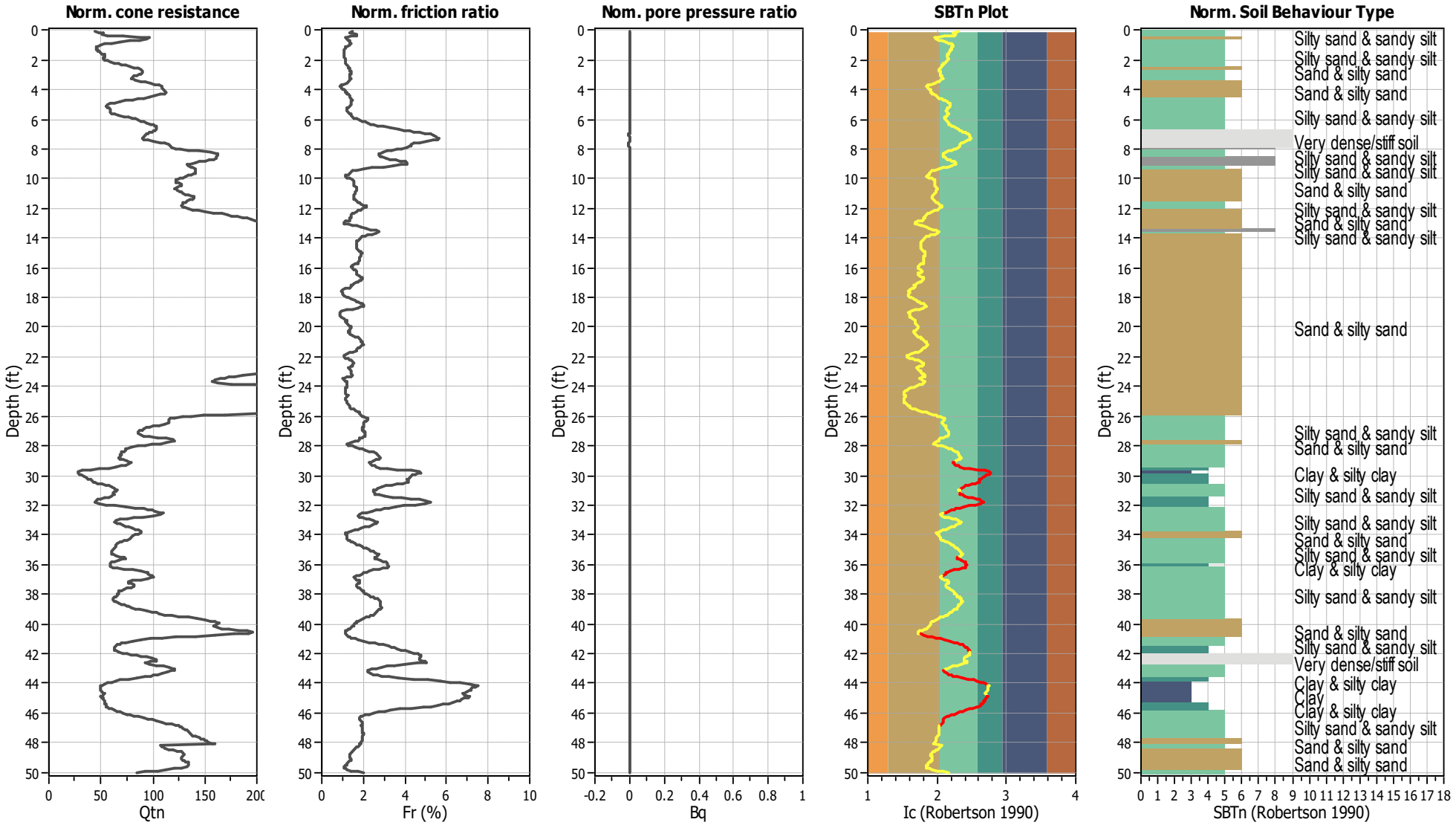
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



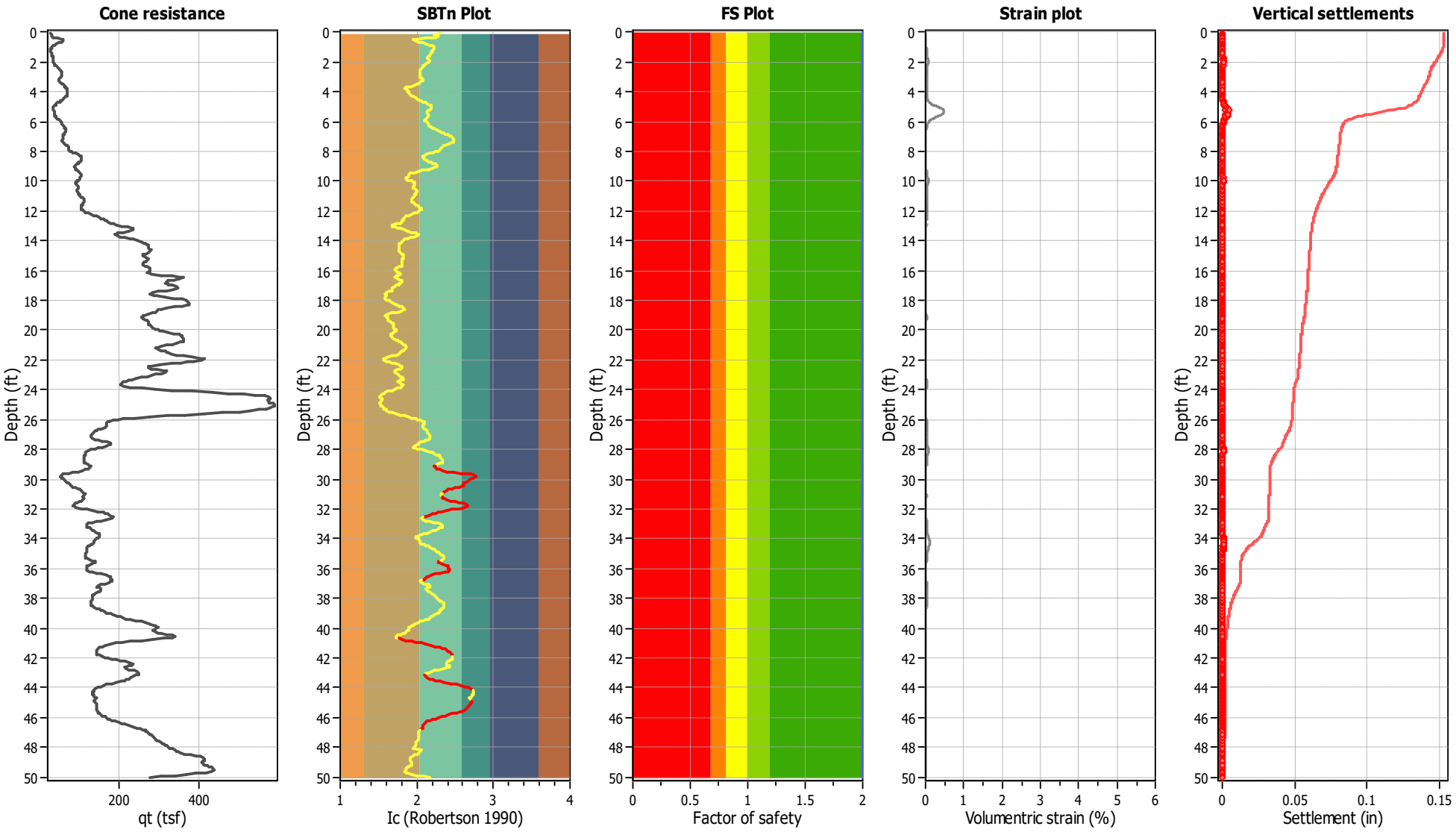
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.07	2.30	43.80	1.92	84.30	20	452	0.51	0.001	0.00	11.89	0.00	0.000
0.14	2.24	48.25	1.73	83.39	19	462	0.51	0.001	0.00	11.89	0.00	0.000
0.22	2.22	51.74	1.68	86.76	20	484	0.51	0.002	0.00	11.89	0.00	0.000
0.29	2.28	51.33	1.84	94.31	22	513	0.51	0.003	0.00	11.89	0.00	0.000
0.33	2.24	56.93	1.72	98.08	22	544	0.51	0.003	0.00	11.89	0.00	0.000
0.41	2.11	71.48	1.44	103.06	22	583	0.51	0.003	0.00	11.89	0.00	0.000
0.49	2.00	87.58	1.31	114.78	24	621	0.51	0.004	0.00	11.89	0.00	0.000
0.53	1.96	96.72	1.28	123.51	25	648	0.51	0.004	0.00	11.89	0.00	0.000
0.62	1.98	94.31	1.29	121.93	25	650	0.51	0.005	0.00	11.89	0.00	0.000
0.70	2.02	87.45	1.33	116.15	24	635	0.51	0.005	0.00	11.89	0.00	0.000
0.74	2.08	77.85	1.39	107.87	23	604	0.51	0.006	0.01	11.89	0.00	0.000
0.81	2.12	68.59	1.46	99.93	22	566	0.51	0.008	0.01	11.89	0.01	0.000
0.89	2.17	60.48	1.54	93.33	21	528	0.51	0.011	0.01	11.89	0.01	0.000
0.92	2.20	54.13	1.62	87.65	20	493	0.51	0.013	0.01	11.89	0.01	0.000
1.00	2.22	50.02	1.66	83.27	19	466	0.51	0.018	0.02	11.89	0.02	0.000
1.07	2.23	46.91	1.68	78.86	18	440	0.51	0.023	0.03	11.89	0.02	0.000
1.15	2.22	45.96	1.66	76.25	17	427	0.51	0.029	0.03	11.89	0.03	0.000
1.19	2.21	45.85	1.63	74.92	17	421	0.51	0.033	0.04	11.89	0.04	0.000
1.26	2.20	46.04	1.62	74.41	17	419	0.51	0.037	0.05	11.89	0.04	0.000
1.35	2.19	46.44	1.60	74.20	17	418	0.51	0.042	0.05	11.89	0.05	0.000
1.38	2.19	46.99	1.58	74.29	17	419	0.51	0.044	0.05	11.89	0.05	0.000
1.46	2.18	47.73	1.57	75.12	17	424	0.51	0.047	0.06	11.89	0.05	0.000
1.53	2.18	49.22	1.56	76.60	17	433	0.51	0.048	0.06	11.89	0.05	0.000
1.61	2.16	51.22	1.53	78.24	17	443	0.51	0.049	0.06	11.89	0.05	0.000
1.65	2.14	53.07	1.49	79.24	17	449	0.51	0.049	0.06	11.89	0.05	0.000
1.72	2.14	53.61	1.48	79.57	18	451	0.51	0.053	0.06	11.89	0.05	0.001
1.81	2.14	53.35	1.49	79.68	18	452	0.51	0.058	0.07	11.89	0.06	0.001
1.84	2.16	52.70	1.52	79.86	18	453	0.51	0.060	0.07	11.89	0.06	0.000
1.92	2.16	52.85	1.53	80.69	18	457	0.51	0.063	0.07	11.89	0.06	0.001
1.99	2.16	54.04	1.52	82.05	18	465	0.51	0.064	0.07	11.89	0.06	0.001
2.07	2.15	55.73	1.50	83.53	18	474	0.51	0.065	0.07	11.89	0.06	0.001
2.10	2.12	58.87	1.46	85.83	19	486	0.51	0.060	0.07	11.89	0.06	0.000
2.18	2.10	62.52	1.42	88.97	19	502	0.51	0.058	0.06	11.89	0.05	0.001
2.26	2.09	66.71	1.40	93.29	20	524	0.51	0.053	0.05	11.89	0.05	0.000
2.33	2.08	69.81	1.39	96.91	21	543	0.51	0.050	0.05	11.89	0.04	0.000
2.37	2.07	73.25	1.38	101.12	22	566	0.51	0.045	0.04	11.89	0.04	0.000
2.45	2.06	77.60	1.37	106.10	23	591	0.51	0.042	0.04	11.89	0.03	0.000
2.53	2.05	81.94	1.35	111.01	24	615	0.51	0.040	0.03	11.89	0.03	0.000
2.56	2.04	85.94	1.34	115.28	24	635	0.51	0.037	0.03	11.89	0.03	0.000
2.64	2.03	88.28	1.34	118.09	25	649	0.51	0.037	0.03	11.89	0.02	0.000
2.72	2.04	89.77	1.34	120.23	25	662	0.51	0.037	0.03	11.89	0.02	0.000
2.79	2.04	89.92	1.35	121.07	26	669	0.51	0.037	0.03	11.89	0.02	0.000
2.82	2.05	89.31	1.35	120.55	26	667	0.51	0.038	0.03	11.89	0.02	0.000
2.91	2.05	88.16	1.35	119.06	25	659	0.51	0.042	0.03	11.89	0.03	0.000
2.98	2.05	86.70	1.35	117.11	25	648	0.51	0.046	0.04	11.89	0.03	0.000
3.02	2.05	84.69	1.35	114.72	24	636	0.51	0.050	0.04	11.89	0.03	0.000
3.10	2.06	82.13	1.37	112.40	24	626	0.51	0.055	0.04	11.89	0.04	0.000
3.17	2.07	79.92	1.38	110.43	24	618	0.51	0.061	0.05	11.89	0.04	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
3.25	2.08	78.77	1.39	109.60	24	615	0.51	0.065	0.05	11.89	0.05	0.000
3.29	2.07	80.01	1.38	110.18	24	616	0.51	0.066	0.05	11.89	0.05	0.000
3.37	2.05	83.06	1.35	112.46	24	623	0.51	0.067	0.05	11.89	0.05	0.000
3.44	2.02	87.96	1.33	116.78	25	639	0.51	0.064	0.05	11.89	0.04	0.000
3.52	2.00	92.60	1.31	121.28	25	655	0.51	0.061	0.05	11.89	0.04	0.000
3.55	1.97	97.65	1.28	125.18	26	660	0.51	0.061	0.05	11.89	0.04	0.000
3.63	1.91	102.24	1.25	127.40	26	646	0.51	0.069	0.05	11.89	0.04	0.000
3.70	1.86	106.33	1.21	128.86	25	631	0.51	0.077	0.06	11.89	0.05	0.000
3.74	1.84	108.38	1.20	129.62	25	627	0.51	0.081	0.06	11.89	0.05	0.000
3.81	1.86	109.17	1.21	131.59	26	641	0.51	0.078	0.06	11.89	0.05	0.000
3.90	1.87	109.37	1.22	133.15	26	656	0.51	0.075	0.05	11.89	0.05	0.000
3.96	1.89	109.69	1.23	134.63	27	669	0.51	0.073	0.05	11.89	0.04	0.000
4.01	1.90	110.13	1.24	136.08	27	682	0.51	0.070	0.05	11.89	0.04	0.000
4.09	1.90	111.57	1.24	138.25	28	696	0.51	0.068	0.05	11.89	0.04	0.000
4.16	1.91	112.74	1.24	140.32	28	711	0.51	0.065	0.04	11.89	0.04	0.000
4.23	1.92	112.83	1.25	141.17	29	720	0.51	0.065	0.04	11.89	0.04	0.000
4.30	1.94	111.28	1.26	140.27	28	723	0.51	0.066	0.04	11.89	0.04	0.000
4.34	1.96	107.57	1.27	137.03	28	717	0.51	0.069	0.05	11.89	0.04	0.000
4.41	1.98	102.46	1.29	132.33	27	705	0.51	0.076	0.05	11.89	0.04	0.000
4.49	2.01	96.05	1.32	126.40	26	686	0.51	0.086	0.06	11.89	0.05	0.000
4.56	2.04	90.79	1.34	121.61	26	669	0.51	0.097	0.07	11.89	0.06	0.001
4.60	2.06	85.54	1.37	116.91	25	651	0.51	0.110	0.08	11.89	0.07	0.000
4.68	2.08	80.28	1.40	112.18	24	630	0.51	0.130	0.10	11.89	0.09	0.001
4.75	2.11	74.12	1.44	106.58	23	603	0.51	0.161	0.14	11.89	0.11	0.001
4.81	2.14	68.27	1.48	101.26	22	574	0.51	0.206	0.18	11.89	0.15	0.001
4.89	2.16	63.56	1.53	97.19	22	551	0.51	0.260	0.24	11.89	0.20	0.002
4.93	2.18	59.60	1.57	93.81	21	530	0.51	0.320	0.30	11.89	0.25	0.001
5.00	2.19	56.94	1.60	91.05	20	513	0.51	0.391	0.38	11.89	0.31	0.003
5.07	2.20	55.19	1.60	88.50	20	499	0.51	0.474	0.48	11.89	0.39	0.004
5.15	2.19	54.78	1.59	87.00	20	491	0.51	0.538	0.55	11.89	0.46	0.004
5.19	2.17	55.78	1.55	86.57	19	490	0.51	0.556	0.58	11.89	0.48	0.002
5.26	2.15	57.42	1.51	86.85	19	492	0.51	0.563	0.59	11.89	0.48	0.004
5.34	2.14	59.01	1.48	87.47	19	496	0.51	0.563	0.59	11.89	0.48	0.004
5.41	2.14	59.66	1.48	88.31	19	501	0.51	0.553	0.57	11.89	0.47	0.004
5.49	2.15	59.55	1.50	89.10	20	505	0.51	0.547	0.56	11.89	0.46	0.004
5.52	2.16	59.70	1.52	90.55	20	513	0.51	0.510	0.51	11.89	0.41	0.001
5.59	2.16	60.75	1.52	92.60	21	525	0.51	0.470	0.45	11.89	0.37	0.003
5.66	2.16	63.19	1.52	95.91	21	544	0.51	0.403	0.37	11.89	0.31	0.002
5.73	2.14	67.39	1.49	100.25	22	568	0.51	0.333	0.30	11.89	0.24	0.002
5.81	2.12	71.88	1.46	104.67	23	593	0.51	0.281	0.24	11.89	0.19	0.002
5.84	2.11	76.73	1.43	109.69	24	620	0.51	0.232	0.19	11.89	0.15	0.001
5.91	2.11	80.22	1.43	114.50	25	647	0.51	0.198	0.15	11.89	0.12	0.001
5.99	2.11	83.36	1.44	120.15	26	680	0.51	0.165	0.12	11.89	0.10	0.001
6.06	2.13	85.96	1.47	126.16	28	715	0.51	0.139	0.09	11.89	0.08	0.001
6.14	2.14	88.24	1.49	131.58	29	746	0.51	0.122	0.08	11.89	0.06	0.001
6.18	2.15	91.09	1.51	137.44	30	779	0.51	0.105	0.06	11.89	0.05	0.000
6.25	2.16	94.23	1.53	143.77	32	815	0.51	0.093	0.05	11.89	0.04	0.000
6.32	2.17	98.02	1.55	151.90	34	860	0.51	0.079	0.04	11.89	0.03	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
6.40	2.18	100.91	1.58	159.15	36	899	0.51	0.071	0.04	11.89	0.03	0.000
6.44	2.20	102.61	1.62	166.71	38	937	0.51	0.063	0.03	11.89	0.02	0.000
6.51	2.23	103.25	1.70	175.27	40	976	0.51	0.058	0.03	11.89	0.02	0.000
6.58	2.27	103.34	1.80	186.46	43	1020	0.51	0.052	0.02	11.89	0.02	0.000
6.65	2.30	103.03	1.94	199.59	47	1067	0.51	0.048	0.02	11.89	0.01	0.000
6.73	2.33	102.42	2.05	210.38	50	1100	0.51	0.045	0.01	11.89	0.01	0.000
6.77	2.36	101.21	2.16	218.34	53	1120	0.51	0.044	0.01	11.89	0.01	0.000
6.84	2.38	99.09	2.26	223.57	54	1126	0.51	0.044	0.01	11.89	0.01	0.000
6.91	2.41	96.58	2.40	232.13	57	1138	0.51	0.043	0.01	11.89	0.01	0.000
6.99	2.43	94.71	2.54	240.83	60	1152	0.51	0.043	0.01	11.89	0.01	0.000
7.02	2.45	93.71	2.65	248.76	63	1168	0.51	0.042	0.01	11.89	0.01	0.000
7.10	2.46	92.81	2.73	253.05	64	1174	0.51	0.042	0.01	11.89	0.01	0.000
7.15	2.47	91.56	2.80	256.73	65	1176	0.51	0.043	0.01	11.89	0.01	0.000
7.25	2.48	90.46	2.86	258.98	66	1176	0.51	0.044	0.01	11.89	0.01	0.000
7.29	2.49	90.12	2.89	260.29	67	1177	0.51	0.044	0.01	11.89	0.01	0.000
7.36	2.48	91.35	2.84	259.65	66	1182	0.51	0.044	0.01	11.89	0.01	0.000
7.43	2.46	94.79	2.70	255.78	65	1192	0.51	0.044	0.01	11.89	0.01	0.000
7.51	2.42	100.52	2.47	248.51	62	1204	0.51	0.044	0.01	11.89	0.01	0.000
7.58	2.38	106.85	2.26	241.28	59	1215	0.51	0.044	0.01	11.89	0.01	0.000
7.62	2.35	112.03	2.11	236.54	57	1224	0.51	0.043	0.01	11.89	0.01	0.000
7.70	2.33	115.07	2.04	235.14	56	1232	0.51	0.043	0.01	11.89	0.01	0.000
7.78	2.32	116.31	2.02	235.19	56	1237	0.51	0.044	0.01	11.89	0.01	0.000
7.82	2.32	116.97	2.00	234.38	56	1237	0.51	0.044	0.01	11.89	0.01	0.000
7.89	2.30	118.37	1.94	229.31	54	1226	0.51	0.046	0.01	11.89	0.01	0.000
7.97	2.28	121.63	1.83	223.18	52	1215	0.51	0.048	0.02	11.89	0.01	0.000
8.04	2.24	126.17	1.73	218.58	50	1210	0.51	0.049	0.02	11.89	0.01	0.000
8.08	2.21	133.73	1.63	217.80	49	1224	0.51	0.048	0.02	11.89	0.01	0.000
8.15	2.16	144.07	1.53	220.18	49	1248	0.51	0.046	0.02	11.89	0.01	0.000
8.23	2.12	155.05	1.45	224.55	49	1273	0.51	0.045	0.02	11.89	0.01	0.000
8.30	2.09	160.49	1.41	226.49	49	1295	0.51	0.044	0.02	11.89	0.01	0.000
8.34	2.08	162.81	1.40	227.19	49	1304	0.51	0.044	0.01	11.89	0.01	0.000
8.42	2.08	162.15	1.39	226.20	49	1307	0.51	0.044	0.02	11.89	0.01	0.000
8.50	2.09	161.56	1.41	227.09	49	1321	0.51	0.044	0.01	11.89	0.01	0.000
8.57	2.11	160.76	1.43	229.37	50	1341	0.50	0.043	0.01	11.89	0.01	0.000
8.61	2.13	160.47	1.46	234.39	51	1372	0.50	0.041	0.01	11.89	0.01	0.000
8.68	2.15	158.31	1.51	238.95	53	1398	0.50	0.040	0.01	11.89	0.01	0.000
8.75	2.19	153.95	1.59	244.12	55	1417	0.50	0.039	0.01	11.89	0.01	0.000
8.83	2.21	150.38	1.65	248.17	56	1430	0.50	0.039	0.01	11.89	0.01	0.000
8.86	2.24	145.46	1.73	251.87	58	1429	0.50	0.040	0.01	11.89	0.01	0.000
8.93	2.26	140.96	1.78	250.99	58	1415	0.50	0.041	0.01	11.89	0.01	0.000
9.01	2.27	135.42	1.81	245.34	57	1382	0.50	0.044	0.01	11.89	0.01	0.000
9.08	2.25	133.56	1.75	234.19	54	1347	0.50	0.047	0.01	11.89	0.01	0.000
9.12	2.21	134.66	1.63	219.64	50	1304	0.50	0.051	0.02	11.89	0.01	0.000
9.20	2.15	136.64	1.51	206.00	46	1260	0.50	0.056	0.02	11.89	0.02	0.000
9.28	2.08	138.90	1.40	194.10	42	1204	0.50	0.064	0.03	11.89	0.02	0.000
9.35	2.02	140.35	1.32	185.84	39	1144	0.50	0.074	0.03	11.89	0.03	0.000
9.42	1.96	141.00	1.28	180.27	37	1089	0.50	0.086	0.04	11.89	0.03	0.000
9.46	1.92	141.51	1.25	176.90	36	1049	0.50	0.097	0.05	11.89	0.04	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
9.54	1.90	141.04	1.24	174.57	35	1031	0.50	0.104	0.05	11.89	0.04	0.000
9.62	1.89	140.32	1.23	173.01	35	1024	0.50	0.108	0.06	11.89	0.04	0.000
9.65	1.89	139.14	1.23	171.56	34	1017	0.50	0.111	0.06	11.89	0.04	0.000
9.73	1.88	137.02	1.22	167.35	33	990	0.50	0.124	0.07	11.89	0.05	0.000
9.81	1.86	134.41	1.21	162.26	32	956	0.50	0.142	0.08	11.89	0.06	0.001
9.85	1.86	132.08	1.20	159.11	31	939	0.50	0.153	0.09	11.89	0.07	0.000
9.92	1.88	129.35	1.23	158.67	32	952	0.50	0.147	0.08	11.89	0.06	0.001
10.00	1.93	126.33	1.25	158.37	32	975	0.50	0.138	0.08	11.89	0.06	0.001
10.07	1.95	123.52	1.27	157.06	32	986	0.50	0.135	0.08	11.89	0.06	0.000
10.11	1.97	122.27	1.28	156.70	32	993	0.50	0.132	0.07	11.89	0.06	0.000
10.18	1.97	121.73	1.29	156.43	32	998	0.50	0.132	0.07	11.89	0.06	0.000
10.25	1.97	122.68	1.29	157.78	33	1012	0.50	0.128	0.07	11.89	0.05	0.000
10.32	1.97	124.84	1.28	159.97	33	1027	0.50	0.123	0.07	11.89	0.05	0.000
10.40	1.96	127.02	1.28	162.22	33	1043	0.50	0.119	0.06	11.89	0.05	0.000
10.44	1.96	127.93	1.28	163.22	33	1051	0.50	0.117	0.06	11.89	0.05	0.000
10.51	1.97	125.61	1.29	161.48	33	1052	0.50	0.118	0.06	11.89	0.05	0.000
10.59	1.99	122.86	1.30	159.83	33	1057	0.50	0.118	0.06	11.89	0.05	0.000
10.67	2.01	120.89	1.31	158.65	33	1061	0.50	0.119	0.06	11.89	0.05	0.000
10.71	2.00	121.94	1.31	159.75	33	1069	0.50	0.116	0.06	11.89	0.05	0.000
10.78	2.00	123.46	1.30	160.89	33	1078	0.50	0.115	0.06	11.89	0.05	0.000
10.86	1.98	125.53	1.29	162.49	34	1088	0.50	0.113	0.06	11.89	0.04	0.000
10.93	1.98	126.91	1.29	163.76	34	1098	0.50	0.111	0.06	11.89	0.04	0.000
10.97	1.97	129.16	1.28	165.55	34	1106	0.50	0.110	0.06	11.89	0.04	0.000
11.05	1.96	131.59	1.27	167.63	34	1118	0.50	0.107	0.06	11.89	0.04	0.000
11.12	1.94	134.49	1.27	170.27	35	1134	0.50	0.104	0.05	11.89	0.04	0.000
11.16	1.93	137.64	1.26	173.31	35	1150	0.50	0.101	0.05	11.89	0.04	0.000
11.24	1.93	139.25	1.26	174.87	35	1161	0.50	0.099	0.05	11.89	0.04	0.000
11.31	1.93	139.50	1.26	175.38	36	1171	0.50	0.098	0.05	11.89	0.04	0.000
11.39	1.94	138.16	1.26	174.57	36	1177	0.50	0.098	0.05	11.89	0.04	0.000
11.43	1.96	136.00	1.27	173.25	35	1181	0.50	0.097	0.05	11.89	0.04	0.000
11.50	1.97	133.46	1.29	171.62	35	1186	0.50	0.097	0.05	11.89	0.04	0.000
11.58	1.99	130.98	1.30	170.11	35	1191	0.50	0.097	0.05	11.89	0.04	0.000
11.62	2.01	128.89	1.32	169.51	35	1201	0.50	0.096	0.05	11.89	0.03	0.000
11.70	2.03	128.20	1.33	170.70	36	1224	0.50	0.092	0.05	11.89	0.03	0.000
11.77	2.05	127.25	1.36	172.44	37	1251	0.50	0.087	0.04	11.89	0.03	0.000
11.85	2.06	127.57	1.37	174.50	37	1277	0.50	0.083	0.04	11.89	0.03	0.000
11.88	2.06	128.56	1.37	175.95	38	1290	0.50	0.082	0.04	11.89	0.03	0.000
11.96	2.05	130.87	1.35	176.67	37	1295	0.50	0.082	0.04	11.89	0.03	0.000
12.03	2.02	134.26	1.33	178.17	37	1300	0.50	0.082	0.04	11.89	0.03	0.000
12.11	2.00	137.62	1.31	179.93	37	1305	0.50	0.082	0.04	11.89	0.03	0.000
12.15	1.97	143.31	1.28	184.03	38	1317	0.50	0.080	0.04	11.89	0.03	0.000
12.23	1.93	150.55	1.26	189.60	38	1334	0.50	0.079	0.04	11.89	0.03	0.000
12.30	1.90	158.85	1.23	195.99	39	1352	0.50	0.077	0.03	11.89	0.02	0.000
12.34	1.86	166.68	1.21	201.79	40	1370	0.50	0.074	0.03	11.89	0.02	0.000
12.42	1.84	172.08	1.19	205.16	40	1383	0.50	0.073	0.03	11.89	0.02	0.000
12.49	1.83	176.24	1.19	208.86	41	1409	0.50	0.071	0.03	11.89	0.02	0.000
12.57	1.82	181.33	1.18	213.46	42	1441	0.50	0.068	0.03	11.89	0.02	0.000
12.64	1.82	186.33	1.17	218.01	42	1473	0.50	0.065	0.03	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
12.68	1.81	190.46	1.16	220.79	43	1491	0.50	0.063	0.03	11.89	0.02	0.000
12.75	1.80	194.66	1.15	223.87	43	1515	0.50	0.062	0.02	11.89	0.02	0.000
12.83	1.78	198.24	1.13	224.56	43	1523	0.50	0.061	0.02	11.89	0.02	0.000
12.86	1.73	204.69	1.04	213.11	40	1475	0.50	0.067	0.03	11.89	0.02	0.000
12.94	1.68	213.20	1.00	213.20	40	1470	0.50	0.068	0.03	11.89	0.02	0.000
13.01	1.68	228.55	1.00	228.55	42	1565	0.50	0.059	0.02	11.89	0.02	0.000
13.09	1.71	243.48	1.01	246.39	46	1743	0.50	0.047	0.02	11.89	0.01	0.000
13.13	1.76	253.30	1.09	277.34	53	1913	0.50	0.040	0.01	11.89	0.01	0.000
13.21	1.79	259.14	1.14	295.74	57	2042	0.50	0.036	0.01	11.89	0.01	0.000
13.27	1.84	257.45	1.19	306.24	60	2149	0.50	0.033	0.01	11.89	0.01	0.000
13.35	1.88	248.07	1.23	304.30	61	2198	0.50	0.032	0.01	11.89	0.01	0.000
13.42	1.94	231.94	1.26	293.28	60	2204	0.50	0.032	0.01	11.89	0.01	0.000
13.46	1.99	218.55	1.30	283.85	59	2201	0.50	0.032	0.01	11.89	0.01	0.000
13.53	2.01	212.08	1.32	279.60	58	2203	0.50	0.032	0.01	11.89	0.01	0.000
13.62	2.02	209.77	1.32	277.83	58	2206	0.50	0.033	0.01	11.89	0.01	0.000
13.65	2.00	213.73	1.31	279.08	58	2196	0.50	0.033	0.01	11.89	0.01	0.000
13.73	1.96	222.00	1.28	283.51	58	2189	0.50	0.033	0.01	11.89	0.01	0.000
13.81	1.92	233.00	1.25	290.54	59	2187	0.50	0.034	0.01	11.89	0.01	0.000
13.88	1.88	243.83	1.22	297.75	59	2195	0.50	0.034	0.01	11.89	0.01	0.000
13.92	1.85	253.06	1.20	303.20	60	2203	0.50	0.034	0.01	11.89	0.01	0.000
13.99	1.82	261.48	1.18	307.73	60	2220	0.50	0.033	0.01	11.89	0.01	0.000
14.07	1.80	269.63	1.15	311.39	60	2240	0.50	0.033	0.01	11.89	0.01	0.000
14.14	1.79	276.04	1.14	314.02	60	2260	0.50	0.033	0.01	11.89	0.01	0.000
14.18	1.78	280.69	1.12	315.38	60	2273	0.50	0.033	0.01	11.89	0.01	0.000
14.26	1.77	283.64	1.11	315.60	60	2283	0.50	0.033	0.01	11.89	0.01	0.000
14.33	1.76	285.60	1.11	315.67	60	2292	0.50	0.033	0.01	11.89	0.01	0.000
14.37	1.76	285.60	1.11	315.95	60	2298	0.50	0.033	0.01	11.89	0.01	0.000
14.45	1.77	284.59	1.11	316.84	61	2310	0.50	0.033	0.01	11.89	0.01	0.000
14.52	1.77	285.08	1.12	318.93	61	2332	0.50	0.032	0.01	11.89	0.01	0.000
14.59	1.77	286.90	1.11	319.82	61	2346	0.50	0.032	0.01	11.89	0.01	0.000
14.63	1.76	288.46	1.11	319.02	61	2346	0.50	0.032	0.01	11.89	0.01	0.000
14.70	1.77	286.09	1.11	317.08	61	2338	0.50	0.033	0.01	11.89	0.01	0.000
14.79	1.78	280.21	1.13	315.94	61	2336	0.50	0.033	0.01	11.89	0.01	0.000
14.86	1.80	272.86	1.15	314.84	61	2342	0.50	0.033	0.01	11.89	0.01	0.000
14.93	1.82	266.27	1.17	312.46	61	2345	0.50	0.033	0.01	11.89	0.01	0.000
14.97	1.83	263.71	1.18	311.92	61	2354	0.50	0.033	0.01	11.89	0.01	0.000
15.05	1.83	265.77	1.18	314.53	61	2382	0.50	0.033	0.01	11.89	0.01	0.000
15.12	1.82	271.40	1.18	319.38	62	2419	0.50	0.032	0.01	11.89	0.01	0.000
15.19	1.82	276.02	1.17	322.82	63	2445	0.50	0.032	0.01	11.89	0.01	0.000
15.23	1.81	276.02	1.17	321.61	62	2436	0.50	0.032	0.01	11.89	0.01	0.000
15.31	1.81	272.20	1.16	317.02	62	2409	0.50	0.033	0.01	11.89	0.01	0.000
15.38	1.81	266.98	1.17	311.26	60	2373	0.50	0.034	0.01	11.89	0.01	0.000
15.46	1.81	262.73	1.17	306.56	60	2346	0.50	0.035	0.01	11.89	0.01	0.000
15.50	1.81	259.27	1.17	302.50	59	2318	0.50	0.036	0.01	11.89	0.01	0.000
15.57	1.81	257.58	1.17	300.52	58	2310	0.50	0.036	0.01	11.89	0.01	0.000
15.64	1.81	257.95	1.17	300.55	58	2315	0.50	0.036	0.01	11.89	0.01	0.000
15.68	1.80	262.31	1.15	301.52	58	2317	0.50	0.037	0.01	11.89	0.01	0.000
15.76	1.77	266.51	1.11	295.90	57	2274	0.50	0.038	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
15.84	1.74	271.22	1.06	288.46	55	2239	0.50	0.039	0.01	11.89	0.01	0.000
15.91	1.72	272.86	1.03	281.91	53	2215	0.50	0.040	0.01	11.89	0.01	0.000
15.95	1.73	271.86	1.04	283.45	53	2223	0.50	0.040	0.01	11.89	0.01	0.000
16.03	1.73	271.31	1.05	283.69	53	2229	0.50	0.040	0.01	11.89	0.01	0.000
16.09	1.76	262.50	1.10	287.86	55	2242	0.50	0.040	0.01	11.89	0.01	0.000
16.16	1.77	264.87	1.12	296.41	57	2311	0.50	0.038	0.01	11.89	0.01	0.000
16.23	1.78	273.42	1.13	308.74	59	2415	0.50	0.036	0.01	11.89	0.01	0.000
16.30	1.76	296.65	1.09	324.65	62	2549	0.50	0.033	0.01	11.89	0.01	0.000
16.34	1.73	321.85	1.05	338.37	64	2684	0.50	0.030	0.01	11.89	0.00	0.000
16.42	1.72	339.62	1.03	348.32	65	2794	0.50	0.029	0.01	11.89	0.00	0.000
16.49	1.72	346.03	1.03	357.68	67	2869	0.50	0.028	0.01	11.89	0.00	0.000
16.56	1.75	336.03	1.08	364.09	69	2889	0.50	0.028	0.01	11.89	0.00	0.000
16.63	1.78	320.89	1.13	362.41	70	2878	0.50	0.028	0.01	11.89	0.00	0.000
16.67	1.80	308.46	1.15	356.19	69	2844	0.50	0.029	0.01	11.89	0.00	0.000
16.75	1.80	304.73	1.15	350.21	68	2801	0.50	0.029	0.01	11.89	0.00	0.000
16.82	1.79	301.46	1.14	344.10	66	2755	0.50	0.030	0.01	11.89	0.00	0.000
16.89	1.78	304.28	1.12	341.45	65	2735	0.50	0.031	0.01	11.89	0.00	0.000
16.96	1.77	305.43	1.11	339.53	65	2727	0.50	0.031	0.01	11.89	0.00	0.000
17.00	1.74	314.69	1.07	336.25	64	2719	0.50	0.031	0.01	11.89	0.01	0.000
17.07	1.71	322.76	1.00	323.68	61	2681	0.50	0.032	0.01	11.89	0.01	0.000
17.15	1.68	326.64	1.00	326.64	61	2629	0.50	0.034	0.01	11.89	0.01	0.000
17.22	1.67	324.09	1.00	324.09	60	2577	0.50	0.035	0.01	11.89	0.01	0.000
17.26	1.68	313.88	1.00	313.88	58	2528	0.50	0.036	0.01	11.89	0.01	0.000
17.34	1.67	298.42	1.00	298.42	55	2389	0.50	0.040	0.01	11.89	0.01	0.000
17.41	1.64	278.62	1.00	278.62	51	2155	0.50	0.048	0.02	11.89	0.01	0.000
17.50	1.60	263.07	1.00	263.07	47	1936	0.50	0.060	0.02	11.89	0.01	0.000
17.54	1.59	256.26	1.00	256.26	46	1851	0.50	0.067	0.02	11.89	0.02	0.000
17.62	1.60	256.58	1.00	256.58	46	1895	0.50	0.064	0.02	11.89	0.01	0.000
17.65	1.61	264.63	1.00	264.63	48	1970	0.50	0.059	0.02	11.89	0.01	0.000
17.73	1.61	272.39	1.00	272.39	49	2039	0.50	0.055	0.02	11.89	0.01	0.000
17.80	1.59	291.08	1.00	291.08	52	2134	0.50	0.051	0.02	11.89	0.01	0.000
17.87	1.58	309.69	1.00	309.69	56	2250	0.50	0.046	0.01	11.89	0.01	0.000
17.94	1.58	328.73	1.00	328.73	59	2390	0.50	0.042	0.01	11.89	0.01	0.000
18.01	1.60	335.65	1.00	335.65	61	2506	0.50	0.039	0.01	11.89	0.01	0.000
18.05	1.63	337.22	1.00	337.22	62	2623	0.50	0.036	0.01	11.89	0.01	0.000
18.12	1.67	337.46	1.00	337.46	62	2752	0.50	0.034	0.01	11.89	0.01	0.000
18.20	1.70	340.23	1.00	340.23	64	2903	0.50	0.031	0.01	11.89	0.00	0.000
18.27	1.73	339.98	1.04	353.94	67	3004	0.50	0.030	0.01	11.89	0.00	0.000
18.32	1.75	336.40	1.08	362.48	69	3056	0.50	0.029	0.01	11.89	0.00	0.000
18.39	1.77	321.38	1.12	359.51	69	3029	0.50	0.030	0.01	11.89	0.00	0.000
18.46	1.80	304.10	1.15	350.52	68	2976	0.50	0.031	0.01	11.89	0.00	0.000
18.51	1.83	284.81	1.18	336.30	66	2893	0.50	0.032	0.01	11.89	0.00	0.000
18.58	1.84	273.22	1.19	325.40	64	2824	0.50	0.033	0.01	11.89	0.01	0.000
18.64	1.83	265.17	1.18	313.53	61	2712	0.50	0.036	0.01	11.89	0.01	0.000
18.74	1.80	261.65	1.16	302.87	59	2599	0.50	0.039	0.01	11.89	0.01	0.000
18.77	1.75	259.32	1.08	281.03	53	2401	0.50	0.044	0.01	11.89	0.01	0.000
18.85	1.68	253.20	1.00	253.20	47	2157	0.50	0.054	0.02	11.89	0.01	0.000
18.93	1.62	244.31	1.00	244.31	44	1913	0.51	0.070	0.03	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
19.00	1.59	234.56	1.00	234.56	42	1781	0.51	0.083	0.03	11.89	0.02	0.000
19.03	1.60	230.19	1.00	230.19	42	1768	0.51	0.085	0.04	11.89	0.02	0.000
19.11	1.61	228.26	1.00	228.26	41	1771	0.51	0.085	0.04	11.89	0.02	0.000
19.16	1.61	227.32	1.00	227.32	41	1784	0.51	0.084	0.04	11.89	0.02	0.000
19.26	1.61	229.00	1.00	229.00	41	1800	0.51	0.083	0.03	11.89	0.02	0.000
19.29	1.61	233.63	1.00	233.63	42	1838	0.51	0.079	0.03	11.89	0.02	0.000
19.36	1.62	238.80	1.00	238.80	43	1907	0.51	0.073	0.03	11.89	0.02	0.000
19.44	1.65	240.44	1.00	240.44	44	1995	0.51	0.067	0.03	11.89	0.02	0.000
19.51	1.68	240.28	1.00	240.28	44	2068	0.51	0.062	0.02	11.89	0.01	0.000
19.58	1.69	238.88	1.00	238.88	44	2102	0.51	0.061	0.02	11.89	0.01	0.000
19.65	1.69	239.20	1.00	239.20	45	2112	0.51	0.060	0.02	11.89	0.01	0.000
19.69	1.69	240.73	1.00	240.73	45	2109	0.51	0.061	0.02	11.89	0.01	0.000
19.76	1.69	242.11	1.00	242.11	45	2133	0.51	0.060	0.02	11.89	0.01	0.000
19.84	1.70	246.41	1.00	246.41	46	2208	0.51	0.056	0.02	11.89	0.01	0.000
19.91	1.72	249.90	1.03	256.96	48	2299	0.51	0.052	0.02	11.89	0.01	0.000
19.95	1.73	256.31	1.04	266.63	50	2379	0.51	0.049	0.02	11.89	0.01	0.000
20.03	1.72	260.46	1.04	270.36	51	2419	0.51	0.048	0.02	11.89	0.01	0.000
20.09	1.72	265.72	1.02	272.22	51	2451	0.51	0.047	0.02	11.89	0.01	0.000
20.14	1.70	276.51	1.00	276.51	52	2490	0.51	0.046	0.01	11.89	0.01	0.000
20.22	1.68	288.89	1.00	288.89	54	2539	0.51	0.045	0.01	11.89	0.01	0.000
20.28	1.66	301.14	1.00	301.14	55	2589	0.51	0.043	0.01	11.89	0.01	0.000
20.36	1.66	304.58	1.00	304.58	56	2618	0.51	0.043	0.01	11.89	0.01	0.000
20.41	1.66	305.12	1.00	305.12	56	2644	0.51	0.042	0.01	11.89	0.01	0.000
20.49	1.68	304.54	1.00	304.54	56	2692	0.51	0.041	0.01	11.89	0.01	0.000
20.56	1.70	305.24	1.00	305.24	57	2796	0.51	0.039	0.01	11.89	0.01	0.000
20.63	1.73	305.66	1.05	322.25	61	2921	0.51	0.036	0.01	11.89	0.01	0.000
20.71	1.76	305.35	1.10	334.57	64	3021	0.51	0.035	0.01	11.89	0.01	0.000
20.75	1.77	302.42	1.12	338.32	65	3060	0.51	0.034	0.01	11.89	0.00	0.000
20.83	1.79	295.96	1.14	336.47	65	3058	0.51	0.034	0.01	11.89	0.00	0.000
20.90	1.80	286.16	1.16	330.80	64	3028	0.51	0.035	0.01	11.89	0.01	0.000
20.97	1.82	276.47	1.17	323.88	63	2991	0.51	0.036	0.01	11.89	0.01	0.000
21.01	1.84	264.07	1.19	314.00	61	2934	0.51	0.037	0.01	11.89	0.01	0.000
21.09	1.85	252.34	1.20	303.57	60	2874	0.51	0.038	0.01	11.89	0.01	0.000
21.16	1.86	242.79	1.21	294.34	58	2817	0.51	0.040	0.01	11.89	0.01	0.000
21.20	1.86	239.99	1.21	290.24	57	2773	0.51	0.041	0.01	11.89	0.01	0.000
21.27	1.84	243.78	1.20	291.50	57	2758	0.51	0.041	0.01	11.89	0.01	0.000
21.35	1.82	251.17	1.17	294.89	57	2757	0.51	0.042	0.01	11.89	0.01	0.000
21.42	1.80	258.96	1.15	298.28	58	2768	0.52	0.042	0.01	11.89	0.01	0.000
21.46	1.79	263.26	1.14	299.63	58	2773	0.52	0.042	0.01	11.89	0.01	0.000
21.53	1.78	265.42	1.13	300.19	58	2779	0.52	0.042	0.01	11.89	0.01	0.000
21.60	1.77	269.50	1.12	302.04	58	2799	0.52	0.041	0.01	11.89	0.01	0.000
21.67	1.73	280.86	1.05	295.62	56	2758	0.52	0.043	0.01	11.89	0.01	0.000
21.75	1.68	296.40	1.00	296.40	55	2717	0.52	0.044	0.01	11.89	0.01	0.000
21.79	1.62	317.94	1.00	317.94	58	2680	0.52	0.045	0.01	11.89	0.01	0.000
21.87	1.58	333.13	1.00	333.13	60	2684	0.52	0.045	0.01	11.89	0.01	0.000
21.93	1.56	340.89	1.00	340.89	61	2687	0.52	0.045	0.01	11.89	0.01	0.000
22.01	1.57	333.53	1.00	333.53	60	2673	0.52	0.046	0.01	11.89	0.01	0.000
22.08	1.61	317.59	1.00	317.59	58	2678	0.52	0.046	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
22.12	1.65	303.43	1.00	303.43	56	2678	0.52	0.046	0.01	11.89	0.01	0.000
22.18	1.68	287.31	1.00	287.31	53	2666	0.52	0.046	0.01	11.89	0.01	0.000
22.26	1.72	268.52	1.03	275.67	52	2629	0.52	0.048	0.02	11.89	0.01	0.000
22.32	1.77	242.71	1.11	269.53	51	2543	0.52	0.051	0.02	11.89	0.01	0.000
22.38	1.79	224.98	1.15	257.65	50	2449	0.52	0.055	0.02	11.89	0.01	0.000
22.45	1.80	216.75	1.16	250.36	48	2392	0.52	0.058	0.02	11.89	0.01	0.000
22.51	1.80	217.06	1.15	249.50	48	2383	0.52	0.058	0.02	11.89	0.01	0.000
22.59	1.78	222.84	1.13	252.05	48	2401	0.52	0.058	0.02	11.89	0.01	0.000
22.64	1.75	235.93	1.08	254.96	48	2428	0.52	0.057	0.02	11.89	0.01	0.000
22.72	1.71	250.18	1.02	254.19	48	2461	0.52	0.055	0.02	11.89	0.01	0.000
22.77	1.71	254.87	1.00	255.72	48	2490	0.52	0.054	0.02	11.89	0.01	0.000
22.85	1.72	250.35	1.03	258.84	49	2500	0.52	0.054	0.02	11.89	0.01	0.000
22.91	1.75	241.07	1.08	259.56	49	2489	0.52	0.055	0.02	11.89	0.01	0.000
22.97	1.76	231.33	1.10	254.11	48	2438	0.52	0.057	0.02	11.89	0.01	0.000
23.05	1.77	221.96	1.11	247.04	47	2376	0.52	0.061	0.02	11.89	0.01	0.000
23.11	1.78	211.01	1.13	238.78	46	2305	0.52	0.064	0.02	11.89	0.01	0.000
23.17	1.80	199.66	1.16	230.78	45	2247	0.52	0.068	0.03	11.89	0.01	0.000
23.25	1.83	186.96	1.18	220.95	43	2185	0.52	0.073	0.03	11.89	0.02	0.000
23.30	1.83	178.39	1.18	210.82	41	2088	0.52	0.080	0.03	11.89	0.02	0.000
23.36	1.79	173.51	1.14	198.48	38	1934	0.52	0.096	0.04	11.89	0.02	0.000
23.43	1.76	169.35	1.10	185.92	35	1803	0.52	0.115	0.06	11.89	0.03	0.000
23.50	1.75	164.89	1.09	178.94	34	1740	0.52	0.127	0.07	11.89	0.04	0.000
23.57	1.78	160.02	1.13	181.17	35	1769	0.52	0.122	0.06	11.89	0.03	0.000
23.62	1.80	157.93	1.16	182.52	35	1797	0.52	0.117	0.06	11.89	0.03	0.000
23.69	1.82	156.73	1.17	183.66	36	1826	0.52	0.113	0.06	11.89	0.03	0.000
23.76	1.81	162.33	1.16	188.92	37	1873	0.52	0.107	0.05	11.89	0.03	0.000
23.83	1.79	175.73	1.14	199.50	38	1962	0.52	0.096	0.04	11.89	0.02	0.000
23.90	1.75	197.60	1.09	215.17	41	2111	0.52	0.081	0.03	11.89	0.02	0.000
23.97	1.71	226.08	1.02	230.08	43	2292	0.52	0.069	0.03	11.89	0.01	0.000
24.05	1.67	260.57	1.00	260.57	48	2483	0.52	0.059	0.02	11.89	0.01	0.000
24.11	1.62	299.79	1.00	299.79	54	2676	0.52	0.052	0.02	11.89	0.01	0.000
24.18	1.58	339.30	1.00	339.30	61	2893	0.52	0.045	0.01	11.89	0.01	0.000
24.25	1.56	371.08	1.00	371.08	66	3082	0.52	0.041	0.01	11.89	0.01	0.000
24.29	1.54	400.22	1.00	400.22	71	3262	0.52	0.038	0.01	11.89	0.00	0.000
24.37	1.53	420.61	1.00	420.61	74	3384	0.52	0.036	0.01	11.89	0.00	0.000
24.41	1.52	439.02	1.00	439.02	77	3485	0.52	0.034	0.01	11.89	0.00	0.000
24.48	1.52	447.64	1.00	447.64	79	3538	0.52	0.034	0.01	11.89	0.00	0.000
24.55	1.53	450.91	1.00	450.91	79	3627	0.52	0.032	0.01	11.89	0.00	0.000
24.61	1.55	447.33	1.00	447.33	79	3692	0.52	0.032	0.01	11.89	0.00	0.000
24.68	1.55	446.14	1.00	446.14	79	3686	0.53	0.032	0.01	11.89	0.00	0.000
24.74	1.54	441.73	1.00	441.73	78	3620	0.53	0.033	0.01	11.89	0.00	0.000
24.81	1.52	444.09	1.00	444.09	78	3558	0.53	0.034	0.01	11.89	0.00	0.000
24.88	1.52	444.98	1.00	444.98	78	3562	0.53	0.034	0.01	11.89	0.00	0.000
24.94	1.52	452.93	1.00	452.93	79	3612	0.53	0.033	0.01	11.89	0.00	0.000
25.01	1.53	453.63	1.00	453.63	80	3666	0.53	0.033	0.01	11.89	0.00	0.000
25.07	1.53	452.70	1.00	452.70	80	3697	0.53	0.032	0.01	11.89	0.00	0.000
25.14	1.54	448.68	1.00	448.68	79	3709	0.53	0.032	0.01	11.89	0.00	0.000
25.21	1.56	443.69	1.00	443.69	79	3759	0.53	0.032	0.01	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
25.27	1.57	436.14	1.00	436.14	78	3770	0.53	0.032	0.01	11.89	0.00	0.000
25.34	1.59	421.69	1.00	421.69	76	3747	0.53	0.032	0.01	11.89	0.00	0.000
25.41	1.61	403.20	1.00	403.20	73	3658	0.53	0.033	0.01	11.89	0.00	0.000
25.48	1.64	380.98	1.00	380.98	70	3589	0.53	0.034	0.01	11.89	0.00	0.000
25.53	1.68	347.51	1.00	347.51	64	3481	0.53	0.036	0.01	11.89	0.00	0.000
25.62	1.73	309.22	1.05	325.73	61	3340	0.53	0.039	0.01	11.89	0.01	0.000
25.69	1.79	269.48	1.14	308.10	59	3175	0.53	0.042	0.01	11.89	0.01	0.000
25.73	1.84	234.51	1.19	279.21	55	2956	0.53	0.047	0.01	11.89	0.01	0.000
25.80	1.89	200.62	1.23	246.42	49	2718	0.53	0.055	0.02	11.89	0.01	0.000
25.88	1.94	169.63	1.26	214.09	44	2478	0.53	0.066	0.03	11.89	0.01	0.000
25.95	1.98	149.26	1.29	192.97	40	2326	0.53	0.075	0.03	11.89	0.02	0.000
26.00	2.01	137.21	1.32	181.04	38	2243	0.53	0.081	0.04	11.89	0.02	0.000
26.07	2.05	128.47	1.35	173.65	37	2205	0.53	0.084	0.04	11.89	0.02	0.000
26.15	2.08	121.12	1.39	168.69	36	2189	0.53	0.086	0.04	11.89	0.02	0.000
26.18	2.10	117.05	1.42	166.64	36	2186	0.53	0.086	0.04	11.89	0.02	0.000
26.26	2.10	115.60	1.42	164.58	36	2163	0.53	0.089	0.04	11.89	0.02	0.000
26.34	2.10	115.08	1.41	162.64	35	2136	0.53	0.092	0.05	11.89	0.02	0.000
26.38	2.08	115.53	1.39	160.92	35	2101	0.53	0.096	0.05	11.89	0.02	0.000
26.46	2.08	115.04	1.39	159.44	34	2080	0.53	0.098	0.05	11.89	0.03	0.000
26.53	2.08	111.38	1.40	155.40	33	2039	0.53	0.103	0.06	11.89	0.03	0.000
26.60	2.10	105.53	1.42	150.04	33	1989	0.53	0.110	0.06	11.89	0.03	0.000
26.66	2.12	100.23	1.45	145.17	32	1939	0.53	0.118	0.07	11.89	0.03	0.000
26.73	2.13	96.67	1.46	141.32	31	1895	0.53	0.125	0.07	11.89	0.04	0.000
26.80	2.13	94.28	1.47	138.17	30	1858	0.53	0.133	0.08	11.89	0.04	0.000
26.87	2.14	91.65	1.48	135.47	30	1828	0.53	0.139	0.09	11.89	0.04	0.000
26.91	2.14	89.63	1.49	133.69	29	1809	0.53	0.143	0.09	11.89	0.04	0.000
26.98	2.15	87.85	1.51	132.67	29	1801	0.53	0.146	0.09	11.89	0.04	0.000
27.06	2.16	86.34	1.53	132.15	29	1800	0.53	0.147	0.09	11.89	0.05	0.000
27.10	2.17	85.68	1.55	132.55	30	1809	0.53	0.145	0.09	11.89	0.04	0.000
27.18	2.17	86.17	1.55	133.55	30	1826	0.53	0.142	0.09	11.89	0.04	0.000
27.26	2.17	88.30	1.54	135.55	30	1856	0.53	0.136	0.08	11.89	0.04	0.000
27.33	2.15	91.55	1.51	137.95	30	1889	0.53	0.131	0.08	11.89	0.04	0.000
27.37	2.12	97.23	1.46	141.78	31	1932	0.53	0.124	0.07	11.89	0.04	0.000
27.45	2.09	104.49	1.41	146.83	32	1978	0.53	0.117	0.07	11.89	0.03	0.000
27.52	2.05	112.91	1.36	153.30	33	2026	0.53	0.111	0.06	11.89	0.03	0.000
27.59	2.03	118.99	1.33	158.33	33	2058	0.53	0.107	0.06	11.89	0.03	0.000
27.63	2.02	121.09	1.32	160.19	34	2072	0.53	0.106	0.06	11.89	0.03	0.000
27.70	2.00	118.86	1.31	155.38	32	1984	0.53	0.118	0.07	11.89	0.03	0.000
27.78	1.97	113.21	1.29	145.75	30	1824	0.53	0.147	0.09	11.89	0.04	0.000
27.86	1.95	106.85	1.27	135.36	28	1652	0.53	0.197	0.13	11.89	0.06	0.001
27.90	1.96	99.28	1.28	127.05	26	1579	0.53	0.228	0.17	11.89	0.08	0.000
27.98	2.01	92.91	1.31	122.15	26	1581	0.53	0.228	0.17	11.89	0.08	0.001
28.02	2.07	85.48	1.38	117.55	25	1586	0.53	0.226	0.17	11.89	0.08	0.000
28.10	2.12	78.88	1.46	115.01	25	1596	0.53	0.223	0.17	11.89	0.08	0.001
28.16	2.17	74.85	1.54	115.62	26	1620	0.53	0.213	0.16	11.89	0.07	0.000
28.23	2.20	73.48	1.61	118.56	27	1665	0.53	0.196	0.14	11.89	0.07	0.001
28.30	2.22	73.46	1.68	123.32	28	1730	0.53	0.176	0.12	11.89	0.05	0.000
28.38	2.26	71.96	1.78	128.07	30	1785	0.53	0.162	0.10	11.89	0.05	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
28.42	2.29	70.07	1.89	132.48	31	1825	0.53	0.152	0.09	11.89	0.04	0.000
28.49	2.31	69.39	1.95	135.25	32	1852	0.53	0.147	0.08	11.89	0.04	0.000
28.58	2.32	68.88	1.99	137.25	33	1873	0.53	0.143	0.08	11.89	0.04	0.000
28.61	2.32	69.32	2.00	138.40	33	1890	0.53	0.140	0.08	11.89	0.04	0.000
28.69	2.33	68.59	2.03	139.50	33	1899	0.53	0.139	0.08	11.89	0.03	0.000
28.77	2.34	67.93	2.07	140.43	34	1907	0.53	0.138	0.07	11.89	0.03	0.000
28.81	2.34	67.45	2.09	140.99	34	1911	0.53	0.137	0.07	11.89	0.03	0.000
28.88	2.33	68.48	2.04	139.87	33	1911	0.53	0.138	0.07	11.89	0.03	0.000
28.95	2.30	71.22	1.93	137.72	32	1913	0.53	0.138	0.08	11.89	0.04	0.000
29.03	2.27	74.91	1.81	135.38	31	1913	0.53	0.138	0.08	11.89	0.04	0.000
29.11	2.24	77.88	1.72	133.89	31	1911	0.53	0.139	0.08	11.89	0.04	0.000
29.14	2.23	78.81	1.69	133.20	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.22	2.24	76.93	1.73	133.09	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.29	2.27	73.90	1.81	133.46	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.33	2.30	69.49	1.92	133.44	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.42	2.34	63.92	2.08	133.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.49	2.39	57.38	2.33	133.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.53	2.48	48.74	2.81	137.17	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.61	2.58	40.09	3.59	143.84	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.68	2.70	32.39	4.66	150.94	0	0	0.53	0.000	0.00	0.00	0.00	0.000
29.76	2.76	28.69	5.37	154.13	0	0	0.53	0.000	0.00	0.00	0.00	0.000
29.80	2.78	27.72	5.56	154.10	0	0	0.53	0.000	0.00	0.00	0.00	0.000
29.88	2.76	28.26	5.40	152.70	0	0	0.53	0.000	0.00	0.00	0.00	0.000
29.95	2.74	29.29	5.16	151.20	0	0	0.53	0.000	0.00	0.00	0.00	0.000
29.99	2.71	31.05	4.86	150.92	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.06	2.69	33.18	4.58	151.96	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.14	2.66	35.95	4.28	153.73	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.22	2.63	38.25	4.05	155.09	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.26	2.62	40.23	3.90	156.96	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.33	2.61	41.60	3.83	159.16	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.41	2.60	42.74	3.77	161.04	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.45	2.59	44.24	3.63	160.70	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.53	2.55	46.67	3.38	157.60	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.60	2.50	50.76	3.01	152.57	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.67	2.46	54.69	2.71	148.18	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.72	2.42	58.13	2.46	143.16	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.79	2.38	60.44	2.29	138.55	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.86	2.35	62.85	2.14	134.34	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.94	2.33	64.69	2.04	132.05	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.99	2.31	66.05	1.97	130.06	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.06	2.32	63.89	2.02	128.77	31	1867	0.53	0.163	0.10	11.89	0.04	0.000
31.11	2.32	63.15	2.02	127.61	30	1852	0.53	0.167	0.10	11.89	0.04	0.000
31.19	2.34	61.89	2.08	128.54	31	1855	0.53	0.167	0.10	11.89	0.04	0.000
31.27	2.33	63.10	2.06	130.13	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.31	2.36	62.30	2.18	135.62	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.38	2.40	60.74	2.36	143.24	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.45	2.45	57.61	2.66	153.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.53	2.50	54.00	3.00	162.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.57	2.56	50.00	3.44	171.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.65	2.61	46.68	3.86	180.16	0	0	0.53	0.000	0.00	0.00	0.00	0.000
31.73	2.64	45.30	4.11	186.34	0	0	0.53	0.000	0.00	0.00	0.00	0.000
31.80	2.67	43.70	4.37	191.09	0	0	0.53	0.000	0.00	0.00	0.00	0.000
31.84	2.66	44.72	4.28	191.28	0	0	0.53	0.000	0.00	0.00	0.00	0.000
31.91	2.62	47.81	3.94	188.50	0	0	0.53	0.000	0.00	0.00	0.00	0.000
31.99	2.55	54.47	3.34	182.17	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.03	2.47	63.57	2.77	175.97	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.11	2.39	73.66	2.32	170.94	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.18	2.32	83.41	2.01	168.04	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.22	2.27	90.88	1.83	166.27	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.29	2.24	94.71	1.73	164.04	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.37	2.20	98.95	1.62	160.64	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.45	2.17	102.56	1.54	157.66	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.48	2.12	107.19	1.45	155.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.56	2.08	109.46	1.39	152.36	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.63	2.06	107.84	1.36	146.97	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.70	2.07	100.03	1.38	138.28	30	2078	0.53	0.132	0.08	11.89	0.03	0.000
32.78	2.12	90.60	1.44	130.66	28	2009	0.53	0.144	0.09	11.89	0.04	0.000
32.82	2.17	81.45	1.55	125.93	28	1968	0.53	0.152	0.10	11.89	0.04	0.000
32.90	2.22	74.51	1.68	124.94	28	1957	0.53	0.155	0.10	11.89	0.04	0.000
32.98	2.27	68.75	1.83	126.07	29	1955	0.53	0.156	0.10	11.89	0.04	0.000
33.02	2.32	65.09	1.98	129.16	31	1972	0.53	0.153	0.09	11.89	0.04	0.000
33.10	2.33	64.08	2.05	131.52	31	1995	0.53	0.149	0.09	11.89	0.03	0.000
33.14	2.34	63.74	2.10	133.55	32	2016	0.53	0.145	0.08	11.89	0.03	0.000
33.21	2.33	65.56	2.03	133.40	32	2033	0.53	0.142	0.08	11.89	0.03	0.000
33.29	2.30	68.15	1.94	132.35	31	2043	0.53	0.141	0.08	11.89	0.03	0.000
33.36	2.27	71.38	1.83	130.59	30	2043	0.53	0.141	0.09	11.89	0.03	0.000
33.40	2.24	74.07	1.73	128.36	29	2026	0.53	0.144	0.09	11.89	0.04	0.000
33.47	2.21	76.63	1.64	125.67	28	1995	0.53	0.151	0.10	11.89	0.04	0.000
33.55	2.17	79.99	1.54	123.56	28	1961	0.53	0.158	0.11	11.89	0.04	0.000
33.62	2.13	83.67	1.47	122.92	27	1935	0.53	0.164	0.11	11.89	0.04	0.000
33.70	2.10	86.55	1.41	122.38	26	1902	0.53	0.173	0.12	11.89	0.05	0.000
33.74	2.05	88.69	1.35	119.83	25	1805	0.53	0.201	0.15	11.89	0.06	0.000
33.82	2.01	88.96	1.31	116.94	24	1711	0.53	0.237	0.19	11.89	0.07	0.001
33.89	1.98	88.36	1.29	114.34	24	1637	0.53	0.274	0.22	11.89	0.09	0.001
33.93	2.00	86.42	1.30	112.75	23	1635	0.53	0.275	0.23	11.89	0.09	0.000
34.00	2.02	82.93	1.32	109.71	23	1624	0.53	0.283	0.24	11.89	0.09	0.001
34.08	2.03	80.22	1.34	107.25	23	1609	0.53	0.292	0.25	11.89	0.10	0.001
34.15	2.04	78.57	1.35	105.72	22	1598	0.53	0.300	0.26	11.89	0.10	0.001
34.22	2.04	78.68	1.34	105.64	22	1596	0.53	0.302	0.26	11.89	0.10	0.001
34.26	2.04	77.70	1.35	104.85	22	1593	0.53	0.304	0.27	11.89	0.10	0.000
34.33	2.07	75.25	1.37	103.29	22	1595	0.53	0.304	0.27	11.89	0.10	0.001
34.41	2.09	72.39	1.41	101.97	22	1603	0.53	0.300	0.27	11.89	0.10	0.001
34.49	2.12	69.93	1.45	101.57	22	1621	0.53	0.290	0.26	11.89	0.10	0.001
34.53	2.15	67.91	1.50	102.11	23	1646	0.53	0.275	0.24	11.89	0.09	0.000
34.61	2.18	66.23	1.56	103.46	23	1680	0.53	0.259	0.22	11.89	0.08	0.001
34.68	2.20	64.94	1.62	105.42	24	1717	0.53	0.242	0.20	11.89	0.07	0.001

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
34.73	2.22	64.25	1.68	107.93	25	1757	0.53	0.226	0.18	11.89	0.07	0.000
34.80	2.24	63.79	1.73	110.60	25	1798	0.53	0.211	0.16	11.89	0.06	0.001
34.87	2.26	63.20	1.79	113.28	26	1837	0.53	0.199	0.14	11.89	0.05	0.000
34.91	2.28	62.46	1.86	116.18	27	1874	0.53	0.188	0.13	11.89	0.05	0.000
34.99	2.30	61.52	1.94	119.16	28	1910	0.53	0.179	0.12	11.89	0.04	0.000
35.07	2.32	60.93	2.00	122.15	29	1947	0.53	0.170	0.11	11.89	0.04	0.000
35.11	2.34	60.44	2.07	125.01	30	1979	0.53	0.163	0.10	11.89	0.04	0.000
35.18	2.35	60.25	2.12	127.91	31	2015	0.53	0.156	0.09	11.89	0.03	0.000
35.27	2.36	60.21	2.17	130.86	32	2052	0.53	0.149	0.09	11.89	0.03	0.000
35.31	2.36	61.46	2.17	133.46	32	2096	0.53	0.141	0.08	11.89	0.03	0.000
35.38	2.34	64.60	2.09	134.96	32	2144	0.53	0.134	0.08	11.89	0.03	0.000
35.46	2.32	68.53	1.98	136.02	32	2191	0.53	0.127	0.07	11.89	0.03	0.000
35.50	2.29	72.78	1.88	136.78	32	2230	0.53	0.122	0.07	11.89	0.02	0.000
35.58	2.28	73.87	1.86	137.57	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.65	2.30	71.61	1.94	138.82	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.73	2.34	67.11	2.09	140.50	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.77	2.38	62.52	2.28	142.57	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.84	2.40	60.13	2.39	143.80	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.92	2.42	58.79	2.46	144.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.99	2.42	58.82	2.47	145.04	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.03	2.42	58.79	2.48	146.06	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.11	2.42	59.39	2.48	147.13	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.18	2.40	61.91	2.37	147.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.26	2.37	66.08	2.20	145.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.30	2.31	73.06	1.95	142.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.37	2.25	80.77	1.75	141.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.44	2.19	88.61	1.59	140.86	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.51	2.15	93.39	1.51	141.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.55	2.14	95.34	1.48	140.86	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.62	2.12	95.94	1.45	139.29	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.70	2.09	97.36	1.41	137.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.78	2.06	99.26	1.37	135.66	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.82	2.04	100.83	1.34	135.33	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.89	2.04	99.04	1.35	133.56	28	2130	0.53	0.142	0.09	11.89	0.03	0.000
36.97	2.06	95.16	1.37	130.52	28	2116	0.53	0.145	0.10	11.89	0.03	0.000
37.01	2.10	89.10	1.42	126.15	27	2090	0.53	0.149	0.10	11.89	0.03	0.000
37.09	2.15	81.04	1.50	121.63	27	2062	0.53	0.155	0.11	11.89	0.04	0.000
37.15	2.17	77.00	1.55	119.16	27	2033	0.53	0.161	0.11	11.89	0.04	0.000
37.23	2.17	76.06	1.55	117.81	26	2013	0.53	0.166	0.12	11.89	0.04	0.000
37.30	2.14	79.60	1.49	118.40	26	2011	0.53	0.167	0.12	11.89	0.04	0.000
37.34	2.13	81.57	1.46	119.18	26	2014	0.53	0.166	0.12	11.89	0.04	0.000
37.41	2.12	82.45	1.45	119.74	26	2022	0.53	0.165	0.12	11.89	0.04	0.000
37.49	2.13	81.58	1.46	119.34	26	2023	0.53	0.165	0.12	11.89	0.04	0.000
37.57	2.14	79.25	1.49	118.24	26	2019	0.53	0.166	0.12	11.89	0.04	0.000
37.60	2.17	75.69	1.54	116.71	26	2008	0.53	0.169	0.12	11.89	0.04	0.000
37.68	2.19	72.26	1.60	115.59	26	1998	0.53	0.171	0.13	11.89	0.04	0.000
37.75	2.22	69.16	1.66	115.09	26	1993	0.53	0.173	0.13	11.89	0.04	0.000
37.83	2.23	67.56	1.71	115.23	26	1996	0.53	0.172	0.12	11.89	0.04	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
37.87	2.24	67.03	1.73	116.27	27	2013	0.53	0.169	0.12	11.89	0.04	0.000
37.95	2.25	66.73	1.77	117.88	27	2040	0.53	0.163	0.11	11.89	0.04	0.000
38.02	2.27	66.41	1.80	119.74	28	2070	0.53	0.157	0.11	11.89	0.03	0.000
38.06	2.28	65.76	1.85	121.88	28	2100	0.53	0.152	0.10	11.89	0.03	0.000
38.14	2.30	64.65	1.92	124.07	29	2128	0.53	0.147	0.09	11.89	0.03	0.000
38.21	2.32	63.25	2.01	126.91	30	2161	0.53	0.142	0.09	11.89	0.03	0.000
38.29	2.34	62.18	2.08	129.40	31	2188	0.53	0.138	0.08	11.89	0.03	0.000
38.33	2.35	61.74	2.14	132.06	32	2220	0.53	0.133	0.08	11.89	0.02	0.000
38.40	2.36	62.04	2.17	134.50	32	2257	0.53	0.128	0.07	11.89	0.02	0.000
38.48	2.36	62.76	2.18	136.76	33	2296	0.53	0.123	0.07	11.89	0.02	0.000
38.52	2.36	64.30	2.16	138.74	33	2337	0.53	0.119	0.06	11.89	0.02	0.000
38.59	2.35	66.61	2.11	140.51	34	2383	0.53	0.114	0.06	11.89	0.02	0.000
38.67	2.33	69.70	2.05	142.56	34	2439	0.53	0.108	0.06	11.89	0.02	0.000
38.75	2.32	72.39	1.99	144.40	34	2488	0.53	0.104	0.05	11.89	0.02	0.000
38.78	2.31	74.60	1.96	146.51	35	2534	0.53	0.100	0.05	11.89	0.02	0.000
38.85	2.31	76.58	1.95	148.98	35	2585	0.53	0.096	0.05	11.89	0.01	0.000
38.93	2.30	79.47	1.91	151.69	36	2646	0.53	0.091	0.05	11.89	0.01	0.000
39.00	2.28	82.84	1.86	153.87	36	2700	0.53	0.088	0.04	11.89	0.01	0.000
39.05	2.26	87.76	1.78	155.79	36	2753	0.53	0.085	0.04	11.89	0.01	0.000
39.13	2.23	93.33	1.69	157.91	36	2806	0.53	0.082	0.04	11.89	0.01	0.000
39.20	2.20	99.16	1.62	160.90	36	2864	0.52	0.079	0.04	11.89	0.01	0.000
39.27	2.19	103.20	1.58	163.49	37	2910	0.52	0.076	0.04	11.89	0.01	0.000
39.31	2.18	106.59	1.56	165.84	37	2949	0.52	0.075	0.04	11.89	0.01	0.000
39.38	2.16	110.81	1.51	167.86	37	2975	0.52	0.074	0.03	11.89	0.01	0.000
39.46	2.12	117.88	1.45	171.29	37	3003	0.52	0.072	0.03	11.89	0.01	0.000
39.53	2.09	125.41	1.40	175.62	38	3026	0.52	0.072	0.03	11.89	0.01	0.000
39.57	2.05	134.19	1.36	181.98	39	3058	0.52	0.070	0.03	11.89	0.01	0.000
39.65	2.02	141.88	1.32	187.80	39	3075	0.52	0.070	0.03	11.89	0.01	0.000
39.72	1.98	150.08	1.29	193.47	40	3045	0.52	0.071	0.03	11.89	0.01	0.000
39.79	1.95	155.54	1.27	197.22	40	3012	0.52	0.073	0.03	11.89	0.01	0.000
39.83	1.92	159.58	1.25	199.95	40	2981	0.52	0.074	0.03	11.89	0.01	0.000
39.91	1.91	162.11	1.25	201.94	41	2979	0.52	0.074	0.03	11.89	0.01	0.000
39.99	1.90	163.93	1.24	202.53	41	2943	0.52	0.076	0.03	11.89	0.01	0.000
40.06	1.90	160.41	1.24	198.12	40	2880	0.52	0.079	0.03	11.89	0.01	0.000
40.11	1.89	158.90	1.23	195.36	39	2818	0.52	0.083	0.04	11.89	0.01	0.000
40.18	1.88	157.80	1.22	193.02	38	2761	0.52	0.086	0.04	11.89	0.01	0.000
40.25	1.86	162.17	1.21	195.53	39	2734	0.52	0.088	0.04	11.89	0.01	0.000
40.32	1.84	166.78	1.19	198.38	39	2728	0.52	0.089	0.04	11.89	0.01	0.000
40.39	1.82	172.82	1.17	202.15	39	2736	0.52	0.088	0.04	11.89	0.01	0.000
40.43	1.78	182.45	1.13	206.33	40	2735	0.52	0.088	0.04	11.89	0.01	0.000
40.50	1.75	191.06	1.08	207.12	39	2723	0.52	0.089	0.04	11.89	0.01	0.000
40.58	1.73	196.61	1.04	205.26	39	2706	0.52	0.090	0.04	11.89	0.01	0.000
40.62	1.73	192.36	1.06	203.17	38	2677	0.52	0.093	0.04	11.89	0.01	0.000
40.69	1.77	178.83	1.11	198.25	38	2622	0.52	0.097	0.04	11.89	0.01	0.000
40.76	1.81	160.22	1.17	186.67	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.83	1.87	140.60	1.21	170.46	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.90	1.93	122.52	1.25	153.70	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.98	1.99	108.80	1.30	141.10	0	0	0.52	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
41.01	2.05	97.59	1.36	132.46	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.09	2.11	88.95	1.44	128.03	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.16	2.19	80.33	1.58	126.93	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.24	2.25	74.23	1.75	129.99	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.31	2.30	70.38	1.92	134.88	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.35	2.33	67.97	2.06	140.26	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.42	2.37	66.06	2.20	145.36	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.50	2.39	64.48	2.34	150.91	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.56	2.41	63.38	2.45	155.33	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.60	2.43	62.75	2.54	159.42	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.68	2.45	62.45	2.63	164.18	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.75	2.46	63.00	2.70	170.35	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.82	2.46	64.82	2.74	177.49	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.89	2.47	67.73	2.77	187.27	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.96	2.47	70.80	2.78	196.80	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.00	2.47	74.51	2.78	206.86	53	3491	0.52	0.058	0.02	11.89	0.00	0.000
42.07	2.46	78.54	2.73	214.68	54	3644	0.52	0.055	0.02	11.89	0.00	0.000
42.15	2.45	83.92	2.65	222.64	56	3818	0.52	0.051	0.01	11.89	0.00	0.000
42.22	2.43	89.16	2.56	228.04	57	3957	0.52	0.048	0.01	11.89	0.00	0.000
42.26	2.42	94.61	2.45	232.22	58	4078	0.52	0.046	0.01	11.89	0.00	0.000
42.32	2.40	99.51	2.37	235.65	58	4184	0.52	0.044	0.01	11.89	0.00	0.000
42.40	2.39	103.41	2.31	239.08	58	4278	0.52	0.043	0.01	11.89	0.00	0.000
42.47	2.40	102.69	2.36	242.46	60	4321	0.52	0.042	0.01	11.89	0.00	0.000
42.55	2.42	98.32	2.49	244.60	61	4305	0.52	0.043	0.01	11.89	0.00	0.000
42.62	2.43	93.93	2.56	240.89	60	4210	0.51	0.044	0.01	11.89	0.00	0.000
42.66	2.41	93.08	2.42	225.41	56	4005	0.51	0.048	0.01	11.89	0.00	0.000
42.73	2.35	96.97	2.14	207.51	50	3807	0.51	0.051	0.02	11.89	0.00	0.000
42.80	2.29	103.17	1.88	193.45	45	3645	0.51	0.055	0.02	11.89	0.01	0.000
42.88	2.23	110.54	1.70	188.16	43	3583	0.51	0.057	0.02	11.89	0.01	0.000
42.95	2.19	115.62	1.59	183.98	41	3502	0.51	0.059	0.02	11.89	0.01	0.000
42.99	2.15	119.52	1.51	179.99	40	3396	0.51	0.062	0.03	11.89	0.01	0.000
43.07	2.12	120.89	1.45	175.52	38	3275	0.51	0.066	0.03	11.89	0.01	0.000
43.14	2.10	121.28	1.41	171.21	37	3152	0.51	0.071	0.03	11.89	0.01	0.000
43.18	2.09	118.16	1.41	166.57	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.26	2.11	113.69	1.43	163.09	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.33	2.14	108.57	1.49	161.29	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.41	2.17	104.95	1.54	161.86	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.45	2.20	101.29	1.62	164.54	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.53	2.24	97.88	1.72	167.89	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.57	2.29	92.13	1.89	174.46	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.64	2.36	84.72	2.18	185.10	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.72	2.45	76.11	2.65	201.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.79	2.53	68.96	3.17	218.34	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.87	2.58	64.40	3.58	230.60	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.91	2.62	60.63	3.97	240.39	0	0	0.51	0.000	0.00	0.00	0.00	0.000
43.98	2.67	57.00	4.36	248.54	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.05	2.71	53.15	4.81	255.62	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.13	2.74	50.94	5.09	259.08	0	0	0.51	0.000	0.00	0.00	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
44.17	2.74	50.14	5.17	259.07	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.24	2.74	50.18	5.11	256.19	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.32	2.73	49.84	5.08	253.12	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.40	2.73	49.49	5.07	250.72	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.44	2.73	49.39	5.06	250.14	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.51	2.73	50.02	4.98	249.12	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.58	2.71	51.15	4.85	247.84	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.66	2.70	52.43	4.70	246.45	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.69	2.69	53.29	4.61	245.89	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.77	2.70	52.26	4.73	247.10	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.85	2.72	50.95	4.88	248.58	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.89	2.73	50.11	4.99	249.85	0	0	0.51	0.000	0.00	0.00	0.00	0.000
44.96	2.72	51.06	4.87	248.59	0	0	0.51	0.000	0.00	0.00	0.00	0.000
45.03	2.70	52.18	4.72	246.41	0	0	0.51	0.000	0.00	0.00	0.00	0.000
45.08	2.69	52.84	4.62	244.40	0	0	0.51	0.000	0.00	0.00	0.00	0.000
45.15	2.69	53.03	4.57	242.39	0	0	0.51	0.000	0.00	0.00	0.00	0.000
45.23	2.68	53.28	4.50	239.83	0	0	0.51	0.000	0.00	0.00	0.00	0.000
45.30	2.67	53.73	4.37	234.82	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.38	2.65	54.16	4.23	229.20	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.42	2.64	54.42	4.09	222.62	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.50	2.62	54.81	3.94	215.89	0	0	0.50	0.000	0.00	0.00	0.00	0.000
45.56	2.60	55.64	3.72	207.14	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.64	2.57	56.61	3.49	197.31	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.68	2.52	58.32	3.11	181.48	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.75	2.47	60.55	2.75	166.66	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.83	2.41	63.15	2.44	154.10	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.87	2.37	66.11	2.22	146.88	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.95	2.33	68.82	2.03	139.81	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.02	2.28	71.42	1.87	133.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.09	2.24	74.81	1.72	129.04	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.16	2.20	78.05	1.62	126.68	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.20	2.17	82.31	1.53	126.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.28	2.14	85.93	1.48	127.48	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.36	2.11	90.60	1.44	130.42	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.43	2.10	94.84	1.41	134.10	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.47	2.09	99.13	1.40	139.21	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.54	2.09	103.64	1.40	145.04	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.62	2.08	108.80	1.39	151.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.69	2.07	113.34	1.38	156.29	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.73	2.06	118.03	1.36	160.86	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.80	2.04	121.81	1.35	164.35	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.88	2.04	124.71	1.34	167.06	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.92	2.03	126.11	1.34	168.54	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.99	2.03	127.28	1.34	170.24	36	3171	0.50	0.073	0.04	11.89	0.01	0.000
47.06	2.03	129.23	1.34	172.55	36	3210	0.50	0.072	0.04	11.89	0.01	0.000
47.14	2.03	130.97	1.33	174.54	37	3243	0.50	0.071	0.03	11.89	0.01	0.000
47.18	2.02	132.90	1.33	176.42	37	3263	0.50	0.070	0.03	11.89	0.01	0.000
47.25	2.02	133.97	1.33	177.78	37	3290	0.50	0.069	0.03	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.33	2.02	134.93	1.33	179.14	38	3321	0.50	0.068	0.03	11.89	0.01	0.000
47.41	2.02	135.37	1.33	179.90	38	3343	0.50	0.067	0.03	11.89	0.01	0.000
47.45	2.02	136.44	1.33	180.99	38	3357	0.50	0.067	0.03	11.89	0.01	0.000
47.51	2.01	138.68	1.32	182.93	38	3369	0.50	0.066	0.03	11.89	0.01	0.000
47.59	2.00	141.58	1.31	185.52	39	3386	0.50	0.066	0.03	11.89	0.01	0.000
47.66	2.00	144.46	1.30	188.41	39	3416	0.50	0.065	0.03	11.89	0.01	0.000
47.74	1.99	146.43	1.30	190.59	40	3447	0.49	0.064	0.03	11.89	0.00	0.000
47.78	1.99	148.47	1.30	192.85	40	3477	0.49	0.063	0.03	11.89	0.00	0.000
47.85	1.99	149.93	1.30	194.26	40	3490	0.49	0.063	0.03	11.89	0.00	0.000
47.93	1.98	151.80	1.29	195.94	40	3499	0.49	0.063	0.03	11.89	0.00	0.000
48.00	1.97	153.31	1.29	197.23	41	3504	0.49	0.062	0.03	11.89	0.00	0.000
48.03	1.96	156.52	1.28	199.96	41	3505	0.49	0.062	0.03	11.89	0.00	0.000
48.12	1.95	160.11	1.27	203.19	41	3516	0.49	0.062	0.03	11.89	0.00	0.000
48.19	2.06	107.70	1.36	146.96	31	4120	0.49	0.049	0.03	11.89	0.00	0.000
48.27	2.05	108.91	1.36	147.61	31	4130	0.49	0.048	0.03	11.89	0.00	0.000
48.31	2.04	110.02	1.34	147.62	31	4109	0.49	0.049	0.03	11.89	0.00	0.000
48.38	2.02	111.85	1.32	148.16	31	4091	0.49	0.049	0.03	11.89	0.00	0.000
48.45	2.00	115.42	1.30	150.59	31	4107	0.49	0.049	0.03	11.89	0.00	0.000
48.52	1.98	119.54	1.29	154.07	32	4152	0.49	0.048	0.03	11.89	0.00	0.000
48.56	1.96	123.86	1.28	158.15	32	4216	0.49	0.047	0.03	11.89	0.00	0.000
48.63	1.94	127.08	1.27	160.78	33	4239	0.49	0.047	0.03	11.89	0.00	0.000
48.70	1.92	129.18	1.25	161.68	33	4205	0.49	0.047	0.03	11.89	0.00	0.000
48.78	1.91	129.77	1.24	161.52	33	4175	0.49	0.048	0.03	11.89	0.00	0.000
48.86	1.91	129.11	1.24	160.69	32	4160	0.49	0.048	0.03	11.89	0.00	0.000
48.89	1.92	128.48	1.25	160.68	32	4192	0.49	0.048	0.03	11.89	0.00	0.000
48.97	1.92	127.56	1.25	159.87	32	4190	0.49	0.048	0.03	11.89	0.00	0.000
49.04	1.93	127.35	1.25	159.69	32	4195	0.49	0.048	0.03	11.89	0.00	0.000
49.09	1.93	127.57	1.26	160.15	32	4217	0.49	0.047	0.03	11.89	0.00	0.000
49.18	1.92	128.69	1.25	161.28	33	4246	0.49	0.047	0.03	11.89	0.00	0.000
49.22	1.91	130.46	1.25	162.62	33	4253	0.49	0.047	0.03	11.89	0.00	0.000
49.29	1.90	132.14	1.24	163.21	33	4221	0.49	0.047	0.03	11.89	0.00	0.000
49.36	1.88	133.89	1.22	163.86	33	4194	0.49	0.048	0.03	11.89	0.00	0.000
49.43	1.87	134.77	1.22	163.76	32	4164	0.49	0.048	0.03	11.89	0.00	0.000
49.51	1.86	134.82	1.21	163.13	32	4136	0.49	0.049	0.03	11.89	0.00	0.000
49.55	1.85	134.86	1.20	162.06	32	4085	0.49	0.050	0.03	11.89	0.00	0.000
49.62	1.85	132.86	1.20	158.98	31	4000	0.49	0.051	0.03	11.89	0.00	0.000
49.70	1.85	127.91	1.20	153.90	30	3896	0.49	0.053	0.03	11.89	0.00	0.000
49.77	1.88	120.98	1.22	147.78	29	3807	0.49	0.055	0.03	11.89	0.00	0.000
49.81	1.93	112.48	1.26	141.49	29	3795	0.49	0.056	0.04	11.89	0.01	0.000
49.88	2.00	104.22	1.31	136.01	28	3826	0.49	0.055	0.04	11.89	0.01	0.000
49.95	2.10	92.60	1.41	130.82	28	3857	0.48	0.054	0.04	11.89	0.00	0.000
50.04	2.17	84.59	1.54	130.15	29	3863	0.48	0.054	0.03	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)

Total estimated settlement: 0.15

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
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

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1548 N. Maple Street
Corona, CA 92878
951-710-1160, www.geotekusa.com

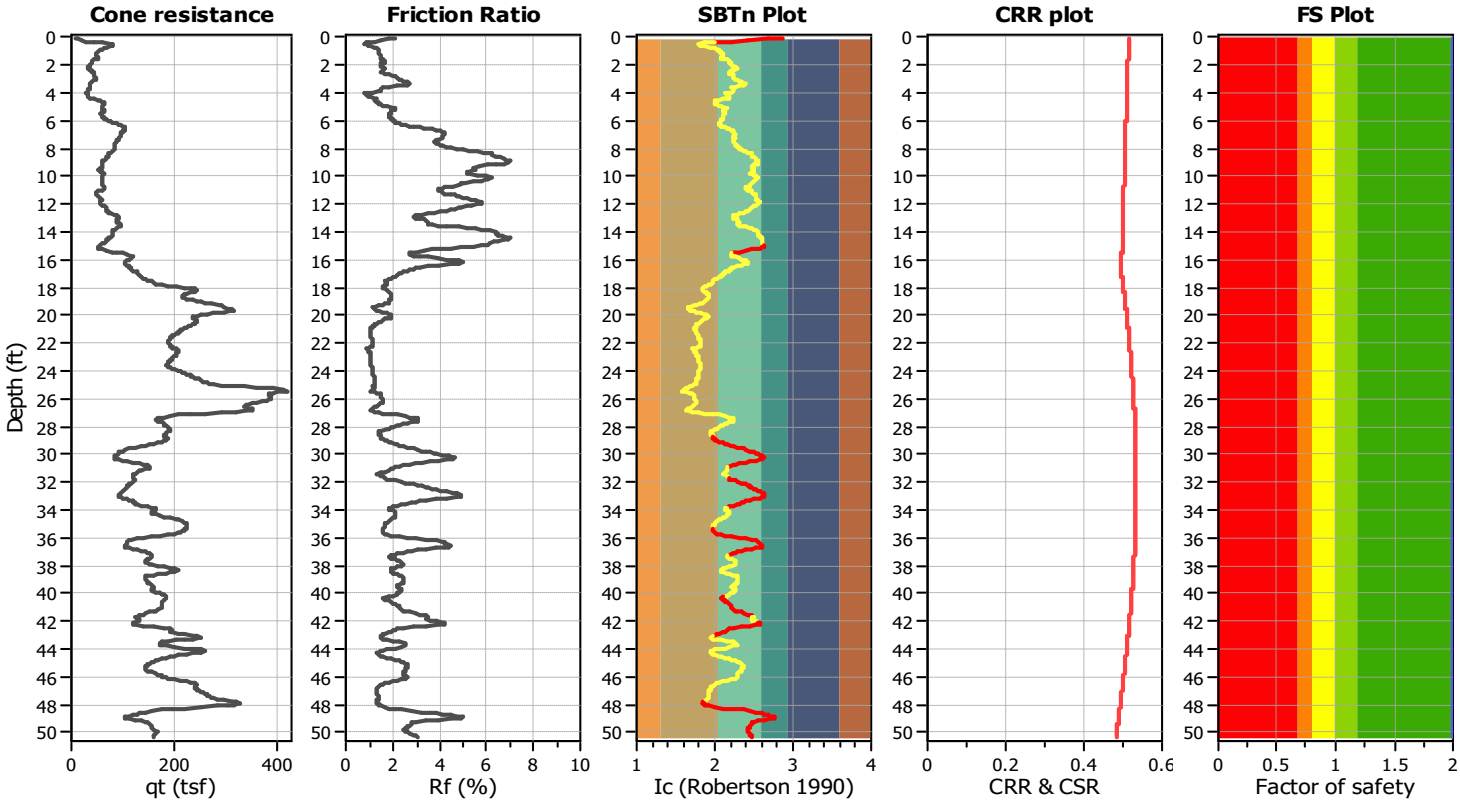
LIQUEFACTION ANALYSIS REPORT

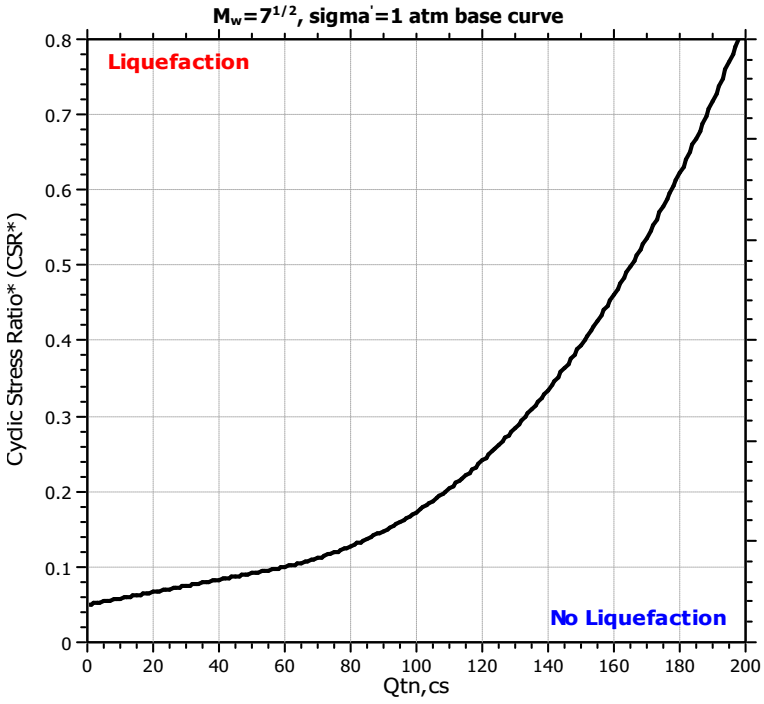
Project title : Xenia Site **Location : Beaumont, California**

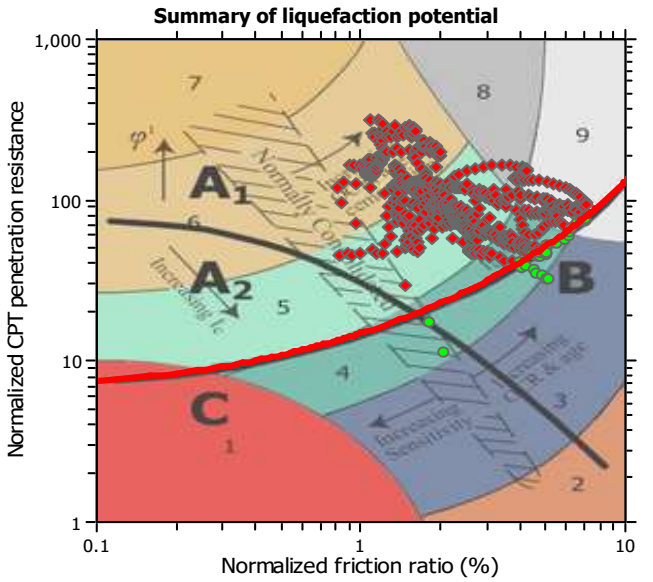
CPT file : CPT-3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	100.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	100.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.13	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.90	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

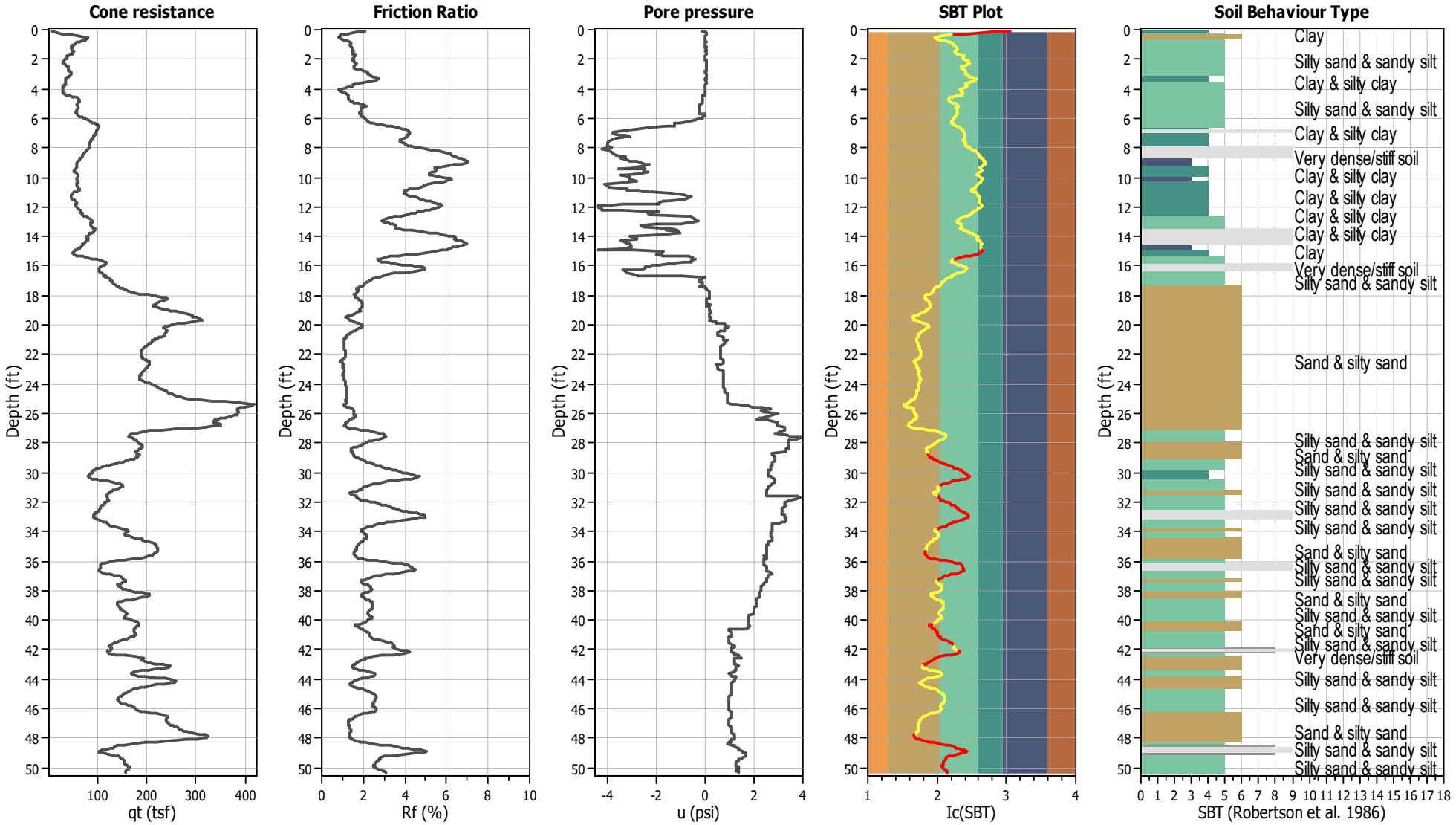






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



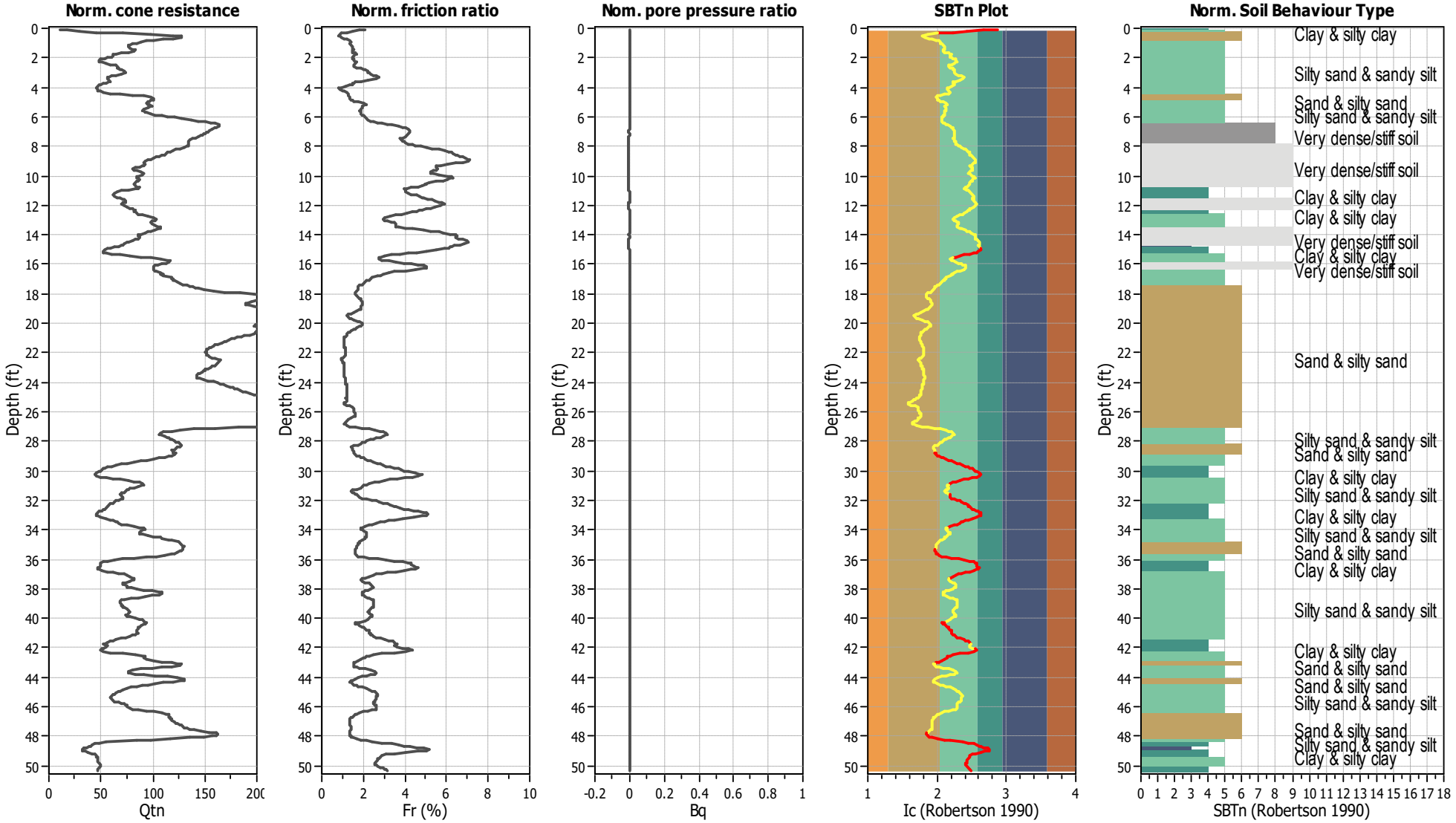
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



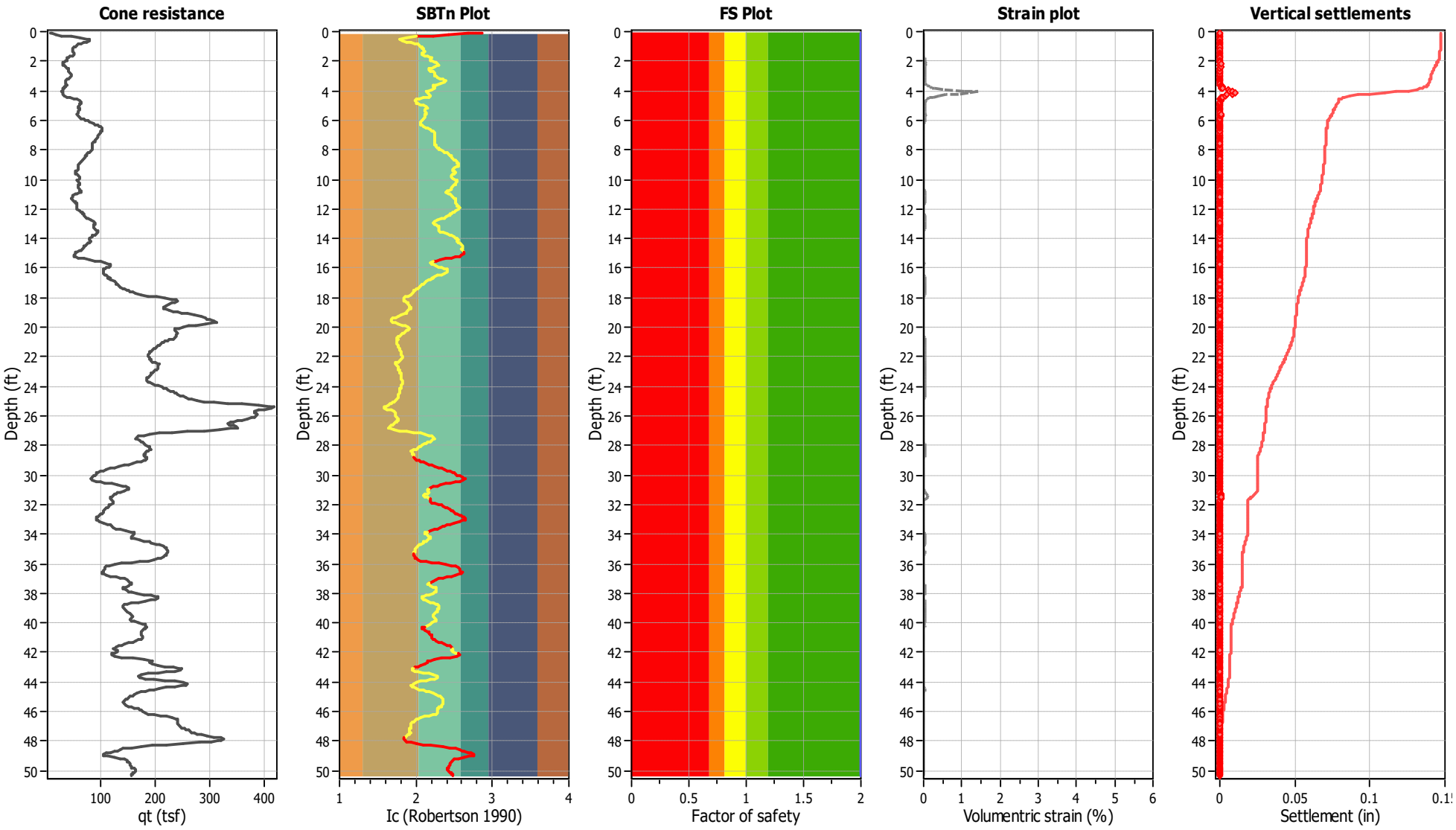
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.10	2.87	11.24	6.71	75.46	0	0	0.51	0.000	0.00	0.00	0.00	0.000
0.14	2.68	17.24	4.51	77.67	0	0	0.51	0.000	0.00	0.00	0.00	0.000
0.22	2.43	29.49	2.56	75.54	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.30	2.22	46.28	1.67	77.51	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.34	2.01	71.67	1.32	94.42	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.42	1.87	97.41	1.22	118.59	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.49	1.79	119.61	1.15	137.03	26	649	0.51	0.003	0.00	11.89	0.00	0.000
0.56	1.78	128.05	1.13	145.21	28	687	0.51	0.004	0.00	11.89	0.00	0.000
0.60	1.82	127.20	1.17	148.97	29	711	0.51	0.004	0.00	11.89	0.00	0.000
0.68	1.88	119.04	1.22	145.28	29	717	0.51	0.004	0.00	11.89	0.00	0.000
0.76	1.94	110.08	1.26	138.72	28	715	0.51	0.005	0.00	11.89	0.00	0.000
0.79	1.99	100.83	1.30	131.03	27	702	0.51	0.005	0.00	11.89	0.00	0.000
0.87	2.02	94.62	1.32	125.25	26	683	0.51	0.006	0.00	11.89	0.00	0.000
0.96	2.04	88.86	1.35	119.61	25	661	0.51	0.008	0.01	11.89	0.01	0.000
1.00	2.05	84.26	1.36	114.57	24	636	0.51	0.009	0.01	11.89	0.01	0.000
1.08	2.07	80.65	1.38	111.20	24	622	0.51	0.010	0.01	11.89	0.01	0.000
1.15	2.09	77.90	1.40	109.04	23	613	0.51	0.011	0.01	11.89	0.01	0.000
1.19	2.10	76.99	1.41	108.85	24	613	0.51	0.012	0.01	11.89	0.01	0.000
1.26	2.11	76.99	1.43	109.93	24	621	0.51	0.013	0.01	11.89	0.01	0.000
1.34	2.11	78.23	1.43	111.83	24	632	0.51	0.013	0.01	11.89	0.01	0.000
1.42	2.10	80.37	1.42	114.05	25	643	0.51	0.014	0.01	11.89	0.01	0.000
1.45	2.08	82.87	1.39	115.50	25	648	0.51	0.014	0.01	11.89	0.01	0.000
1.53	2.09	81.61	1.40	114.08	25	641	0.51	0.016	0.01	11.89	0.01	0.000
1.61	2.11	77.15	1.43	110.62	24	625	0.51	0.018	0.01	11.89	0.01	0.000
1.65	2.16	69.85	1.52	106.46	24	603	0.51	0.021	0.02	11.89	0.01	0.000
1.72	2.19	64.84	1.60	103.73	23	585	0.51	0.024	0.02	11.89	0.02	0.000
1.81	2.21	62.19	1.63	101.42	23	570	0.51	0.028	0.02	11.89	0.02	0.000
1.85	2.19	61.63	1.60	98.42	22	555	0.51	0.032	0.03	11.89	0.02	0.000
1.92	2.19	60.08	1.60	95.83	22	540	0.51	0.037	0.03	11.89	0.03	0.000
1.99	2.21	56.57	1.64	92.70	21	520	0.51	0.045	0.04	11.89	0.04	0.000
2.07	2.24	53.06	1.71	90.75	21	504	0.51	0.054	0.05	11.89	0.04	0.000
2.10	2.26	50.00	1.79	89.61	21	491	0.51	0.061	0.06	11.89	0.05	0.000
2.19	2.28	48.90	1.84	89.74	21	489	0.51	0.067	0.06	11.89	0.06	0.001
2.26	2.29	48.59	1.89	91.66	21	494	0.51	0.069	0.06	11.89	0.05	0.000
2.30	2.28	50.54	1.85	93.33	22	507	0.51	0.065	0.06	11.89	0.05	0.000
2.38	2.25	54.38	1.75	95.10	22	525	0.51	0.061	0.06	11.89	0.05	0.000
2.46	2.21	59.12	1.63	96.64	22	543	0.51	0.058	0.05	11.89	0.05	0.000
2.50	2.18	63.77	1.56	99.44	22	562	0.51	0.053	0.05	11.89	0.04	0.000
2.57	2.18	65.62	1.56	102.46	23	579	0.51	0.051	0.04	11.89	0.04	0.000
2.65	2.20	66.56	1.60	106.81	24	602	0.51	0.048	0.04	11.89	0.03	0.000
2.72	2.22	66.35	1.68	111.28	25	621	0.51	0.045	0.03	11.89	0.03	0.000
2.76	2.24	67.80	1.72	116.45	27	646	0.51	0.041	0.03	11.89	0.03	0.000
2.83	2.24	69.94	1.73	121.01	28	670	0.51	0.039	0.03	11.89	0.02	0.000
2.91	2.24	72.48	1.73	125.56	29	695	0.51	0.037	0.02	11.89	0.02	0.000
2.98	2.24	74.37	1.73	128.47	29	712	0.51	0.036	0.02	11.89	0.02	0.000
3.02	2.25	73.51	1.76	129.67	30	714	0.51	0.037	0.02	11.89	0.02	0.000
3.09	2.28	70.11	1.84	129.24	30	703	0.51	0.040	0.02	11.89	0.02	0.000
3.17	2.31	65.06	1.97	128.30	30	681	0.51	0.046	0.03	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
3.24	2.35	60.30	2.14	129.16	31	664	0.51	0.052	0.03	11.89	0.03	0.000
3.32	2.38	57.44	2.28	130.68	32	656	0.51	0.056	0.03	11.89	0.03	0.000
3.36	2.39	56.08	2.34	131.28	32	651	0.51	0.059	0.03	11.89	0.03	0.000
3.43	2.37	56.07	2.25	125.93	31	635	0.51	0.067	0.04	11.89	0.03	0.000
3.50	2.32	57.27	2.00	114.79	27	606	0.51	0.082	0.06	11.89	0.05	0.000
3.58	2.26	58.57	1.79	104.57	24	574	0.51	0.106	0.08	11.89	0.07	0.001
3.61	2.22	57.92	1.67	96.90	22	541	0.51	0.138	0.12	11.89	0.10	0.000
3.70	2.23	55.20	1.68	92.87	21	518	0.51	0.176	0.16	11.89	0.14	0.001
3.77	2.24	51.70	1.73	89.54	21	496	0.51	0.227	0.22	11.89	0.19	0.002
3.84	2.25	50.19	1.75	87.86	20	485	0.51	0.264	0.26	11.89	0.22	0.002
3.88	2.24	48.59	1.73	83.86	19	465	0.51	0.336	0.35	11.89	0.30	0.001
3.96	2.21	46.88	1.63	76.28	17	429	0.51	0.554	0.66	11.89	0.56	0.006
4.03	2.16	46.00	1.52	70.01	16	397	0.51	0.924	1.25	11.89	1.05	0.009
4.07	2.14	45.40	1.49	67.57	15	383	0.51	1.189	1.70	11.89	1.42	0.007
4.15	2.15	46.35	1.51	69.83	15	396	0.51	1.017	1.39	11.89	1.16	0.010
4.22	2.17	47.17	1.54	72.64	16	411	0.51	0.844	1.09	11.89	0.91	0.008
4.29	2.18	49.71	1.56	77.49	17	438	0.51	0.606	0.72	11.89	0.60	0.005
4.36	2.18	52.80	1.57	82.94	19	469	0.51	0.437	0.48	11.89	0.40	0.004
4.41	2.16	58.69	1.53	89.63	20	508	0.51	0.295	0.30	11.89	0.25	0.001
4.48	2.11	68.63	1.43	97.93	21	553	0.51	0.205	0.19	11.89	0.16	0.001
4.56	2.05	79.98	1.35	108.24	23	600	0.51	0.150	0.13	11.89	0.11	0.001
4.60	2.01	90.67	1.32	119.26	25	647	0.51	0.113	0.09	11.89	0.07	0.000
4.68	2.00	97.37	1.30	126.96	26	683	0.51	0.095	0.07	11.89	0.06	0.001
4.75	2.00	100.61	1.31	131.46	27	709	0.51	0.087	0.06	11.89	0.05	0.000
4.82	2.01	100.30	1.32	131.97	28	716	0.51	0.086	0.06	11.89	0.05	0.000
4.86	2.03	98.65	1.33	131.16	28	718	0.51	0.087	0.06	11.89	0.05	0.000
4.93	2.05	96.74	1.36	131.30	28	729	0.51	0.085	0.06	11.89	0.05	0.000
5.02	2.09	95.49	1.41	134.30	29	756	0.51	0.078	0.05	11.89	0.04	0.000
5.09	2.13	94.48	1.47	138.87	30	787	0.51	0.070	0.04	11.89	0.03	0.000
5.13	2.15	95.17	1.50	143.01	32	811	0.51	0.065	0.04	11.89	0.03	0.000
5.20	2.14	96.82	1.48	143.39	32	813	0.51	0.066	0.04	11.89	0.03	0.000
5.28	2.12	98.80	1.44	142.56	31	806	0.51	0.070	0.04	11.89	0.03	0.000
5.32	2.11	97.95	1.43	140.16	30	792	0.51	0.075	0.05	11.89	0.04	0.000
5.40	2.12	94.64	1.45	137.06	30	776	0.51	0.083	0.05	11.89	0.04	0.000
5.47	2.13	91.29	1.47	133.76	29	758	0.51	0.092	0.06	11.89	0.05	0.000
5.55	2.13	89.98	1.46	131.42	29	744	0.51	0.101	0.07	11.89	0.05	0.001
5.59	2.12	90.92	1.44	131.19	29	742	0.51	0.104	0.07	11.89	0.06	0.000
5.66	2.12	91.97	1.44	132.77	29	751	0.51	0.102	0.07	11.89	0.05	0.000
5.74	2.11	94.11	1.44	135.50	29	766	0.51	0.098	0.06	11.89	0.05	0.000
5.78	2.11	97.41	1.43	139.57	30	789	0.51	0.090	0.05	11.89	0.04	0.000
5.85	2.10	102.35	1.42	145.23	31	819	0.51	0.081	0.05	11.89	0.04	0.000
5.93	2.09	108.79	1.41	152.89	33	860	0.51	0.072	0.04	11.89	0.03	0.000
6.01	2.08	114.58	1.40	159.97	34	898	0.51	0.064	0.03	11.89	0.03	0.000
6.04	2.07	121.28	1.38	167.57	36	938	0.51	0.058	0.03	11.89	0.02	0.000
6.12	2.07	128.07	1.37	175.78	38	981	0.51	0.052	0.02	11.89	0.02	0.000
6.19	2.06	136.76	1.37	187.10	40	1043	0.51	0.045	0.02	11.89	0.02	0.000
6.27	2.06	144.04	1.37	197.42	42	1101	0.51	0.041	0.02	11.89	0.01	0.000
6.31	2.07	150.43	1.38	207.89	45	1163	0.51	0.036	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
6.39	2.09	155.72	1.40	218.47	47	1229	0.51	0.033	0.01	11.89	0.01	0.000
6.46	2.11	160.11	1.43	228.78	50	1292	0.51	0.030	0.01	11.89	0.01	0.000
6.50	2.13	163.15	1.46	238.83	52	1353	0.51	0.028	0.01	11.89	0.01	0.000
6.57	2.15	163.89	1.51	247.61	55	1404	0.51	0.026	0.01	11.89	0.01	0.000
6.65	2.18	163.17	1.57	256.94	58	1452	0.51	0.025	0.01	11.89	0.01	0.000
6.72	2.21	161.55	1.63	263.69	60	1481	0.51	0.025	0.01	11.89	0.01	0.000
6.77	2.22	159.39	1.68	267.59	61	1494	0.51	0.025	0.01	11.89	0.01	0.000
6.84	2.24	157.12	1.71	269.02	62	1494	0.51	0.025	0.01	11.89	0.01	0.000
6.92	2.25	154.61	1.74	269.01	62	1488	0.51	0.026	0.01	11.89	0.01	0.000
6.99	2.25	152.65	1.75	267.84	62	1478	0.51	0.026	0.01	11.89	0.01	0.000
7.03	2.25	151.30	1.76	265.64	61	1466	0.51	0.027	0.01	11.89	0.01	0.000
7.10	2.25	150.49	1.75	263.38	61	1454	0.51	0.028	0.01	11.89	0.01	0.000
7.18	2.25	149.24	1.75	260.81	60	1441	0.51	0.029	0.01	11.89	0.01	0.000
7.25	2.25	148.04	1.75	258.89	60	1430	0.51	0.030	0.01	11.89	0.01	0.000
7.29	2.25	146.08	1.76	256.62	59	1416	0.51	0.030	0.01	11.89	0.01	0.000
7.37	2.25	143.46	1.74	249.99	57	1382	0.51	0.032	0.01	11.89	0.01	0.000
7.45	2.24	140.55	1.72	242.14	56	1343	0.51	0.035	0.01	11.89	0.01	0.000
7.49	2.24	137.84	1.71	235.83	54	1310	0.51	0.037	0.01	11.89	0.01	0.000
7.57	2.24	136.03	1.73	235.36	54	1304	0.51	0.038	0.01	11.89	0.01	0.000
7.64	2.25	134.63	1.76	236.92	55	1306	0.51	0.039	0.01	11.89	0.01	0.000
7.68	2.26	133.92	1.78	238.98	55	1312	0.51	0.038	0.01	11.89	0.01	0.000
7.75	2.27	133.56	1.81	242.34	56	1324	0.51	0.038	0.01	11.89	0.01	0.000
7.82	2.28	134.20	1.84	247.42	58	1345	0.51	0.038	0.01	11.89	0.01	0.000
7.90	2.29	134.55	1.89	254.16	60	1370	0.51	0.037	0.01	11.89	0.01	0.000
7.97	2.30	134.54	1.94	260.70	61	1393	0.51	0.036	0.01	11.89	0.01	0.000
8.01	2.33	132.64	2.03	268.86	64	1413	0.51	0.035	0.01	11.89	0.01	0.000
8.09	2.35	129.78	2.14	277.91	67	1430	0.51	0.035	0.01	11.89	0.01	0.000
8.17	2.38	126.52	2.27	287.13	70	1443	0.51	0.035	0.01	11.89	0.01	0.000
8.21	2.41	122.72	2.41	295.59	73	1448	0.51	0.035	0.01	11.89	0.01	0.000
8.29	2.43	119.21	2.54	302.49	75	1449	0.51	0.035	0.01	11.89	0.01	0.000
8.37	2.45	116.30	2.65	308.28	78	1448	0.51	0.036	0.01	11.89	0.01	0.000
8.40	2.46	114.35	2.72	311.11	79	1445	0.51	0.036	0.01	11.89	0.01	0.000
8.48	2.47	112.85	2.77	312.19	79	1439	0.51	0.037	0.01	11.89	0.01	0.000
8.55	2.48	110.79	2.83	313.64	80	1431	0.50	0.038	0.01	11.89	0.01	0.000
8.63	2.49	109.08	2.89	315.12	81	1425	0.50	0.039	0.01	11.89	0.01	0.000
8.67	2.50	106.53	2.98	317.34	82	1415	0.50	0.040	0.01	11.89	0.01	0.000
8.74	2.52	103.52	3.08	319.25	83	1401	0.50	0.041	0.01	11.89	0.01	0.000
8.82	2.53	100.37	3.20	320.99	84	1386	0.50	0.043	0.01	11.89	0.01	0.000
8.86	2.54	97.57	3.30	321.79	85	1370	0.50	0.044	0.01	11.89	0.01	0.000
8.93	2.55	95.07	3.36	319.84	85	1350	0.50	0.046	0.01	11.89	0.01	0.000
9.01	2.56	92.56	3.39	313.64	83	1319	0.50	0.049	0.01	11.89	0.01	0.000
9.09	2.55	91.46	3.33	304.24	80	1290	0.50	0.053	0.01	11.89	0.01	0.000
9.13	2.53	91.80	3.18	291.98	76	1264	0.50	0.056	0.01	11.89	0.01	0.000
9.20	2.50	92.75	3.01	279.00	72	1239	0.50	0.060	0.01	11.89	0.01	0.000
9.28	2.49	91.72	2.89	264.85	68	1212	0.50	0.064	0.01	11.89	0.01	0.000
9.35	2.48	89.84	2.84	255.20	65	1187	0.50	0.069	0.02	11.89	0.01	0.000
9.39	2.49	86.78	2.89	250.65	64	1159	0.50	0.074	0.02	11.89	0.01	0.000
9.46	2.50	83.42	2.98	248.56	64	1137	0.50	0.079	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
9.55	2.51	80.78	3.06	246.91	64	1122	0.50	0.083	0.02	11.89	0.02	0.000
9.58	2.51	81.28	3.02	245.41	63	1127	0.50	0.083	0.02	11.89	0.02	0.000
9.66	2.49	84.20	2.89	243.42	62	1152	0.50	0.079	0.02	11.89	0.02	0.000
9.73	2.47	88.24	2.76	243.25	62	1190	0.50	0.073	0.02	11.89	0.01	0.000
9.81	2.46	91.06	2.69	245.02	62	1223	0.50	0.069	0.02	11.89	0.01	0.000
9.85	2.46	91.68	2.74	251.10	64	1245	0.50	0.066	0.02	11.89	0.01	0.000
9.93	2.49	89.39	2.91	259.79	67	1256	0.50	0.066	0.02	11.89	0.01	0.000
10.00	2.52	86.37	3.12	269.06	70	1261	0.50	0.066	0.01	11.89	0.01	0.000
10.04	2.54	84.38	3.27	275.62	72	1263	0.50	0.066	0.01	11.89	0.01	0.000
10.11	2.54	84.39	3.27	276.10	73	1272	0.50	0.066	0.01	11.89	0.01	0.000
10.19	2.53	85.61	3.19	273.32	71	1285	0.50	0.065	0.01	11.89	0.01	0.000
10.26	2.52	86.60	3.12	270.09	70	1294	0.50	0.065	0.01	11.89	0.01	0.000
10.34	2.51	86.33	3.06	263.74	68	1286	0.50	0.066	0.02	11.89	0.01	0.000
10.38	2.49	84.74	2.93	248.44	64	1243	0.50	0.073	0.02	11.89	0.01	0.000
10.45	2.47	83.70	2.81	234.87	60	1210	0.50	0.079	0.02	11.89	0.02	0.000
10.53	2.47	81.89	2.78	227.45	58	1186	0.50	0.085	0.02	11.89	0.02	0.000
10.57	2.47	82.38	2.78	229.16	58	1197	0.50	0.084	0.02	11.89	0.02	0.000
10.65	2.45	83.51	2.69	224.27	57	1202	0.50	0.084	0.02	11.89	0.02	0.000
10.72	2.43	84.91	2.56	217.76	54	1203	0.50	0.085	0.03	11.89	0.02	0.000
10.76	2.40	87.71	2.37	208.31	51	1201	0.50	0.086	0.03	11.89	0.02	0.000
10.84	2.39	86.54	2.33	201.51	49	1179	0.50	0.091	0.03	11.89	0.02	0.000
10.91	2.39	83.16	2.33	193.57	47	1140	0.50	0.102	0.04	11.89	0.03	0.000
10.99	2.42	76.29	2.48	189.20	47	1085	0.50	0.121	0.04	11.89	0.03	0.000
11.03	2.45	70.01	2.63	183.95	46	1026	0.50	0.147	0.05	11.89	0.04	0.000
11.10	2.46	65.72	2.74	180.02	46	988	0.50	0.170	0.06	11.89	0.05	0.000
11.17	2.49	62.56	2.88	180.17	46	969	0.50	0.185	0.07	11.89	0.05	0.000
11.25	2.50	61.48	3.00	184.28	48	977	0.50	0.183	0.06	11.89	0.05	0.000
11.29	2.52	61.56	3.12	192.07	50	1000	0.50	0.169	0.06	11.89	0.04	0.000
11.36	2.52	63.29	3.14	198.99	52	1037	0.50	0.150	0.05	11.89	0.03	0.000
11.45	2.52	65.38	3.14	205.56	54	1078	0.50	0.134	0.04	11.89	0.03	0.000
11.49	2.51	68.63	3.08	211.61	55	1125	0.50	0.118	0.03	11.89	0.03	0.000
11.56	2.52	70.92	3.09	219.10	57	1170	0.50	0.105	0.03	11.89	0.02	0.000
11.64	2.52	72.86	3.13	227.69	59	1216	0.50	0.095	0.03	11.89	0.02	0.000
11.71	2.53	73.57	3.19	235.00	61	1247	0.50	0.090	0.02	11.89	0.02	0.000
11.76	2.54	73.20	3.28	240.40	63	1262	0.50	0.087	0.02	11.89	0.02	0.000
11.83	2.56	71.78	3.39	243.60	65	1264	0.50	0.088	0.02	11.89	0.02	0.000
11.91	2.57	70.54	3.47	244.84	65	1263	0.50	0.089	0.02	11.89	0.02	0.000
11.94	2.57	70.45	3.46	244.01	65	1264	0.50	0.090	0.02	11.89	0.02	0.000
12.02	2.55	71.85	3.36	241.11	64	1277	0.50	0.088	0.02	11.89	0.02	0.000
12.10	2.52	74.86	3.15	236.02	62	1298	0.50	0.085	0.02	11.89	0.02	0.000
12.18	2.50	77.80	2.97	231.39	60	1318	0.50	0.083	0.02	11.89	0.02	0.000
12.21	2.48	80.64	2.82	227.26	58	1333	0.50	0.081	0.02	11.89	0.02	0.000
12.29	2.46	81.95	2.73	223.47	57	1340	0.50	0.080	0.02	11.89	0.02	0.000
12.36	2.45	82.56	2.65	218.43	55	1336	0.50	0.082	0.02	11.89	0.02	0.000
12.44	2.44	82.24	2.59	213.21	53	1325	0.50	0.085	0.03	11.89	0.02	0.000
12.48	2.42	82.73	2.50	206.84	51	1312	0.50	0.087	0.03	11.89	0.02	0.000
12.55	2.40	84.18	2.37	199.24	49	1304	0.50	0.090	0.03	11.89	0.02	0.000
12.62	2.37	86.35	2.22	191.45	46	1299	0.50	0.092	0.03	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
12.67	2.33	90.26	2.04	183.94	44	1300	0.50	0.092	0.04	11.89	0.03	0.000
12.75	2.29	95.08	1.88	178.71	42	1313	0.50	0.091	0.04	11.89	0.03	0.000
12.82	2.25	100.48	1.75	175.54	40	1331	0.50	0.088	0.04	11.89	0.03	0.000
12.90	2.23	103.39	1.69	174.74	40	1346	0.50	0.087	0.04	11.89	0.03	0.000
12.93	2.23	103.95	1.69	175.28	40	1353	0.50	0.086	0.04	11.89	0.03	0.000
13.01	2.24	101.94	1.74	176.96	41	1360	0.50	0.086	0.04	11.89	0.03	0.000
13.09	2.27	99.58	1.80	179.59	42	1368	0.50	0.085	0.04	11.89	0.02	0.000
13.13	2.29	98.16	1.87	183.85	43	1384	0.50	0.083	0.03	11.89	0.02	0.000
13.20	2.30	98.11	1.92	188.68	44	1411	0.50	0.080	0.03	11.89	0.02	0.000
13.27	2.30	99.37	1.94	192.53	45	1442	0.50	0.076	0.03	11.89	0.02	0.000
13.35	2.30	102.03	1.91	195.37	46	1477	0.50	0.072	0.03	11.89	0.02	0.000
13.42	2.29	104.57	1.89	197.79	46	1509	0.50	0.069	0.03	11.89	0.02	0.000
13.46	2.30	106.84	1.92	204.79	48	1558	0.50	0.065	0.02	11.89	0.02	0.000
13.54	2.32	106.88	2.02	216.01	51	1616	0.50	0.060	0.02	11.89	0.01	0.000
13.62	2.36	105.83	2.16	228.07	55	1667	0.50	0.056	0.02	11.89	0.01	0.000
13.65	2.40	101.67	2.39	243.26	60	1699	0.50	0.054	0.01	11.89	0.01	0.000
13.75	2.44	98.14	2.58	253.62	63	1718	0.50	0.054	0.01	11.89	0.01	0.000
13.78	2.47	94.72	2.79	264.41	67	1729	0.50	0.053	0.01	11.89	0.01	0.000
13.86	2.49	92.22	2.94	270.68	70	1736	0.50	0.053	0.01	11.89	0.01	0.000
13.94	2.52	88.80	3.14	278.57	73	1739	0.50	0.054	0.01	11.89	0.01	0.000
14.01	2.54	86.53	3.29	285.02	75	1746	0.50	0.054	0.01	11.89	0.01	0.000
14.08	2.55	86.47	3.32	287.40	76	1760	0.50	0.053	0.01	11.89	0.01	0.000
14.12	2.54	87.80	3.27	287.45	76	1778	0.50	0.052	0.01	11.89	0.01	0.000
14.20	2.54	87.89	3.27	287.54	76	1788	0.50	0.052	0.01	11.89	0.01	0.000
14.28	2.55	86.55	3.34	288.74	76	1788	0.50	0.052	0.01	11.89	0.01	0.000
14.32	2.57	83.40	3.50	291.78	78	1770	0.50	0.054	0.01	11.89	0.01	0.000
14.39	2.59	79.96	3.67	293.60	79	1749	0.50	0.056	0.01	11.89	0.01	0.000
14.47	2.61	76.72	3.81	292.60	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.54	2.61	74.57	3.87	288.74	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.58	2.61	73.11	3.84	280.64	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.66	2.60	71.54	3.77	270.05	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.74	2.60	69.77	3.72	259.56	70	1570	0.50	0.074	0.02	11.89	0.01	0.000
14.77	2.60	66.83	3.77	251.81	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.85	2.62	63.05	3.89	245.18	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.92	2.63	59.25	4.01	237.75	0	0	0.50	0.000	0.00	0.00	0.00	0.000
14.96	2.63	56.28	4.03	226.70	0	0	0.50	0.000	0.00	0.00	0.00	0.000
15.04	2.62	54.03	3.94	212.78	0	0	0.50	0.000	0.00	0.00	0.00	0.000
15.11	2.60	52.37	3.76	196.66	0	0	0.50	0.000	0.00	0.00	0.00	0.000
15.18	2.57	52.64	3.47	182.70	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.25	2.53	54.53	3.16	172.46	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.29	2.47	60.08	2.75	165.15	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.38	2.39	68.59	2.32	159.46	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.45	2.32	78.12	2.01	157.01	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.49	2.26	88.29	1.79	157.78	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.56	2.22	98.34	1.66	163.37	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.64	2.20	107.79	1.61	173.40	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.71	2.20	113.89	1.61	183.65	41	1661	0.50	0.072	0.03	11.89	0.02	0.000
15.75	2.22	116.19	1.68	195.01	44	1752	0.50	0.064	0.02	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
15.83	2.26	115.60	1.78	206.18	48	1827	0.50	0.059	0.02	11.89	0.01	0.000
15.90	2.30	112.70	1.94	218.55	52	1889	0.50	0.055	0.02	11.89	0.01	0.000
15.97	2.34	108.67	2.10	228.71	55	1922	0.50	0.054	0.02	11.89	0.01	0.000
16.02	2.38	105.00	2.27	237.87	58	1942	0.50	0.053	0.01	11.89	0.01	0.000
16.10	2.40	102.57	2.38	244.44	60	1961	0.50	0.052	0.01	11.89	0.01	0.000
16.17	2.42	101.20	2.46	248.57	62	1976	0.50	0.052	0.01	11.89	0.01	0.000
16.21	2.42	100.92	2.46	247.89	61	1974	0.50	0.052	0.01	11.89	0.01	0.000
16.28	2.41	100.45	2.42	243.36	60	1958	0.50	0.053	0.01	11.89	0.01	0.000
16.36	2.38	100.78	2.27	229.00	56	1901	0.50	0.057	0.02	11.89	0.01	0.000
16.44	2.34	101.61	2.08	210.99	50	1825	0.50	0.062	0.02	11.89	0.01	0.000
16.48	2.29	103.99	1.88	195.24	46	1756	0.50	0.068	0.03	11.89	0.02	0.000
16.55	2.25	106.84	1.75	187.12	43	1726	0.50	0.071	0.03	11.89	0.02	0.000
16.63	2.21	110.73	1.65	182.79	41	1718	0.50	0.073	0.03	11.89	0.02	0.000
16.70	2.22	107.12	1.67	178.76	41	1682	0.50	0.077	0.03	11.89	0.02	0.000
16.74	2.19	109.77	1.60	175.68	40	1669	0.50	0.079	0.03	11.89	0.02	0.000
16.83	2.18	110.71	1.56	173.11	39	1657	0.50	0.081	0.04	11.89	0.02	0.000
16.90	2.13	118.21	1.47	173.25	38	1667	0.50	0.080	0.04	11.89	0.02	0.000
16.94	2.12	118.75	1.45	172.25	38	1659	0.50	0.081	0.04	11.89	0.02	0.000
17.01	2.11	119.27	1.43	171.12	37	1650	0.50	0.083	0.04	11.89	0.03	0.000
17.09	2.10	119.92	1.42	170.07	37	1642	0.50	0.085	0.04	11.89	0.03	0.000
17.13	2.08	121.31	1.40	169.43	36	1631	0.50	0.086	0.04	11.89	0.03	0.000
17.21	2.07	123.10	1.38	169.51	36	1629	0.50	0.087	0.04	11.89	0.03	0.000
17.28	2.05	125.97	1.35	170.42	36	1628	0.50	0.088	0.04	11.89	0.03	0.000
17.36	2.03	128.67	1.33	171.61	36	1629	0.50	0.089	0.04	11.89	0.03	0.000
17.39	2.01	132.42	1.31	173.67	36	1626	0.50	0.089	0.04	11.89	0.03	0.000
17.47	1.99	135.34	1.30	175.44	36	1628	0.50	0.090	0.04	11.89	0.03	0.000
17.54	1.97	138.35	1.28	177.69	37	1635	0.50	0.089	0.04	11.89	0.03	0.000
17.59	1.96	141.13	1.28	180.61	37	1657	0.50	0.087	0.04	11.89	0.03	0.000
17.66	1.96	144.17	1.28	184.47	38	1696	0.50	0.083	0.04	11.89	0.02	0.000
17.73	1.95	149.42	1.27	190.10	39	1739	0.50	0.078	0.04	11.89	0.02	0.000
17.80	1.93	158.34	1.26	198.96	40	1793	0.50	0.074	0.03	11.89	0.02	0.000
17.88	1.90	169.01	1.24	208.81	42	1842	0.50	0.070	0.03	11.89	0.02	0.000
17.93	1.86	183.41	1.21	222.12	44	1915	0.50	0.064	0.03	11.89	0.02	0.000
18.00	1.85	197.17	1.20	236.27	46	2021	0.50	0.058	0.02	11.89	0.01	0.000
18.08	1.84	209.03	1.19	249.16	49	2127	0.50	0.053	0.02	11.89	0.01	0.000
18.12	1.84	216.11	1.20	258.34	51	2214	0.50	0.049	0.02	11.89	0.01	0.000
18.19	1.84	217.88	1.20	260.57	51	2240	0.50	0.048	0.02	11.89	0.01	0.000
18.26	1.85	216.50	1.20	260.63	51	2259	0.50	0.048	0.02	11.89	0.01	0.000
18.34	1.87	211.79	1.22	257.64	51	2264	0.50	0.048	0.02	11.89	0.01	0.000
18.38	1.89	206.10	1.23	253.56	51	2263	0.50	0.048	0.02	11.89	0.01	0.000
18.45	1.90	199.88	1.24	247.66	50	2238	0.50	0.049	0.02	11.89	0.01	0.000
18.53	1.91	194.81	1.24	242.51	49	2212	0.50	0.051	0.02	11.89	0.01	0.000
18.61	1.92	190.91	1.25	238.81	48	2200	0.50	0.051	0.02	11.89	0.01	0.000
18.64	1.93	189.12	1.26	237.41	48	2201	0.50	0.051	0.02	11.89	0.01	0.000
18.72	1.93	189.46	1.26	237.91	48	2213	0.50	0.051	0.02	11.89	0.01	0.000
18.80	1.92	191.46	1.25	239.68	48	2225	0.50	0.051	0.02	11.89	0.01	0.000
18.83	1.90	197.26	1.24	244.62	49	2242	0.50	0.050	0.02	11.89	0.01	0.000
18.91	1.89	204.28	1.23	250.66	50	2270	0.51	0.050	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
18.99	1.88	211.20	1.22	257.80	51	2325	0.51	0.048	0.02	11.89	0.01	0.000
19.07	1.87	217.19	1.22	264.25	52	2380	0.51	0.046	0.01	11.89	0.01	0.000
19.11	1.85	225.31	1.20	271.10	53	2415	0.51	0.045	0.01	11.89	0.01	0.000
19.18	1.81	236.99	1.17	276.76	54	2418	0.51	0.045	0.01	11.89	0.01	0.000
19.25	1.77	249.12	1.12	278.86	53	2414	0.51	0.045	0.01	11.89	0.01	0.000
19.32	1.73	255.19	1.05	268.29	51	2345	0.51	0.048	0.02	11.89	0.01	0.000
19.40	1.70	256.16	1.00	256.16	48	2250	0.51	0.052	0.02	11.89	0.01	0.000
19.44	1.67	257.07	1.00	257.07	47	2187	0.51	0.055	0.02	11.89	0.01	0.000
19.52	1.67	261.88	1.00	261.88	48	2235	0.51	0.053	0.02	11.89	0.01	0.000
19.59	1.68	268.11	1.00	268.11	50	2321	0.51	0.050	0.02	11.89	0.01	0.000
19.63	1.70	271.11	1.00	271.11	51	2403	0.51	0.047	0.02	11.89	0.01	0.000
19.70	1.73	265.99	1.04	276.94	52	2454	0.51	0.046	0.01	11.89	0.01	0.000
19.77	1.78	251.57	1.12	282.44	54	2485	0.51	0.045	0.01	11.89	0.01	0.000
19.84	1.82	235.46	1.18	277.14	54	2482	0.51	0.045	0.01	11.89	0.01	0.000
19.90	1.86	222.46	1.21	269.28	53	2477	0.51	0.046	0.01	11.89	0.01	0.000
19.97	1.89	213.56	1.23	262.33	52	2463	0.51	0.046	0.01	11.89	0.01	0.000
20.05	1.91	205.64	1.24	255.18	51	2437	0.51	0.047	0.02	11.89	0.01	0.000
20.09	1.92	198.82	1.25	248.00	50	2390	0.51	0.049	0.02	11.89	0.01	0.000
20.17	1.91	197.27	1.24	244.73	49	2345	0.51	0.051	0.02	11.89	0.01	0.000
20.24	1.89	198.13	1.23	243.22	49	2301	0.51	0.053	0.02	11.89	0.01	0.000
20.28	1.86	201.12	1.21	243.13	48	2259	0.51	0.055	0.02	11.89	0.01	0.000
20.36	1.84	202.47	1.19	241.77	47	2224	0.51	0.057	0.02	11.89	0.01	0.000
20.43	1.82	202.15	1.18	237.83	46	2168	0.51	0.061	0.02	11.89	0.01	0.000
20.50	1.80	200.25	1.16	231.56	45	2096	0.51	0.065	0.02	11.89	0.01	0.000
20.58	1.78	199.06	1.13	224.99	43	2028	0.51	0.071	0.03	11.89	0.02	0.000
20.62	1.76	199.59	1.10	220.22	42	1983	0.51	0.074	0.03	11.89	0.02	0.000
20.69	1.76	197.56	1.10	216.47	41	1954	0.51	0.077	0.03	11.89	0.02	0.000
20.77	1.76	193.68	1.10	212.61	40	1923	0.51	0.080	0.03	11.89	0.02	0.000
20.81	1.76	188.13	1.10	207.15	39	1876	0.51	0.085	0.04	11.89	0.02	0.000
20.88	1.75	184.81	1.09	201.61	38	1830	0.51	0.091	0.04	11.89	0.02	0.000
20.96	1.75	181.32	1.08	195.41	37	1780	0.51	0.098	0.05	11.89	0.03	0.000
21.04	1.74	178.86	1.07	191.51	36	1749	0.51	0.103	0.05	11.89	0.03	0.000
21.07	1.75	176.04	1.08	189.48	36	1731	0.51	0.106	0.05	11.89	0.03	0.000
21.15	1.75	173.41	1.09	188.80	36	1726	0.51	0.108	0.05	11.89	0.03	0.000
21.23	1.76	170.89	1.10	188.32	36	1724	0.51	0.109	0.05	11.89	0.03	0.000
21.27	1.77	168.63	1.11	187.45	36	1718	0.51	0.110	0.05	11.89	0.03	0.000
21.34	1.77	166.02	1.12	185.74	36	1707	0.51	0.112	0.06	11.89	0.03	0.000
21.42	1.78	162.93	1.13	183.51	35	1691	0.51	0.116	0.06	11.89	0.03	0.000
21.49	1.78	160.20	1.13	181.61	35	1679	0.52	0.119	0.06	11.89	0.03	0.000
21.53	1.79	157.85	1.14	180.07	35	1669	0.52	0.121	0.06	11.89	0.04	0.000
21.61	1.80	155.68	1.15	178.76	35	1664	0.52	0.123	0.06	11.89	0.04	0.000
21.68	1.80	153.94	1.15	177.72	34	1660	0.52	0.124	0.06	11.89	0.04	0.000
21.72	1.81	153.00	1.16	177.32	34	1661	0.52	0.125	0.07	11.89	0.04	0.000
21.80	1.81	152.24	1.16	176.86	34	1662	0.52	0.125	0.07	11.89	0.04	0.000
21.87	1.81	151.52	1.17	176.53	34	1665	0.52	0.125	0.07	11.89	0.04	0.000
21.95	1.81	150.96	1.17	176.32	34	1668	0.52	0.125	0.07	11.89	0.04	0.000
21.99	1.81	151.01	1.17	176.52	34	1673	0.52	0.125	0.07	11.89	0.04	0.000
22.06	1.81	151.19	1.17	176.59	34	1676	0.52	0.125	0.07	11.89	0.04	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
22.14	1.81	151.78	1.16	176.74	34	1678	0.52	0.125	0.07	11.89	0.04	0.000
22.21	1.81	152.42	1.16	176.89	34	1680	0.52	0.126	0.07	11.89	0.04	0.000
22.25	1.79	154.01	1.15	176.42	34	1668	0.52	0.128	0.07	11.89	0.04	0.000
22.33	1.76	156.73	1.11	173.59	33	1635	0.52	0.136	0.07	11.89	0.04	0.000
22.41	1.74	160.07	1.06	170.32	32	1612	0.52	0.143	0.08	11.89	0.05	0.000
22.45	1.72	163.52	1.04	169.53	32	1616	0.52	0.142	0.08	11.89	0.05	0.000
22.52	1.73	164.98	1.05	173.55	33	1651	0.52	0.135	0.07	11.89	0.04	0.000
22.60	1.75	164.00	1.08	177.62	34	1685	0.52	0.128	0.07	11.89	0.04	0.000
22.67	1.76	163.02	1.10	180.11	34	1710	0.52	0.124	0.06	11.89	0.04	0.000
22.72	1.77	161.92	1.12	180.62	35	1718	0.52	0.123	0.06	11.89	0.04	0.000
22.79	1.77	161.39	1.11	179.82	34	1713	0.52	0.124	0.06	11.89	0.04	0.000
22.87	1.77	159.62	1.12	178.31	34	1703	0.52	0.127	0.07	11.89	0.04	0.000
22.91	1.78	157.65	1.13	177.43	34	1698	0.52	0.128	0.07	11.89	0.04	0.000
22.98	1.78	155.41	1.13	176.20	34	1692	0.52	0.130	0.07	11.89	0.04	0.000
23.05	1.79	152.86	1.14	174.72	34	1684	0.52	0.133	0.07	11.89	0.04	0.000
23.13	1.80	150.85	1.15	173.50	34	1679	0.52	0.135	0.07	11.89	0.04	0.000
23.16	1.80	149.86	1.15	172.65	33	1673	0.52	0.136	0.07	11.89	0.04	0.000
23.24	1.80	148.90	1.15	171.15	33	1661	0.52	0.140	0.08	11.89	0.04	0.000
23.32	1.80	147.39	1.15	169.39	33	1646	0.52	0.144	0.08	11.89	0.04	0.000
23.40	1.80	145.62	1.15	167.82	32	1636	0.52	0.148	0.08	11.89	0.04	0.000
23.43	1.81	143.64	1.16	166.85	32	1634	0.52	0.148	0.08	11.89	0.05	0.000
23.51	1.81	142.94	1.17	166.67	32	1639	0.52	0.148	0.08	11.89	0.05	0.000
23.58	1.82	142.01	1.17	166.55	32	1646	0.52	0.147	0.08	11.89	0.04	0.000
23.65	1.82	142.43	1.18	167.46	33	1661	0.52	0.144	0.08	11.89	0.04	0.000
23.73	1.83	142.54	1.18	168.15	33	1675	0.52	0.141	0.08	11.89	0.04	0.000
23.77	1.82	144.76	1.18	170.23	33	1693	0.52	0.137	0.07	11.89	0.04	0.000
23.84	1.81	148.42	1.17	173.47	34	1722	0.52	0.132	0.07	11.89	0.04	0.000
23.92	1.81	152.78	1.16	177.30	34	1756	0.52	0.126	0.07	11.89	0.04	0.000
23.96	1.80	157.84	1.15	182.09	35	1800	0.52	0.118	0.06	11.89	0.03	0.000
24.04	1.80	161.75	1.15	186.06	36	1841	0.52	0.112	0.06	11.89	0.03	0.000
24.12	1.80	164.93	1.15	189.39	37	1876	0.52	0.108	0.05	11.89	0.03	0.000
24.16	1.79	167.71	1.15	192.17	37	1903	0.52	0.104	0.05	11.89	0.03	0.000
24.23	1.79	170.56	1.14	194.68	37	1929	0.52	0.101	0.05	11.89	0.03	0.000
24.30	1.79	174.09	1.14	197.78	38	1961	0.52	0.098	0.05	11.89	0.02	0.000
24.38	1.78	176.77	1.13	200.15	38	1986	0.52	0.095	0.04	11.89	0.02	0.000
24.41	1.78	179.17	1.13	202.47	39	2010	0.52	0.093	0.04	11.89	0.02	0.000
24.49	1.78	181.09	1.13	203.98	39	2027	0.52	0.092	0.04	11.89	0.02	0.000
24.57	1.77	183.27	1.12	205.52	39	2044	0.52	0.090	0.04	11.89	0.02	0.000
24.61	1.77	186.09	1.12	207.69	40	2066	0.52	0.088	0.04	11.89	0.02	0.000
24.68	1.77	189.33	1.11	210.88	40	2101	0.52	0.085	0.04	11.89	0.02	0.000
24.76	1.76	193.44	1.11	213.80	41	2133	0.52	0.083	0.04	11.89	0.02	0.000
24.83	1.76	197.92	1.10	217.09	41	2168	0.52	0.080	0.03	11.89	0.02	0.000
24.91	1.75	202.08	1.09	219.44	42	2196	0.52	0.078	0.03	11.89	0.02	0.000
24.94	1.74	208.45	1.07	222.54	42	2233	0.52	0.076	0.03	11.89	0.02	0.000
25.02	1.72	219.84	1.03	225.35	42	2286	0.53	0.073	0.03	11.89	0.02	0.000
25.10	1.70	234.07	1.00	234.07	44	2361	0.53	0.068	0.03	11.89	0.01	0.000
25.14	1.67	253.32	1.00	253.32	47	2484	0.53	0.062	0.02	11.89	0.01	0.000
25.21	1.66	274.36	1.00	274.36	50	2636	0.53	0.056	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
25.27	1.64	297.97	1.00	297.97	54	2792	0.53	0.050	0.02	11.89	0.01	0.000
25.35	1.61	313.75	1.00	313.75	57	2836	0.53	0.049	0.01	11.89	0.01	0.000
25.42	1.59	318.49	1.00	318.49	57	2797	0.53	0.051	0.01	11.89	0.01	0.000
25.46	1.59	313.76	1.00	313.76	56	2760	0.53	0.052	0.01	11.89	0.01	0.000
25.54	1.63	303.24	1.00	303.24	55	2818	0.53	0.050	0.01	11.89	0.01	0.000
25.62	1.68	292.95	1.00	292.95	54	2930	0.53	0.047	0.01	11.89	0.01	0.000
25.68	1.72	286.44	1.02	293.22	55	3020	0.53	0.045	0.01	11.89	0.01	0.000
25.74	1.73	285.25	1.05	300.11	57	3074	0.53	0.044	0.01	11.89	0.01	0.000
25.82	1.73	285.93	1.06	302.44	57	3100	0.53	0.044	0.01	11.89	0.01	0.000
25.85	1.73	286.75	1.05	302.42	57	3104	0.53	0.044	0.01	11.89	0.01	0.000
25.93	1.73	286.69	1.05	302.29	57	3108	0.53	0.044	0.01	11.89	0.01	0.000
26.00	1.74	284.83	1.07	303.57	57	3121	0.53	0.043	0.01	11.89	0.01	0.000
26.08	1.75	282.39	1.08	304.90	58	3136	0.53	0.043	0.01	11.89	0.01	0.000
26.12	1.76	277.43	1.10	304.54	58	3133	0.53	0.043	0.01	11.89	0.01	0.000
26.20	1.77	270.31	1.11	299.69	57	3090	0.53	0.045	0.01	11.89	0.01	0.000
26.27	1.77	262.39	1.11	290.76	56	3003	0.53	0.047	0.01	11.89	0.01	0.000
26.35	1.76	256.93	1.09	281.24	54	2908	0.53	0.050	0.02	11.89	0.01	0.000
26.38	1.74	251.68	1.07	270.47	51	2801	0.53	0.053	0.02	11.89	0.01	0.000
26.46	1.73	247.42	1.06	261.17	49	2716	0.53	0.056	0.02	11.89	0.01	0.000
26.53	1.72	245.30	1.03	251.54	47	2638	0.53	0.060	0.02	11.89	0.01	0.000
26.61	1.70	247.23	1.00	247.23	46	2589	0.53	0.062	0.02	11.89	0.01	0.000
26.64	1.68	252.56	1.00	252.56	47	2559	0.53	0.064	0.02	11.89	0.01	0.000
26.71	1.65	258.54	1.00	258.54	47	2537	0.53	0.065	0.02	11.89	0.01	0.000
26.79	1.64	259.87	1.00	259.87	48	2521	0.53	0.066	0.02	11.89	0.01	0.000
26.86	1.66	249.77	1.00	249.77	46	2499	0.53	0.067	0.02	11.89	0.01	0.000
26.94	1.71	231.92	1.00	232.03	43	2474	0.53	0.069	0.03	11.89	0.01	0.000
26.98	1.78	208.26	1.13	234.92	45	2472	0.53	0.069	0.03	11.89	0.01	0.000
27.05	1.87	183.00	1.22	222.58	44	2482	0.53	0.069	0.03	11.89	0.01	0.000
27.13	1.97	159.38	1.28	204.21	42	2489	0.53	0.069	0.03	11.89	0.01	0.000
27.17	2.06	139.66	1.36	190.29	40	2491	0.53	0.069	0.03	11.89	0.01	0.000
27.25	2.12	126.73	1.45	184.38	40	2494	0.53	0.069	0.03	11.89	0.01	0.000
27.33	2.18	117.50	1.56	182.91	41	2502	0.53	0.069	0.03	11.89	0.01	0.000
27.37	2.21	110.49	1.65	182.16	41	2489	0.53	0.069	0.03	11.89	0.01	0.000
27.44	2.23	107.11	1.70	182.62	42	2491	0.53	0.070	0.03	11.89	0.01	0.000
27.52	2.24	105.65	1.73	183.09	42	2496	0.53	0.070	0.03	11.89	0.01	0.000
27.60	2.23	107.78	1.70	183.35	42	2512	0.53	0.069	0.03	11.89	0.01	0.000
27.64	2.21	110.75	1.64	181.97	41	2506	0.53	0.070	0.03	11.89	0.01	0.000
27.71	2.19	113.63	1.58	179.56	40	2482	0.53	0.071	0.03	11.89	0.01	0.000
27.79	2.16	115.75	1.53	176.64	39	2443	0.53	0.074	0.03	11.89	0.02	0.000
27.83	2.14	117.20	1.48	173.26	38	2388	0.53	0.077	0.04	11.89	0.02	0.000
27.90	2.11	118.27	1.44	170.43	37	2338	0.53	0.081	0.04	11.89	0.02	0.000
27.97	2.09	120.33	1.40	168.55	36	2290	0.53	0.085	0.04	11.89	0.02	0.000
28.05	2.06	122.64	1.37	167.97	36	2256	0.53	0.088	0.04	11.89	0.02	0.000
28.12	2.04	124.58	1.35	167.87	36	2230	0.53	0.091	0.05	11.89	0.02	0.000
28.16	2.03	126.37	1.33	168.03	35	2206	0.53	0.093	0.05	11.89	0.02	0.000
28.23	2.00	127.10	1.31	165.87	34	2133	0.53	0.101	0.05	11.89	0.02	0.000
28.31	1.96	127.09	1.28	162.51	33	2030	0.53	0.114	0.06	11.89	0.03	0.000
28.35	1.94	125.71	1.26	158.84	32	1945	0.53	0.127	0.07	11.89	0.03	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
28.43	1.94	123.58	1.27	156.35	32	1923	0.53	0.132	0.08	11.89	0.04	0.000
28.50	1.96	121.63	1.27	154.91	32	1930	0.53	0.131	0.08	11.89	0.04	0.000
28.54	1.96	120.82	1.28	154.25	32	1932	0.53	0.131	0.08	11.89	0.04	0.000
28.62	1.97	118.27	1.29	152.24	31	1936	0.53	0.131	0.08	11.89	0.04	0.000
28.69	1.98	118.94	1.29	153.23	32	1954	0.53	0.128	0.07	11.89	0.03	0.000
28.77	1.98	119.56	1.29	154.15	32	1972	0.53	0.126	0.07	11.89	0.03	0.000
28.81	1.97	122.22	1.28	156.99	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.88	1.99	120.90	1.30	156.77	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.96	2.01	118.31	1.32	155.83	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.03	2.04	115.34	1.34	154.66	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.07	2.06	111.38	1.37	152.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.15	2.09	106.46	1.41	150.02	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.23	2.13	100.10	1.47	146.85	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.30	2.16	94.36	1.53	144.44	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.34	2.20	88.07	1.62	142.93	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.42	2.25	81.60	1.74	142.29	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.49	2.30	74.72	1.91	142.66	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.56	2.33	69.48	2.06	143.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.61	2.37	64.95	2.22	143.99	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.68	2.40	60.64	2.40	145.32	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.76	2.44	56.74	2.60	147.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.80	2.47	53.88	2.81	151.38	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.87	2.50	52.22	2.98	155.64	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.95	2.52	50.98	3.13	159.64	0	0	0.53	0.000	0.00	11.89	0.00	0.000
29.99	2.54	49.81	3.27	162.88	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.06	2.57	47.92	3.48	166.78	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.14	2.60	45.46	3.79	172.47	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.22	2.63	44.24	3.99	176.70	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.26	2.64	43.94	4.09	179.52	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.33	2.61	46.00	3.87	178.05	0	0	0.53	0.000	0.00	0.00	0.00	0.000
30.40	2.57	49.68	3.51	174.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.48	2.52	54.61	3.09	168.92	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.52	2.45	61.20	2.66	162.87	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.60	2.39	68.40	2.30	157.52	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.67	2.32	75.93	2.02	153.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.71	2.27	82.19	1.83	150.36	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.78	2.23	86.83	1.70	147.21	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.86	2.19	90.30	1.59	143.36	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.94	2.16	91.45	1.53	139.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000
30.97	2.15	89.74	1.51	135.11	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.05	2.15	86.11	1.51	130.08	29	1945	0.53	0.145	0.09	11.89	0.04	0.000
31.13	2.16	81.64	1.53	124.72	28	1871	0.53	0.162	0.11	11.89	0.05	0.000
31.20	2.17	78.25	1.54	120.75	27	1816	0.53	0.176	0.12	11.89	0.05	0.000
31.24	2.14	76.49	1.49	114.25	25	1712	0.53	0.210	0.16	11.89	0.07	0.000
31.32	2.12	75.35	1.45	109.16	24	1626	0.53	0.248	0.20	11.89	0.09	0.001
31.39	2.10	74.02	1.42	105.05	23	1555	0.53	0.289	0.25	11.89	0.10	0.001
31.47	2.12	72.19	1.45	104.93	23	1570	0.53	0.281	0.24	11.89	0.10	0.001
31.51	2.15	70.19	1.50	105.41	23	1591	0.53	0.269	0.22	11.89	0.09	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.59	2.17	69.37	1.54	106.61	24	1617	0.53	0.256	0.21	11.89	0.09	0.001
31.64	2.18	68.84	1.57	108.28	24	1647	0.53	0.242	0.19	11.89	0.08	0.001
31.71	2.18	70.20	1.57	110.22	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.78	2.19	70.91	1.60	113.44	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.86	2.21	71.30	1.64	117.17	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.90	2.25	69.65	1.76	122.34	0	0	0.53	0.000	0.00	11.89	0.00	0.000
31.97	2.29	67.28	1.89	127.33	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.05	2.33	65.01	2.04	132.88	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.12	2.36	63.51	2.16	136.90	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.16	2.38	61.76	2.28	140.90	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.24	2.41	59.58	2.43	144.88	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.31	2.44	57.51	2.60	149.57	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.39	2.46	56.44	2.71	153.11	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.43	2.47	55.93	2.80	156.62	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.50	2.49	55.06	2.92	160.76	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.58	2.52	53.71	3.09	165.89	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.65	2.54	52.26	3.27	170.75	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.69	2.57	50.54	3.49	176.24	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.77	2.60	48.88	3.71	181.44	0	0	0.53	0.000	0.00	11.89	0.00	0.000
32.85	2.62	47.52	3.91	186.01	0	0	0.53	0.000	0.00	0.00	0.00	0.000
32.88	2.63	46.74	4.04	188.89	0	0	0.53	0.000	0.00	0.00	0.00	0.000
32.96	2.64	46.14	4.11	189.50	0	0	0.53	0.000	0.00	0.00	0.00	0.000
33.03	2.64	45.86	4.11	188.66	0	0	0.53	0.000	0.00	0.00	0.00	0.000
33.07	2.62	47.07	3.90	183.63	0	0	0.53	0.000	0.00	0.00	0.00	0.000
33.15	2.57	49.93	3.52	175.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.23	2.51	54.52	3.03	165.16	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.31	2.45	58.75	2.67	156.68	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.34	2.41	62.24	2.41	149.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.42	2.38	63.84	2.27	144.67	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.49	2.35	65.17	2.14	139.27	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.56	2.32	66.93	2.01	134.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.64	2.29	69.70	1.88	130.92	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.68	2.24	74.73	1.73	129.31	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.75	2.19	81.22	1.60	129.54	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.83	2.15	87.66	1.50	131.32	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.87	2.12	91.86	1.45	133.35	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.95	2.12	92.17	1.45	134.10	29	2115	0.53	0.131	0.08	11.89	0.03	0.000
34.01	2.14	90.62	1.48	134.24	30	2132	0.53	0.129	0.08	11.89	0.03	0.000
34.06	2.16	88.65	1.52	134.62	30	2151	0.53	0.127	0.08	11.89	0.03	0.000
34.14	2.18	86.96	1.56	135.47	30	2175	0.53	0.124	0.08	11.89	0.03	0.000
34.20	2.18	86.78	1.57	136.48	31	2196	0.53	0.121	0.07	11.89	0.03	0.000
34.28	2.18	87.36	1.57	137.07	31	2208	0.53	0.120	0.07	11.89	0.03	0.000
34.32	2.17	90.43	1.55	139.85	31	2252	0.53	0.114	0.07	11.89	0.03	0.000
34.40	2.15	95.49	1.51	144.13	32	2317	0.53	0.108	0.06	11.89	0.02	0.000
34.48	2.13	101.12	1.47	149.01	33	2386	0.53	0.101	0.06	11.89	0.02	0.000
34.52	2.10	107.74	1.42	153.35	33	2426	0.53	0.098	0.05	11.89	0.02	0.000
34.59	2.10	109.09	1.42	154.44	33	2440	0.53	0.096	0.05	11.89	0.02	0.000
34.67	2.07	114.86	1.38	158.21	34	2462	0.53	0.095	0.05	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
34.74	2.05	118.47	1.36	160.66	34	2472	0.53	0.094	0.05	11.89	0.02	0.000
34.81	2.02	124.86	1.32	165.33	35	2484	0.53	0.094	0.05	11.89	0.02	0.000
34.88	2.01	125.72	1.32	165.74	35	2480	0.53	0.094	0.05	11.89	0.02	0.000
34.92	2.00	126.79	1.31	166.24	35	2471	0.53	0.095	0.05	11.89	0.02	0.000
35.00	2.00	128.02	1.30	166.84	35	2462	0.53	0.096	0.05	11.89	0.02	0.000
35.08	1.99	129.04	1.30	167.35	35	2454	0.53	0.097	0.05	11.89	0.02	0.000
35.11	1.98	129.58	1.29	167.61	35	2449	0.53	0.097	0.05	11.89	0.02	0.000
35.19	1.98	129.36	1.29	167.21	35	2444	0.53	0.098	0.05	11.89	0.02	0.000
35.26	1.98	129.09	1.29	166.46	34	2426	0.53	0.100	0.05	11.89	0.02	0.000
35.33	1.97	128.41	1.29	165.11	34	2399	0.53	0.103	0.05	11.89	0.02	0.000
35.41	1.97	127.54	1.28	163.66	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.45	1.97	125.83	1.29	161.78	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.52	1.98	123.49	1.29	159.47	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.60	1.99	120.96	1.30	156.96	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.64	2.00	117.76	1.31	153.86	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.71	2.03	111.64	1.33	148.64	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.80	2.07	103.92	1.37	142.85	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.83	2.13	93.35	1.47	137.47	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.91	2.21	82.32	1.65	135.81	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.99	2.30	71.62	1.94	138.97	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.03	2.39	62.97	2.32	145.88	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.10	2.46	56.61	2.73	154.32	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.18	2.52	52.12	3.13	163.24	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.26	2.55	50.20	3.37	169.01	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.29	2.56	49.97	3.44	171.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.36	2.57	49.92	3.47	173.24	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.44	2.58	49.11	3.57	175.39	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.52	2.59	48.03	3.69	177.45	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.56	2.60	47.28	3.77	178.19	0	0	0.53	0.000	0.00	0.00	0.00	0.000
36.64	2.60	47.35	3.71	175.74	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.71	2.57	48.67	3.51	170.83	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.75	2.53	51.58	3.17	163.38	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.82	2.47	56.33	2.76	155.25	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.90	2.40	62.21	2.37	147.65	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.97	2.35	67.26	2.12	142.91	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.01	2.30	71.90	1.93	139.09	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.09	2.27	75.20	1.80	135.54	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.16	2.23	78.32	1.68	131.78	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.24	2.20	80.22	1.61	128.86	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.27	2.17	81.94	1.54	126.10	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.36	2.16	81.88	1.52	124.52	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.43	2.16	80.74	1.53	123.34	27	2111	0.53	0.147	0.10	11.89	0.03	0.000
37.47	2.19	77.84	1.59	123.45	28	2124	0.53	0.145	0.10	11.89	0.03	0.000
37.55	2.22	74.45	1.67	124.33	28	2144	0.53	0.142	0.09	11.89	0.03	0.000
37.62	2.25	71.37	1.77	126.20	29	2169	0.53	0.138	0.09	11.89	0.03	0.000
37.67	2.27	71.38	1.80	128.81	30	2210	0.53	0.132	0.08	11.89	0.03	0.000
37.74	2.27	72.61	1.81	131.17	30	2254	0.53	0.126	0.08	11.89	0.02	0.000
37.81	2.26	74.76	1.79	134.07	31	2309	0.53	0.120	0.07	11.89	0.02	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
37.89	2.27	75.73	1.80	136.57	32	2354	0.53	0.115	0.07	11.89	0.02	0.000
37.93	2.25	78.73	1.76	138.71	32	2400	0.53	0.110	0.06	11.89	0.02	0.000
38.00	2.22	84.22	1.67	140.42	32	2442	0.53	0.106	0.06	11.89	0.02	0.000
38.08	2.18	91.85	1.56	142.95	32	2484	0.53	0.102	0.06	11.89	0.02	0.000
38.15	2.13	99.82	1.47	146.35	32	2513	0.53	0.100	0.06	11.89	0.02	0.000
38.23	2.10	105.38	1.42	149.25	32	2529	0.53	0.099	0.06	11.89	0.02	0.000
38.26	2.08	108.77	1.39	151.29	32	2536	0.53	0.098	0.05	11.89	0.02	0.000
38.33	2.08	108.51	1.39	150.93	32	2534	0.53	0.099	0.06	11.89	0.02	0.000
38.41	2.09	105.82	1.41	148.72	32	2517	0.53	0.100	0.06	11.89	0.02	0.000
38.48	2.12	99.81	1.45	144.29	31	2480	0.53	0.104	0.06	11.89	0.02	0.000
38.55	2.15	93.22	1.50	139.96	31	2438	0.53	0.108	0.06	11.89	0.02	0.000
38.59	2.19	85.59	1.59	136.09	31	2393	0.53	0.113	0.07	11.89	0.02	0.000
38.66	2.23	78.59	1.70	133.40	30	2349	0.53	0.118	0.07	11.89	0.02	0.000
38.74	2.27	72.82	1.81	131.85	31	2311	0.53	0.122	0.07	11.89	0.02	0.000
38.78	2.29	69.58	1.88	131.15	31	2286	0.53	0.125	0.07	11.89	0.02	0.000
38.86	2.30	68.65	1.91	131.13	31	2284	0.53	0.126	0.08	11.89	0.02	0.000
38.93	2.30	68.70	1.91	131.32	31	2290	0.53	0.125	0.07	11.89	0.02	0.000
39.01	2.29	69.27	1.90	131.52	31	2300	0.53	0.124	0.07	11.89	0.02	0.000
39.04	2.29	69.96	1.88	131.86	31	2310	0.53	0.123	0.07	11.89	0.02	0.000
39.12	2.29	70.23	1.89	132.39	31	2323	0.53	0.122	0.07	11.89	0.02	0.000
39.20	2.29	70.78	1.88	132.73	31	2335	0.52	0.121	0.07	11.89	0.02	0.000
39.28	2.28	71.36	1.86	132.70	31	2341	0.52	0.120	0.07	11.89	0.02	0.000
39.31	2.27	72.79	1.81	131.93	31	2337	0.52	0.121	0.07	11.89	0.02	0.000
39.38	2.25	74.76	1.76	131.27	30	2337	0.52	0.121	0.07	11.89	0.02	0.000
39.46	2.23	77.06	1.70	131.11	30	2343	0.52	0.120	0.07	11.89	0.02	0.000
39.54	2.22	78.45	1.68	131.48	30	2355	0.52	0.119	0.07	11.89	0.02	0.000
39.58	2.23	78.39	1.68	131.98	30	2365	0.52	0.118	0.07	11.89	0.02	0.000
39.65	2.24	76.86	1.72	132.54	30	2375	0.52	0.117	0.07	11.89	0.02	0.000
39.73	2.26	75.07	1.77	133.25	31	2386	0.52	0.116	0.07	11.89	0.02	0.000
39.77	2.27	73.98	1.81	134.11	31	2397	0.52	0.115	0.07	11.89	0.02	0.000
39.85	2.26	74.96	1.79	134.46	31	2410	0.52	0.114	0.07	11.89	0.02	0.000
39.92	2.24	78.26	1.72	134.93	31	2430	0.52	0.112	0.07	11.89	0.02	0.000
39.99	2.21	83.01	1.64	136.15	31	2460	0.52	0.109	0.06	11.89	0.02	0.000
40.06	2.19	87.09	1.59	138.08	31	2494	0.52	0.106	0.06	11.89	0.02	0.000
40.11	2.18	89.50	1.57	140.26	31	2533	0.52	0.103	0.06	11.89	0.02	0.000
40.18	2.15	91.16	1.51	137.40	30	2468	0.52	0.109	0.07	11.89	0.02	0.000
40.26	2.11	92.60	1.44	133.30	29	2360	0.52	0.120	0.08	11.89	0.02	0.000
40.29	2.07	93.48	1.38	129.39	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.36	2.08	92.77	1.39	128.76	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.44	2.10	91.42	1.42	129.45	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.52	2.12	88.91	1.46	129.54	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.56	2.14	87.17	1.49	130.17	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.63	2.16	85.65	1.53	131.01	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.71	2.18	85.55	1.56	133.30	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.78	2.19	85.16	1.59	135.45	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.82	2.20	85.09	1.62	137.64	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.90	2.21	85.23	1.63	138.82	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.97	2.21	85.30	1.64	139.49	0	0	0.52	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
41.01	2.21	84.66	1.65	139.35	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.08	2.22	82.88	1.68	138.86	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.16	2.24	80.11	1.73	138.25	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.24	2.26	77.26	1.79	138.23	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.28	2.29	73.60	1.90	139.48	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.36	2.33	69.42	2.05	142.14	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.43	2.38	64.56	2.27	146.52	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.51	2.41	61.21	2.45	150.19	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.55	2.44	58.52	2.61	152.84	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.62	2.47	55.82	2.76	154.06	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.70	2.49	53.60	2.88	154.61	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.74	2.49	52.99	2.91	154.32	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.81	2.48	54.58	2.82	153.80	39	2572	0.52	0.102	0.05	11.89	0.01	0.000
41.89	2.47	55.98	2.76	154.37	39	2602	0.52	0.100	0.04	11.89	0.01	0.000
41.93	2.48	55.57	2.84	157.98	40	2641	0.52	0.097	0.04	11.89	0.01	0.000
42.00	2.52	52.92	3.10	163.87	43	2675	0.52	0.095	0.04	11.89	0.01	0.000
42.08	2.55	50.36	3.37	169.71	45	2706	0.52	0.093	0.04	11.89	0.01	0.000
42.16	2.57	49.00	3.53	172.80	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.20	2.57	49.05	3.50	171.90	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.28	2.53	51.83	3.21	166.17	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.35	2.44	59.50	2.62	155.69	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.42	2.34	70.68	2.07	146.57	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.46	2.24	83.18	1.72	142.82	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.53	2.18	90.70	1.57	142.45	0	0	0.52	0.000	0.00	11.89	0.00	0.000
42.61	2.16	93.22	1.52	141.25	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.68	2.15	91.55	1.51	138.50	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.72	2.14	90.92	1.49	135.57	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.80	2.11	93.79	1.44	134.96	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.87	2.07	100.83	1.37	138.41	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.95	2.03	108.88	1.33	144.81	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.99	1.99	118.03	1.30	153.14	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.06	1.97	123.94	1.28	158.87	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.14	1.95	127.49	1.27	162.34	0	0	0.51	0.000	0.00	11.89	0.00	0.000
43.18	1.96	125.76	1.28	160.47	33	2614	0.51	0.101	0.06	11.89	0.01	0.000
43.26	1.99	118.54	1.30	153.65	32	2580	0.51	0.104	0.06	11.89	0.01	0.000
43.33	2.03	109.35	1.33	145.62	31	2549	0.51	0.107	0.06	11.89	0.02	0.000
43.37	2.09	98.85	1.40	138.79	30	2553	0.51	0.107	0.07	11.89	0.02	0.000
43.44	2.16	88.39	1.53	135.21	30	2577	0.51	0.105	0.06	11.89	0.02	0.000
43.52	2.23	80.08	1.70	136.33	31	2622	0.51	0.101	0.06	11.89	0.01	0.000
43.59	2.28	76.10	1.84	139.68	33	2673	0.51	0.097	0.05	11.89	0.01	0.000
43.67	2.28	76.57	1.86	142.06	33	2719	0.51	0.094	0.05	11.89	0.01	0.000
43.71	2.27	78.41	1.83	143.50	33	2753	0.51	0.092	0.05	11.89	0.01	0.000
43.78	2.25	82.83	1.75	144.80	33	2793	0.51	0.089	0.05	11.89	0.01	0.000
43.86	2.20	91.54	1.60	146.87	33	2837	0.51	0.087	0.05	11.89	0.01	0.000
43.93	2.13	102.36	1.47	150.87	33	2868	0.51	0.085	0.05	11.89	0.01	0.000
43.97	2.06	114.62	1.37	157.28	34	2870	0.51	0.085	0.05	11.89	0.01	0.000
44.04	2.01	124.15	1.31	163.14	34	2834	0.51	0.087	0.05	11.89	0.01	0.000
44.12	1.96	129.99	1.28	166.32	34	2762	0.51	0.092	0.05	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
44.19	1.94	130.06	1.27	164.58	34	2675	0.51	0.098	0.05	11.89	0.01	0.000
44.23	1.94	126.13	1.26	159.09	32	2569	0.51	0.106	0.06	11.89	0.01	0.000
44.30	1.95	119.44	1.27	151.31	31	2469	0.51	0.116	0.07	11.89	0.02	0.000
44.38	1.97	110.18	1.29	141.74	29	2388	0.51	0.125	0.08	11.89	0.02	0.000
44.46	2.01	101.81	1.32	134.19	28	2357	0.51	0.129	0.09	11.89	0.02	0.000
44.49	2.05	95.12	1.36	129.00	27	2347	0.51	0.130	0.09	11.89	0.02	0.000
44.57	2.09	89.62	1.40	125.84	27	2359	0.51	0.129	0.09	11.89	0.02	0.000
44.65	2.13	84.41	1.47	123.87	27	2379	0.51	0.126	0.09	11.89	0.02	0.000
44.69	2.18	79.28	1.57	124.15	28	2425	0.51	0.121	0.08	11.89	0.02	0.000
44.77	2.22	75.15	1.67	125.71	29	2470	0.51	0.116	0.08	11.89	0.02	0.000
44.84	2.26	71.37	1.80	128.21	30	2513	0.51	0.112	0.07	11.89	0.02	0.000
44.91	2.29	68.84	1.89	130.10	30	2538	0.51	0.110	0.07	11.89	0.01	0.000
44.95	2.31	66.51	1.97	131.34	31	2546	0.51	0.109	0.06	11.89	0.01	0.000
45.03	2.33	64.32	2.06	132.19	32	2547	0.51	0.109	0.06	11.89	0.01	0.000
45.12	2.35	62.52	2.12	132.80	32	2545	0.51	0.110	0.06	11.89	0.01	0.000
45.15	2.36	61.40	2.16	132.74	32	2536	0.51	0.110	0.06	11.89	0.01	0.000
45.23	2.36	60.46	2.18	131.55	32	2513	0.50	0.113	0.06	11.89	0.01	0.000
45.30	2.36	59.74	2.18	129.94	31	2485	0.50	0.115	0.07	11.89	0.01	0.000
45.37	2.36	59.43	2.16	128.57	31	2465	0.50	0.118	0.07	11.89	0.01	0.000
45.41	2.35	59.61	2.15	127.99	31	2460	0.50	0.118	0.07	11.89	0.01	0.000
45.49	2.35	60.06	2.13	128.16	31	2470	0.50	0.117	0.07	11.89	0.01	0.000
45.56	2.34	61.54	2.09	128.62	31	2492	0.50	0.115	0.07	11.89	0.01	0.000
45.63	2.33	63.53	2.03	129.20	31	2520	0.50	0.112	0.07	11.89	0.01	0.000
45.67	2.31	66.58	1.95	129.91	31	2555	0.50	0.109	0.07	11.89	0.01	0.000
45.75	2.29	69.64	1.89	131.57	31	2603	0.50	0.105	0.06	11.89	0.01	0.000
45.83	2.28	72.48	1.85	134.38	31	2669	0.50	0.100	0.06	11.89	0.01	0.000
45.91	2.28	73.96	1.85	137.05	32	2726	0.50	0.096	0.05	11.89	0.01	0.000
45.94	2.29	74.67	1.87	139.62	33	2775	0.50	0.093	0.05	11.89	0.01	0.000
46.01	2.29	75.52	1.88	141.75	33	2820	0.50	0.090	0.05	11.89	0.01	0.000
46.08	2.28	77.79	1.85	143.76	34	2868	0.50	0.087	0.05	11.89	0.01	0.000
46.16	2.26	80.99	1.79	144.77	33	2902	0.50	0.085	0.05	11.89	0.01	0.000
46.20	2.22	86.53	1.67	144.61	33	2908	0.50	0.085	0.05	11.89	0.01	0.000
46.27	2.17	93.69	1.54	144.41	32	2885	0.50	0.086	0.05	11.89	0.01	0.000
46.35	2.11	101.22	1.44	145.76	32	2849	0.50	0.088	0.05	11.89	0.01	0.000
46.39	2.06	108.15	1.37	148.25	32	2803	0.50	0.091	0.05	11.89	0.01	0.000
46.47	2.03	112.98	1.33	150.56	32	2764	0.50	0.094	0.05	11.89	0.01	0.000
46.54	2.00	115.50	1.31	151.33	32	2714	0.50	0.097	0.06	11.89	0.01	0.000
46.60	1.99	115.83	1.30	150.43	31	2661	0.50	0.101	0.06	11.89	0.01	0.000
46.67	1.97	115.76	1.29	149.04	31	2597	0.50	0.107	0.06	11.89	0.01	0.000
46.74	1.96	116.61	1.27	148.50	30	2535	0.50	0.112	0.07	11.89	0.01	0.000
46.83	1.94	117.30	1.26	148.30	30	2495	0.50	0.116	0.07	11.89	0.01	0.000
46.87	1.94	117.61	1.26	148.38	30	2487	0.50	0.117	0.07	11.89	0.01	0.000
46.94	1.93	118.59	1.26	149.38	30	2497	0.50	0.116	0.07	11.89	0.01	0.000
47.02	1.93	120.24	1.26	151.14	31	2518	0.50	0.114	0.07	11.89	0.01	0.000
47.09	1.93	122.03	1.25	153.00	31	2537	0.50	0.112	0.07	11.89	0.01	0.000
47.13	1.92	124.07	1.25	155.32	31	2568	0.50	0.110	0.06	11.89	0.01	0.000
47.20	1.92	126.07	1.25	157.72	32	2607	0.50	0.106	0.06	11.89	0.01	0.000
47.28	1.92	127.82	1.25	159.94	32	2647	0.50	0.103	0.06	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.32	1.92	129.25	1.25	161.88	33	2686	0.50	0.100	0.06	11.89	0.01	0.000
47.39	1.92	130.49	1.25	163.54	33	2720	0.50	0.098	0.05	11.89	0.01	0.000
47.46	1.92	132.61	1.25	165.96	34	2755	0.50	0.095	0.05	11.89	0.01	0.000
47.54	1.92	135.03	1.25	168.48	34	2781	0.50	0.094	0.05	11.89	0.01	0.000
47.58	1.90	139.31	1.24	172.61	35	2808	0.49	0.092	0.05	11.89	0.01	0.000
47.65	1.88	145.85	1.23	178.78	36	2848	0.49	0.089	0.04	11.89	0.01	0.000
47.72	1.86	154.34	1.21	186.67	37	2905	0.49	0.086	0.04	11.89	0.01	0.000
47.80	1.85	160.78	1.20	192.68	38	2959	0.49	0.083	0.04	11.89	0.01	0.000
47.84	1.85	163.00	1.20	195.27	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.92	1.86	160.55	1.21	193.50	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.00	1.87	156.55	1.21	190.00	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.03	1.89	149.32	1.23	183.22	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.11	1.93	136.02	1.26	170.91	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.19	2.01	116.45	1.32	153.27	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.26	2.10	98.60	1.42	139.88	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.30	2.19	84.43	1.58	133.48	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.38	2.36	54.90	2.18	119.74	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.45	2.45	48.37	2.67	128.91	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.53	2.53	43.82	3.17	138.99	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.57	2.57	41.86	3.52	147.15	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.64	2.60	40.54	3.78	153.27	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.72	2.64	38.93	4.08	158.67	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.76	2.68	36.32	4.50	163.56	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.84	2.72	33.75	4.96	167.39	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.91	2.76	31.73	5.36	170.05	0	0	0.49	0.000	0.00	0.00	0.00	0.000
48.95	2.75	32.00	5.26	168.24	0	0	0.49	0.000	0.00	0.00	0.00	0.000
49.03	2.70	34.29	4.72	161.78	0	0	0.49	0.000	0.00	0.00	0.00	0.000
49.10	2.63	37.93	4.02	152.44	0	0	0.49	0.000	0.00	0.00	0.00	0.000
49.18	2.56	41.45	3.40	140.83	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.25	2.50	43.78	3.00	131.15	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.28	2.47	45.04	2.80	126.18	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.36	2.47	45.70	2.75	125.66	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.44	2.46	46.31	2.73	126.40	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.48	2.45	46.83	2.66	124.65	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.56	2.44	46.97	2.61	122.63	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.63	2.44	46.97	2.58	121.04	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.69	2.43	47.23	2.54	119.91	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.78	2.42	47.66	2.50	119.24	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.81	2.41	48.58	2.45	118.83	0	0	0.49	0.000	0.00	11.89	0.00	0.000
49.88	2.41	49.36	2.42	119.68	0	0	0.48	0.000	0.00	11.89	0.00	0.000
49.96	2.41	49.89	2.43	121.18	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.00	2.42	49.63	2.49	123.83	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.08	2.44	48.79	2.59	126.60	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.15	2.46	47.80	2.71	129.64	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.23	2.47	47.42	2.77	131.46	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.27	2.48	47.12	2.84	133.72	0	0	0.48	0.000	0.00	11.89	0.00	0.000
50.34	2.48	47.00	2.88	135.18	0	0	0.48	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)

Total estimated settlement: 0.15

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
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

GeoTek, Inc.
1548 N. Maple Street
Corona, CA 92878
951-710-1160, www.geotekusa.com

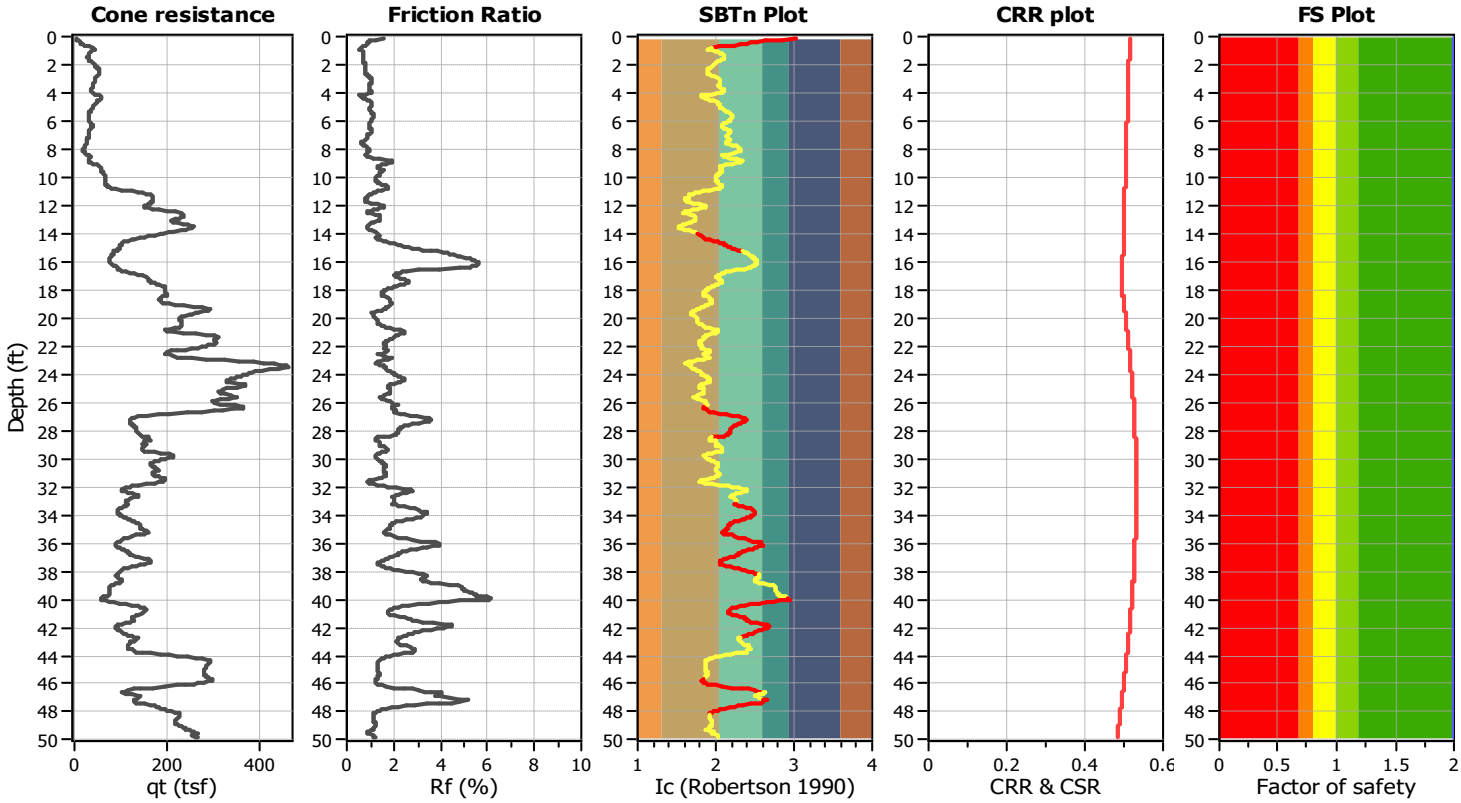
LIQUEFACTION ANALYSIS REPORT

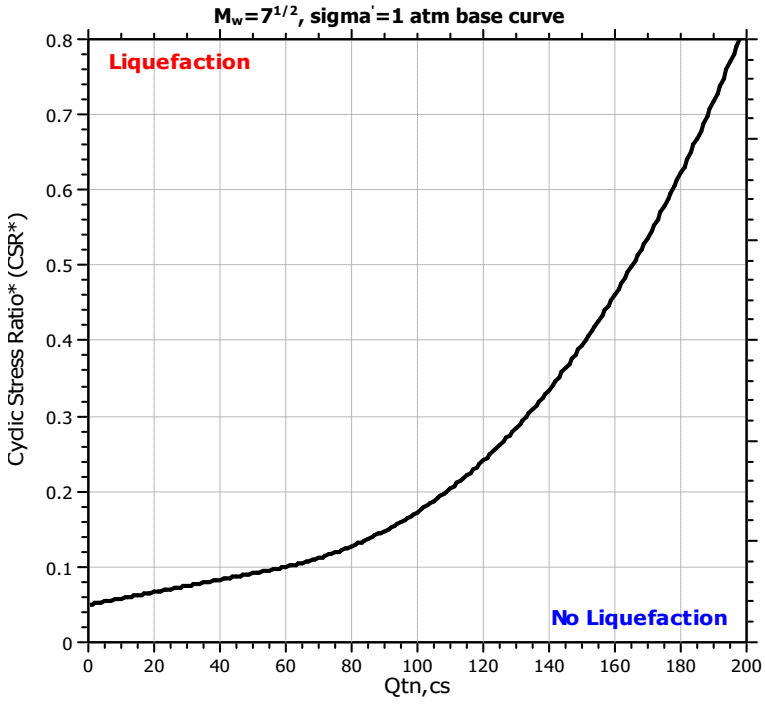
Project title : Xenia Site **Location : Beaumont, California**

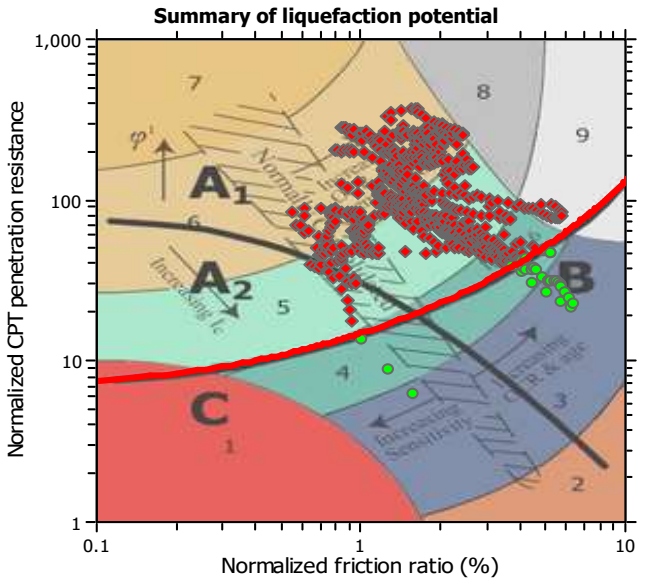
CPT file : CPT-4

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	100.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	100.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.13	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.90	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

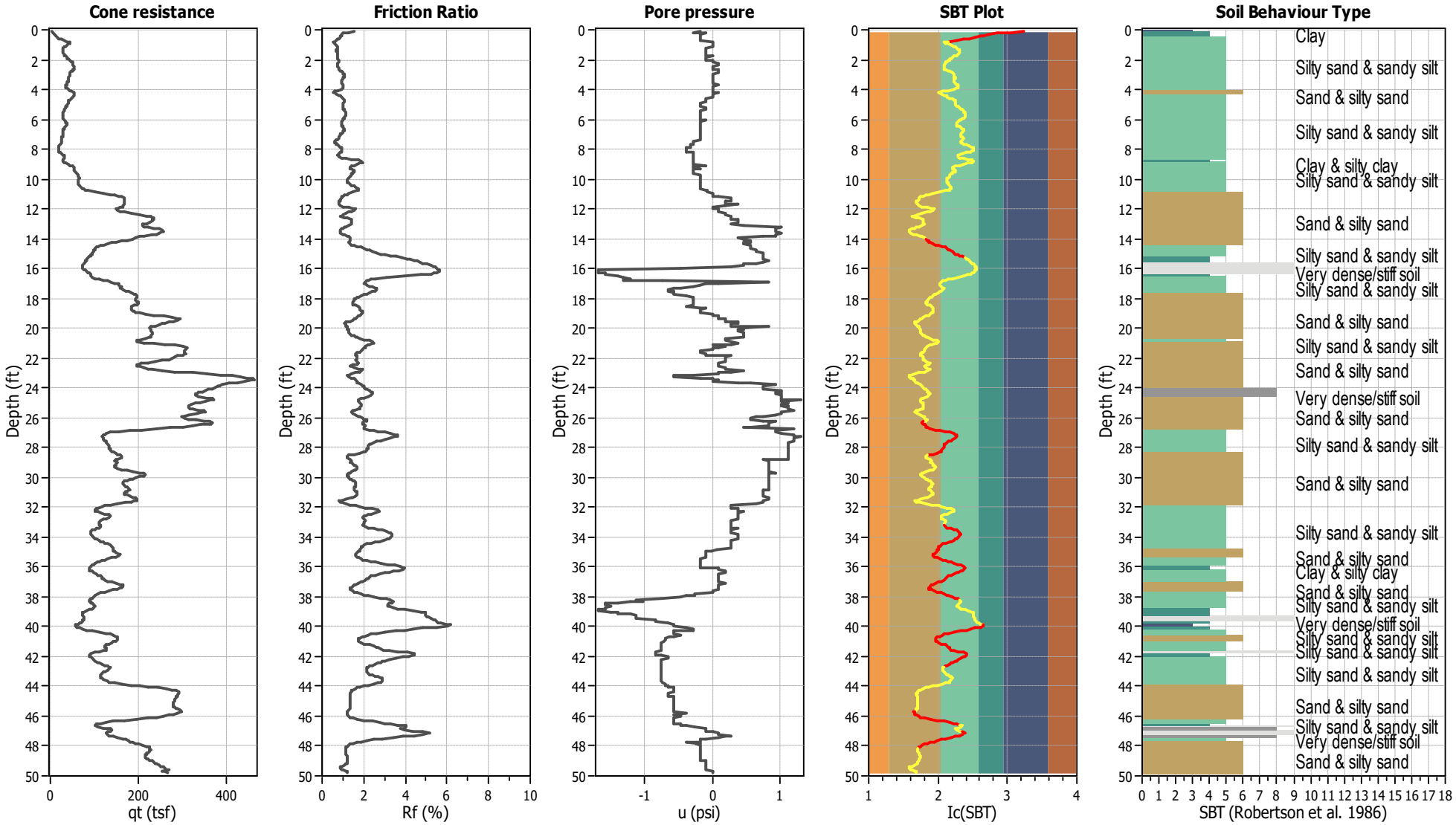






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



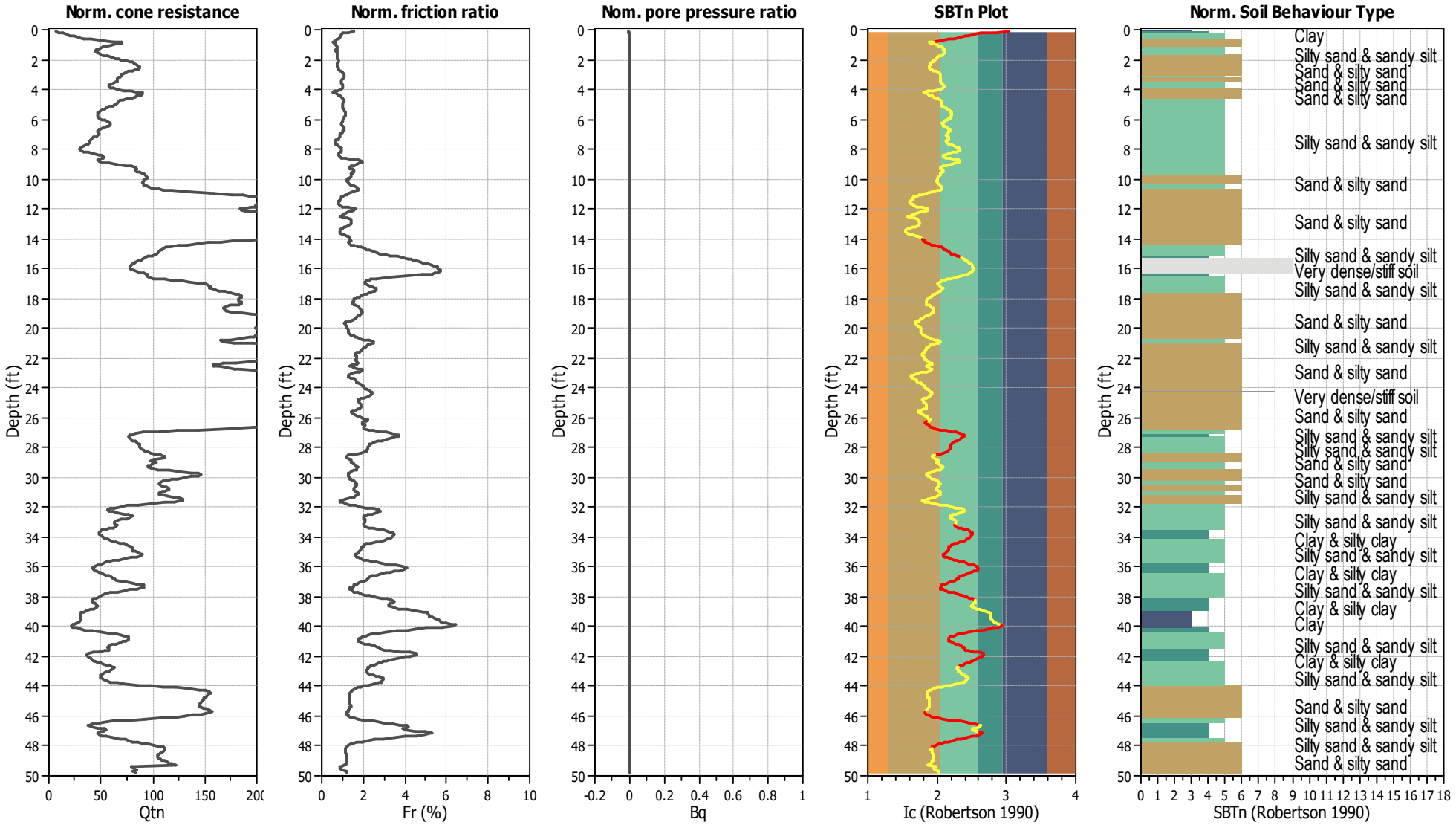
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



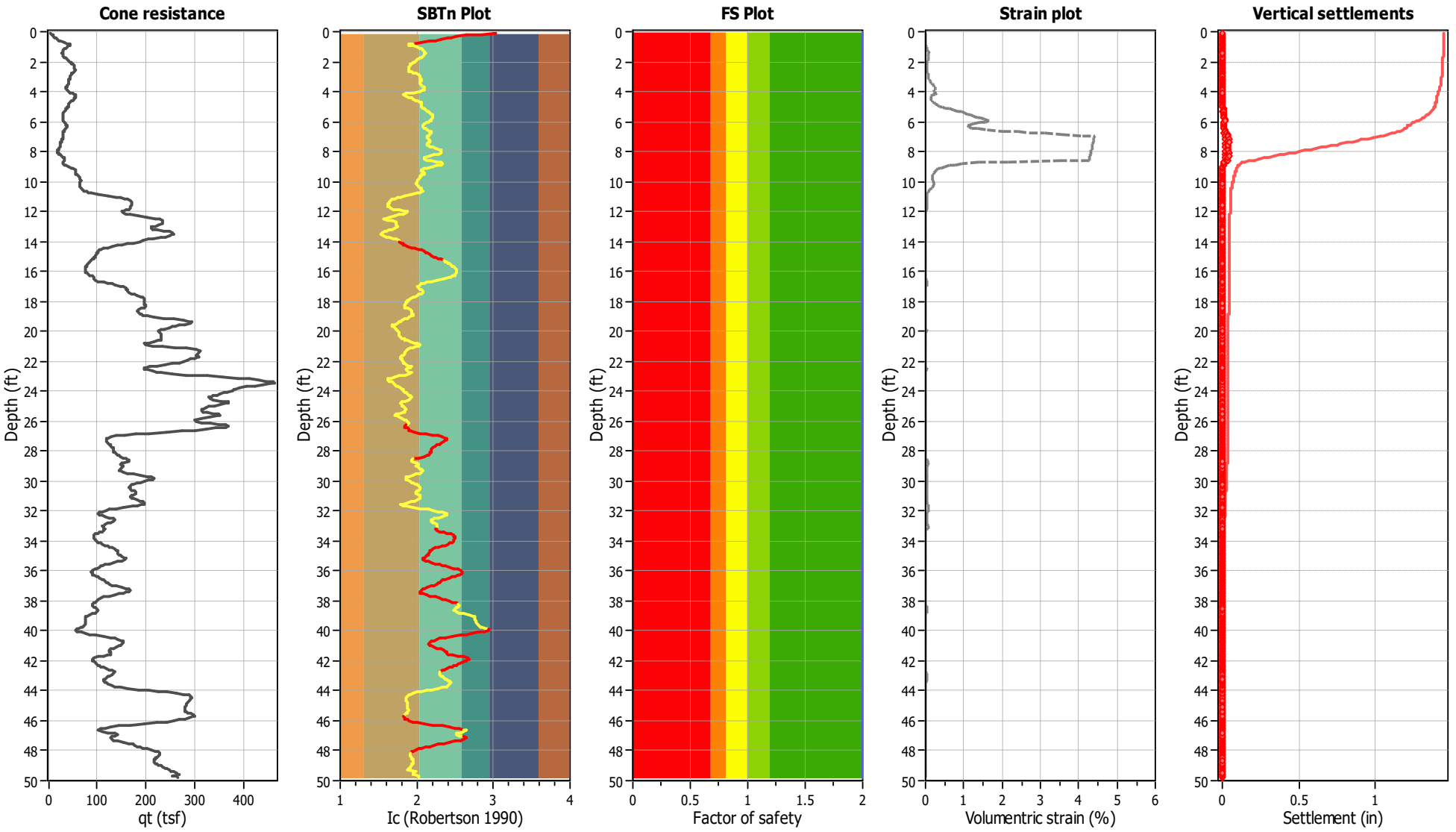
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	100.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.13	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.90	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	100.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.07	3.03	6.14	9.36	57.47	0	0	0.51	0.000	0.00	0.00	0.00	0.000
0.14	2.85	8.84	6.49	57.33	0	0	0.51	0.000	0.00	0.00	0.00	0.000
0.22	2.64	13.53	4.11	55.56	0	0	0.51	0.000	0.00	0.00	0.00	0.000
0.29	2.52	17.52	3.14	54.98	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.33	2.45	20.77	2.68	55.63	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.41	2.40	23.56	2.39	56.27	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.48	2.32	28.06	2.02	56.70	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.56	2.25	33.05	1.75	57.75	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.59	2.16	40.20	1.53	61.62	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.67	2.06	50.34	1.36	68.69	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.74	1.95	62.39	1.27	79.39	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.82	1.89	70.08	1.23	86.42	0	0	0.51	0.000	0.00	11.89	0.00	0.000
0.86	1.90	70.38	1.24	87.02	17	437	0.51	0.014	0.02	11.89	0.01	0.000
0.93	1.95	65.32	1.27	82.81	17	430	0.51	0.016	0.02	11.89	0.02	0.000
1.01	2.00	59.87	1.31	78.17	16	421	0.51	0.020	0.03	11.89	0.02	0.000
1.05	2.04	55.61	1.34	74.50	16	410	0.51	0.023	0.03	11.89	0.03	0.000
1.12	2.06	52.56	1.36	71.71	15	399	0.51	0.029	0.04	11.89	0.04	0.000
1.19	2.08	49.40	1.39	68.60	15	385	0.51	0.037	0.05	11.89	0.05	0.000
1.26	2.09	46.65	1.41	65.84	14	371	0.51	0.048	0.07	11.89	0.06	0.001
1.33	2.10	45.56	1.42	64.61	14	364	0.51	0.058	0.09	11.89	0.08	0.001
1.41	2.11	44.91	1.43	64.27	14	363	0.51	0.068	0.10	11.89	0.09	0.001
1.45	2.10	45.80	1.42	65.24	14	368	0.51	0.068	0.10	11.89	0.09	0.000
1.52	2.10	46.82	1.42	66.53	14	375	0.51	0.070	0.10	11.89	0.09	0.001
1.59	2.08	49.76	1.39	69.27	15	389	0.51	0.068	0.10	11.89	0.08	0.001
1.67	2.06	52.60	1.37	72.00	15	401	0.51	0.066	0.09	11.89	0.08	0.001
1.71	2.04	56.30	1.34	75.49	16	416	0.51	0.061	0.08	11.89	0.07	0.000
1.79	2.01	60.25	1.32	79.39	17	431	0.51	0.058	0.07	11.89	0.06	0.001
1.86	1.99	64.14	1.30	83.39	17	447	0.51	0.056	0.07	11.89	0.06	0.001
1.90	1.98	67.43	1.29	87.07	18	463	0.51	0.051	0.06	11.89	0.05	0.000
1.98	1.97	70.43	1.28	90.45	19	478	0.51	0.050	0.05	11.89	0.05	0.000
2.06	1.95	74.12	1.27	94.36	19	493	0.51	0.048	0.05	11.89	0.04	0.000
2.13	1.94	77.32	1.26	97.53	20	504	0.51	0.049	0.05	11.89	0.04	0.000
2.17	1.92	80.22	1.25	100.24	20	511	0.51	0.048	0.05	11.89	0.04	0.000
2.24	1.91	82.36	1.24	102.25	21	516	0.51	0.050	0.05	11.89	0.04	0.000
2.32	1.90	84.41	1.23	104.21	21	522	0.51	0.051	0.05	11.89	0.04	0.000
2.40	1.89	85.80	1.23	105.64	21	527	0.51	0.053	0.05	11.89	0.04	0.000
2.43	1.89	86.89	1.23	106.85	21	533	0.51	0.053	0.05	11.89	0.04	0.000
2.51	1.89	87.13	1.23	107.27	21	535	0.51	0.056	0.05	11.89	0.04	0.000
2.58	1.91	85.67	1.24	106.27	21	536	0.51	0.059	0.05	11.89	0.05	0.000
2.66	1.93	83.27	1.25	104.40	21	534	0.51	0.063	0.06	11.89	0.05	0.000
2.69	1.95	80.02	1.27	101.87	21	533	0.51	0.066	0.06	11.89	0.05	0.000
2.76	1.99	76.67	1.30	99.33	21	531	0.51	0.070	0.07	11.89	0.06	0.000
2.84	2.02	73.31	1.32	96.90	20	528	0.51	0.076	0.07	11.89	0.06	0.001
2.91	2.04	71.04	1.34	95.32	20	525	0.51	0.082	0.08	11.89	0.07	0.001
2.99	2.04	70.38	1.35	94.83	20	524	0.51	0.088	0.09	11.89	0.08	0.001
3.03	2.04	70.13	1.35	94.53	20	522	0.51	0.092	0.09	11.89	0.08	0.000
3.10	2.05	69.03	1.35	93.48	20	518	0.51	0.100	0.10	11.89	0.09	0.001
3.17	2.05	67.58	1.36	91.91	20	511	0.51	0.113	0.12	11.89	0.10	0.001

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
3.26	2.06	66.37	1.36	90.44	19	503	0.51	0.127	0.13	11.89	0.11	0.001
3.28	2.05	66.02	1.35	89.40	19	495	0.51	0.139	0.15	11.89	0.13	0.000
3.37	2.04	65.76	1.35	88.53	19	489	0.51	0.156	0.17	11.89	0.14	0.001
3.44	2.04	65.30	1.34	87.61	19	483	0.51	0.175	0.19	11.89	0.16	0.002
3.48	2.05	63.85	1.35	86.28	18	478	0.51	0.190	0.21	11.89	0.18	0.001
3.56	2.06	61.84	1.37	84.76	18	473	0.51	0.211	0.24	11.89	0.20	0.002
3.64	2.08	59.69	1.40	83.28	18	468	0.51	0.235	0.27	11.89	0.23	0.002
3.68	2.10	58.28	1.41	82.30	18	464	0.51	0.253	0.29	11.89	0.25	0.001
3.75	2.10	58.07	1.42	82.39	18	465	0.51	0.263	0.30	11.89	0.25	0.002
3.83	2.10	59.26	1.41	83.72	18	472	0.51	0.258	0.29	11.89	0.24	0.002
3.90	2.08	61.66	1.40	86.08	19	483	0.51	0.240	0.26	11.89	0.22	0.002
3.94	2.04	66.36	1.34	89.00	19	490	0.51	0.230	0.25	11.89	0.21	0.001
4.02	1.95	72.60	1.27	92.26	19	481	0.51	0.266	0.29	11.89	0.24	0.002
4.10	1.87	79.29	1.21	96.16	19	472	0.51	0.310	0.33	11.89	0.28	0.002
4.14	1.81	85.19	1.17	99.57	19	475	0.51	0.306	0.32	11.89	0.27	0.001
4.21	1.82	89.63	1.17	105.14	20	503	0.51	0.243	0.24	11.89	0.20	0.002
4.29	1.86	89.57	1.21	108.01	21	527	0.51	0.204	0.19	11.89	0.16	0.001
4.35	1.89	88.66	1.23	109.15	22	545	0.51	0.181	0.16	11.89	0.14	0.001
4.42	1.93	85.16	1.26	107.15	22	551	0.51	0.179	0.16	11.89	0.14	0.001
4.49	1.95	83.60	1.27	106.24	22	554	0.51	0.182	0.16	11.89	0.14	0.001
4.53	1.98	79.35	1.29	102.73	21	548	0.51	0.195	0.18	11.89	0.15	0.001
4.61	2.02	75.14	1.32	99.20	21	540	0.51	0.218	0.21	11.89	0.17	0.001
4.68	2.04	71.68	1.34	96.32	20	531	0.51	0.246	0.24	11.89	0.20	0.002
4.72	2.06	68.98	1.36	93.86	20	522	0.51	0.275	0.28	11.89	0.23	0.001
4.80	2.06	66.98	1.37	91.75	20	511	0.51	0.315	0.32	11.89	0.27	0.002
4.88	2.07	65.32	1.37	89.64	19	500	0.51	0.370	0.39	11.89	0.32	0.003
4.95	2.06	64.26	1.37	88.09	19	491	0.51	0.423	0.46	11.89	0.38	0.003
4.99	2.06	63.36	1.37	86.78	19	484	0.51	0.471	0.52	11.89	0.43	0.002
5.07	2.08	61.20	1.39	84.81	18	475	0.51	0.544	0.61	11.89	0.50	0.005
5.14	2.10	58.29	1.41	82.47	18	465	0.51	0.642	0.74	11.89	0.61	0.005
5.22	2.12	55.44	1.45	80.42	18	455	0.51	0.755	0.88	11.89	0.73	0.006
5.26	2.14	53.03	1.49	78.88	17	447	0.51	0.859	1.02	11.89	0.84	0.004
5.34	2.16	51.23	1.52	78.01	17	442	0.51	0.966	1.15	11.89	0.94	0.009
5.41	2.18	49.57	1.56	77.42	17	438	0.51	1.069	1.27	11.89	1.04	0.009
5.48	2.19	48.46	1.59	77.22	17	435	0.51	1.150	1.36	11.89	1.11	0.009
5.52	2.20	47.56	1.62	76.97	17	433	0.51	1.220	1.44	11.89	1.18	0.006
5.60	2.21	46.95	1.64	76.82	17	431	0.51	1.308	1.55	11.89	1.26	0.012
5.68	2.21	46.65	1.64	76.67	17	430	0.51	1.392	1.65	11.89	1.34	0.013
5.72	2.21	46.69	1.63	76.15	17	428	0.51	1.473	1.76	11.89	1.43	0.007
5.79	2.20	47.08	1.61	75.65	17	426	0.51	1.574	1.91	11.89	1.55	0.014
5.87	2.18	47.77	1.58	75.27	17	425	0.51	1.665	2.04	11.89	1.66	0.015
5.94	2.17	48.81	1.55	75.54	17	428	0.51	1.669	2.05	11.89	1.66	0.014
5.98	2.15	50.61	1.51	76.32	17	433	0.51	1.577	1.93	11.89	1.57	0.008
6.06	2.13	53.15	1.46	77.83	17	441	0.51	1.454	1.76	11.89	1.42	0.013
6.14	2.10	56.15	1.42	79.93	17	451	0.51	1.307	1.55	11.89	1.25	0.011
6.21	2.09	58.40	1.40	81.69	18	459	0.51	1.215	1.42	11.89	1.14	0.010
6.25	2.08	59.70	1.39	82.73	18	463	0.51	1.169	1.35	11.89	1.09	0.005
6.32	2.08	59.49	1.39	82.67	18	464	0.51	1.208	1.39	11.89	1.12	0.010

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
6.40	2.09	58.33	1.41	82.01	18	462	0.51	1.291	1.50	11.89	1.20	0.011
6.44	2.11	55.88	1.44	80.56	18	456	0.51	1.426	1.67	11.89	1.34	0.006
6.51	2.14	52.87	1.49	78.78	17	447	0.51	1.684	2.00	11.89	1.60	0.014
6.59	2.17	50.02	1.54	76.93	17	436	0.51	2.069	2.50	11.89	2.00	0.019
6.67	2.18	48.16	1.57	75.52	17	427	0.51	2.470	3.02	11.89	2.42	0.022
6.71	2.18	47.45	1.57	74.62	17	422	0.51	2.747	3.41	11.89	2.72	0.013
6.78	2.18	47.24	1.56	73.71	16	417	0.51	3.081	3.89	11.89	3.10	0.026
6.86	2.17	47.38	1.54	72.82	16	412	0.51	3.467	4.47	11.89	3.56	0.035
6.90	2.15	47.73	1.50	71.75	16	407	0.51	3.899	5.16	11.89	4.10	0.017
6.97	2.14	47.83	1.48	70.82	16	401	0.51	4.462	6.03	11.89	4.41	0.040
7.04	2.14	46.98	1.48	69.41	15	393	0.51	5.376	7.45	11.89	4.40	0.038
7.13	2.15	45.52	1.49	68.02	15	386	0.51	6.532	9.23	11.89	4.40	0.043
7.16	2.16	43.57	1.52	66.43	15	376	0.51	8.062	11.63	11.89	4.39	0.021
7.24	2.17	42.05	1.55	65.07	14	368	0.51	9.967	14.66	11.89	4.39	0.039
7.31	2.17	40.64	1.54	62.45	14	354	0.51	14.448	22.38	11.89	4.38	0.036
7.39	2.15	39.94	1.51	60.20	13	341	0.51	20.551	33.51	11.89	4.37	0.044
7.43	2.14	39.54	1.48	58.47	13	331	0.51	27.183	46.24	11.89	4.37	0.019
7.51	2.14	39.23	1.49	58.33	13	331	0.51	28.882	49.16	11.89	4.36	0.041
7.58	2.15	38.87	1.50	58.50	13	332	0.51	29.194	49.29	11.89	4.36	0.037
7.62	2.17	38.12	1.54	58.69	13	332	0.51	29.266	48.81	11.89	4.35	0.021
7.69	2.21	35.86	1.64	58.65	13	329	0.51	33.164	54.25	11.89	4.35	0.040
7.76	2.25	33.51	1.76	58.99	14	325	0.51	38.465	61.12	11.89	4.34	0.033
7.83	2.30	31.15	1.92	59.73	14	320	0.51	46.117	70.50	11.89	4.34	0.041
7.90	2.31	30.50	1.98	60.32	14	320	0.51	48.464	72.61	11.89	4.33	0.037
7.95	2.32	30.04	2.02	60.77	14	320	0.51	49.970	73.77	11.89	4.33	0.022
8.03	2.32	30.38	2.01	61.17	15	322	0.51	48.157	70.62	11.89	4.32	0.043
8.10	2.31	31.23	1.97	61.53	15	327	0.51	43.855	64.23	11.89	4.31	0.037
8.14	2.28	33.17	1.87	62.01	14	336	0.51	35.043	51.56	11.89	4.31	0.021
8.21	2.23	37.37	1.68	62.81	14	351	0.51	24.473	36.56	11.89	4.30	0.037
8.30	2.16	42.36	1.53	64.82	14	367	0.51	16.961	25.16	11.89	4.30	0.043
8.34	2.11	47.86	1.43	68.36	15	386	0.51	11.390	16.30	11.89	4.29	0.022
8.42	2.09	50.55	1.40	70.99	15	399	0.51	8.974	12.37	11.89	4.29	0.040
8.47	2.09	52.35	1.41	73.76	16	415	0.51	6.772	8.90	11.89	4.28	0.029
8.54	2.13	52.24	1.46	76.23	17	432	0.51	5.201	6.47	11.89	4.28	0.035
8.61	2.18	50.48	1.58	79.56	18	449	0.50	3.998	4.59	11.89	3.53	0.030
8.66	2.26	48.48	1.78	86.22	20	474	0.50	2.812	2.83	11.89	2.17	0.014
8.74	2.32	47.27	1.99	94.28	22	499	0.50	2.058	1.80	11.89	1.38	0.012
8.81	2.34	48.51	2.07	100.38	24	523	0.50	1.547	1.24	11.89	0.95	0.008
8.86	2.32	51.61	1.99	102.79	24	544	0.50	1.247	0.98	11.89	0.75	0.005
8.93	2.26	57.70	1.79	103.49	24	567	0.50	0.995	0.80	11.89	0.61	0.005
9.01	2.20	64.80	1.63	105.38	24	592	0.50	0.799	0.65	11.89	0.49	0.004
9.06	2.14	73.20	1.48	108.10	24	619	0.50	0.635	0.52	11.89	0.39	0.002
9.14	2.09	78.83	1.41	110.88	24	643	0.50	0.536	0.43	11.89	0.33	0.003
9.19	2.06	83.71	1.36	113.97	24	662	0.50	0.470	0.37	11.89	0.28	0.002
9.27	2.05	84.89	1.36	115.30	24	673	0.50	0.442	0.35	11.89	0.26	0.002
9.32	2.07	84.44	1.38	116.56	25	685	0.50	0.413	0.32	11.89	0.24	0.002
9.40	2.09	83.84	1.40	117.61	25	696	0.50	0.391	0.29	11.89	0.22	0.002
9.47	2.09	84.73	1.41	119.07	26	709	0.50	0.367	0.27	11.89	0.21	0.002

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
9.53	2.07	87.35	1.38	120.34	26	718	0.50	0.350	0.26	11.89	0.20	0.001
9.59	2.05	89.46	1.36	121.62	26	728	0.50	0.335	0.25	11.89	0.19	0.001
9.65	2.05	90.81	1.35	122.68	26	737	0.50	0.322	0.23	11.89	0.18	0.001
9.72	2.04	92.36	1.34	123.91	26	746	0.50	0.309	0.22	11.89	0.17	0.001
9.79	2.02	94.07	1.33	124.74	26	752	0.50	0.305	0.22	11.89	0.17	0.001
9.87	2.01	94.81	1.31	124.45	26	750	0.50	0.314	0.23	11.89	0.17	0.002
9.91	2.00	93.78	1.31	122.51	25	739	0.50	0.341	0.25	11.89	0.19	0.001
9.99	2.00	92.36	1.31	120.61	25	731	0.50	0.365	0.28	11.89	0.21	0.002
10.06	2.00	91.13	1.30	118.90	25	724	0.50	0.390	0.30	11.89	0.23	0.002
10.14	2.00	90.68	1.30	118.26	25	724	0.50	0.399	0.31	11.89	0.23	0.002
10.18	2.00	90.55	1.31	118.72	25	730	0.50	0.385	0.30	11.89	0.22	0.001
10.25	2.02	90.50	1.32	119.47	25	742	0.50	0.366	0.28	11.89	0.21	0.002
10.33	2.03	90.88	1.33	121.23	26	760	0.50	0.333	0.25	11.89	0.18	0.002
10.40	2.04	91.60	1.34	122.93	26	776	0.50	0.309	0.23	11.89	0.17	0.001
10.44	2.05	93.35	1.36	126.92	27	807	0.50	0.264	0.18	11.89	0.14	0.001
10.52	2.07	95.98	1.38	132.23	28	847	0.50	0.219	0.14	11.89	0.11	0.001
10.59	2.07	100.79	1.38	139.13	30	897	0.50	0.179	0.11	11.89	0.08	0.001
10.67	2.06	106.17	1.36	144.86	31	936	0.50	0.155	0.09	11.89	0.07	0.001
10.71	2.05	109.95	1.35	148.54	31	960	0.50	0.143	0.08	11.89	0.06	0.000
10.78	2.01	118.50	1.31	155.51	32	996	0.50	0.127	0.07	11.89	0.05	0.000
10.85	1.93	136.20	1.25	170.80	35	1057	0.50	0.106	0.06	11.89	0.04	0.000
10.91	1.84	158.84	1.19	189.36	37	1131	0.50	0.088	0.04	11.89	0.03	0.000
10.99	1.78	175.53	1.13	199.07	38	1184	0.50	0.078	0.04	11.89	0.03	0.000
11.03	1.74	186.11	1.08	200.09	38	1206	0.50	0.075	0.03	11.89	0.03	0.000
11.11	1.71	193.95	1.00	194.12	36	1212	0.50	0.075	0.04	11.89	0.03	0.000
11.18	1.67	201.20	1.00	201.20	37	1215	0.50	0.076	0.04	11.89	0.03	0.000
11.26	1.65	205.04	1.00	205.04	38	1222	0.50	0.075	0.04	11.89	0.03	0.000
11.30	1.65	206.41	1.00	206.41	38	1231	0.50	0.074	0.03	11.89	0.03	0.000
11.37	1.65	206.36	1.00	206.36	38	1224	0.50	0.076	0.04	11.89	0.03	0.000
11.45	1.63	205.44	1.00	205.44	37	1204	0.50	0.081	0.04	11.89	0.03	0.000
11.48	1.61	205.67	1.00	205.67	37	1180	0.50	0.086	0.04	11.89	0.03	0.000
11.56	1.61	204.77	1.00	204.77	37	1179	0.50	0.088	0.04	11.89	0.03	0.000
11.64	1.62	202.43	1.00	202.43	37	1187	0.50	0.087	0.04	11.89	0.03	0.000
11.71	1.63	200.09	1.00	200.09	37	1192	0.50	0.087	0.04	11.89	0.03	0.000
11.75	1.66	199.15	1.00	199.15	37	1221	0.50	0.082	0.04	11.89	0.03	0.000
11.83	1.70	198.30	1.00	198.30	37	1282	0.50	0.073	0.03	11.89	0.03	0.000
11.90	1.78	194.18	1.12	218.28	42	1364	0.50	0.063	0.03	11.89	0.02	0.000
11.98	1.84	187.50	1.19	223.63	44	1419	0.50	0.058	0.02	11.89	0.02	0.000
12.02	1.87	183.54	1.22	223.42	44	1440	0.50	0.056	0.02	11.89	0.02	0.000
12.10	1.86	184.80	1.21	223.00	44	1434	0.50	0.058	0.02	11.89	0.02	0.000
12.17	1.82	190.45	1.17	223.65	44	1424	0.50	0.059	0.02	11.89	0.02	0.000
12.21	1.77	200.46	1.11	223.40	43	1420	0.50	0.060	0.02	11.89	0.02	0.000
12.29	1.71	216.36	1.01	218.44	41	1442	0.50	0.058	0.02	11.89	0.02	0.000
12.36	1.65	234.67	1.00	234.67	43	1462	0.50	0.057	0.02	11.89	0.02	0.000
12.43	1.59	252.49	1.00	252.49	45	1478	0.50	0.056	0.02	11.89	0.01	0.000
12.47	1.57	264.66	1.00	264.66	47	1504	0.50	0.054	0.02	11.89	0.01	0.000
12.54	1.62	267.64	1.00	267.64	49	1628	0.50	0.046	0.02	11.89	0.01	0.000
12.62	1.67	270.80	1.00	270.80	50	1757	0.50	0.040	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
12.69	1.72	269.79	1.04	279.34	53	1859	0.50	0.036	0.01	11.89	0.01	0.000
12.73	1.73	271.05	1.04	281.79	53	1876	0.50	0.036	0.01	11.89	0.01	0.000
12.81	1.73	267.90	1.04	279.88	53	1867	0.50	0.037	0.01	11.89	0.01	0.000
12.89	1.74	259.23	1.06	274.45	52	1828	0.50	0.039	0.01	11.89	0.01	0.000
12.96	1.74	250.70	1.07	269.04	51	1790	0.50	0.040	0.01	11.89	0.01	0.000
13.00	1.75	240.77	1.08	261.08	50	1736	0.50	0.043	0.01	11.89	0.01	0.000
13.08	1.72	239.70	1.03	247.39	47	1679	0.50	0.047	0.02	11.89	0.01	0.000
13.15	1.68	240.31	1.00	240.31	45	1621	0.50	0.051	0.02	11.89	0.01	0.000
13.19	1.65	249.90	1.00	249.90	46	1614	0.50	0.051	0.02	11.89	0.01	0.000
13.26	1.61	262.88	1.00	262.88	48	1633	0.50	0.051	0.02	11.89	0.01	0.000
13.34	1.58	274.33	1.00	274.33	49	1640	0.50	0.051	0.02	11.89	0.01	0.000
13.42	1.55	281.35	1.00	281.35	50	1621	0.50	0.052	0.02	11.89	0.01	0.000
13.46	1.53	282.94	1.00	282.94	50	1605	0.50	0.054	0.02	11.89	0.01	0.000
13.54	1.54	280.91	1.00	280.91	50	1609	0.50	0.054	0.02	11.89	0.01	0.000
13.60	1.56	273.99	1.00	273.99	49	1624	0.50	0.053	0.02	11.89	0.01	0.000
13.68	1.60	263.41	1.00	263.41	48	1649	0.50	0.052	0.02	11.89	0.01	0.000
13.72	1.65	252.43	1.00	252.43	46	1667	0.50	0.051	0.02	11.89	0.01	0.000
13.79	1.70	234.24	1.00	234.24	44	1652	0.50	0.053	0.02	11.89	0.01	0.000
13.85	1.73	223.45	1.05	234.72	44	1638	0.50	0.054	0.02	11.89	0.01	0.000
13.92	1.76	211.23	1.11	233.64	45	1614	0.50	0.056	0.02	11.89	0.01	0.000
13.99	1.78	204.55	1.12	229.74	44	1590	0.50	0.059	0.02	11.89	0.02	0.000
14.07	1.81	190.87	1.16	221.33	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.11	1.82	177.33	1.18	208.41	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.19	1.83	164.58	1.18	195.00	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.27	1.84	152.88	1.19	182.53	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.31	1.88	142.27	1.22	174.06	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.39	1.93	132.98	1.25	166.76	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.47	1.97	124.30	1.29	159.92	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.50	2.02	117.19	1.33	155.30	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.58	2.06	113.05	1.36	154.30	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.66	2.09	110.37	1.41	155.51	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.73	2.11	109.22	1.44	157.45	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.77	2.14	107.82	1.48	159.47	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.85	2.16	106.26	1.53	162.37	0	0	0.50	0.000	0.00	11.89	0.00	0.000
14.93	2.19	104.79	1.59	167.12	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.00	2.22	103.64	1.66	171.86	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.04	2.25	101.59	1.75	177.56	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.12	2.28	99.03	1.85	183.02	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.16	2.32	95.78	1.99	190.60	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.23	2.35	92.57	2.14	197.91	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.31	2.38	90.17	2.28	205.29	0	0	0.50	0.000	0.00	11.89	0.00	0.000
15.38	2.40	89.32	2.36	210.42	52	1552	0.50	0.073	0.02	11.89	0.02	0.000
15.42	2.41	88.05	2.44	214.92	53	1563	0.50	0.072	0.02	11.89	0.01	0.000
15.50	2.43	86.36	2.53	218.10	54	1569	0.50	0.072	0.02	11.89	0.01	0.000
15.57	2.45	83.70	2.66	222.23	56	1568	0.50	0.073	0.02	11.89	0.01	0.000
15.65	2.46	81.95	2.75	225.11	57	1570	0.50	0.073	0.02	11.89	0.01	0.000
15.69	2.48	79.92	2.88	229.82	59	1572	0.50	0.073	0.02	11.89	0.01	0.000
15.76	2.50	78.56	2.99	234.69	61	1584	0.50	0.073	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
15.84	2.51	77.92	3.07	239.18	62	1601	0.50	0.071	0.02	11.89	0.01	0.000
15.88	2.52	77.91	3.11	242.52	63	1617	0.50	0.070	0.02	11.89	0.01	0.000
15.96	2.52	78.03	3.13	244.48	64	1632	0.50	0.069	0.02	11.89	0.01	0.000
16.03	2.52	79.03	3.14	248.17	65	1662	0.50	0.067	0.02	11.89	0.01	0.000
16.11	2.52	80.88	3.11	251.26	65	1699	0.50	0.064	0.02	11.89	0.01	0.000
16.15	2.51	83.98	3.03	254.77	66	1746	0.50	0.061	0.01	11.89	0.01	0.000
16.22	2.49	87.38	2.92	255.40	66	1789	0.50	0.058	0.01	11.89	0.01	0.000
16.29	2.47	91.37	2.78	254.35	65	1830	0.50	0.056	0.01	11.89	0.01	0.000
16.37	2.45	93.85	2.68	251.22	63	1848	0.50	0.055	0.01	11.89	0.01	0.000
16.41	2.42	94.98	2.48	235.58	58	1799	0.50	0.058	0.02	11.89	0.01	0.000
16.49	2.36	94.41	2.16	204.03	49	1661	0.50	0.070	0.02	11.89	0.02	0.000
16.57	2.27	96.47	1.81	174.99	41	1529	0.50	0.087	0.04	11.89	0.02	0.000
16.64	2.19	100.62	1.60	161.14	36	1460	0.50	0.099	0.05	11.89	0.03	0.000
16.68	2.14	111.50	1.48	165.13	36	1511	0.50	0.091	0.04	11.89	0.03	0.000
16.75	2.10	118.43	1.43	168.88	37	1545	0.50	0.086	0.04	11.89	0.03	0.000
16.82	2.07	127.01	1.38	174.71	37	1588	0.50	0.081	0.04	11.89	0.02	0.000
16.88	2.04	134.44	1.35	181.34	38	1637	0.50	0.076	0.03	11.89	0.02	0.000
16.96	2.02	144.40	1.32	190.73	40	1702	0.50	0.070	0.03	11.89	0.02	0.000
17.00	2.01	150.56	1.32	198.32	41	1769	0.50	0.064	0.03	11.89	0.02	0.000
17.08	2.02	153.06	1.33	203.08	43	1828	0.50	0.060	0.02	11.89	0.02	0.000
17.15	2.04	154.56	1.34	207.63	44	1891	0.50	0.056	0.02	11.89	0.01	0.000
17.22	2.05	155.79	1.36	211.44	45	1943	0.50	0.054	0.02	11.89	0.01	0.000
17.27	2.07	155.01	1.38	213.84	46	1983	0.50	0.052	0.02	11.89	0.01	0.000
17.34	2.08	156.18	1.39	216.76	47	2021	0.50	0.050	0.02	11.89	0.01	0.000
17.42	2.07	159.14	1.38	220.02	47	2056	0.50	0.049	0.02	11.89	0.01	0.000
17.46	2.06	164.19	1.36	223.44	48	2077	0.50	0.048	0.02	11.89	0.01	0.000
17.54	2.03	168.73	1.34	225.67	48	2083	0.50	0.048	0.02	11.89	0.01	0.000
17.60	2.00	174.36	1.31	228.32	48	2077	0.49	0.049	0.02	11.89	0.01	0.000
17.68	1.97	179.46	1.29	230.76	48	2064	0.49	0.050	0.02	11.89	0.01	0.000
17.72	1.94	183.14	1.27	231.95	47	2038	0.49	0.051	0.02	11.89	0.01	0.000
17.80	1.92	185.09	1.25	231.58	47	2005	0.49	0.053	0.02	11.89	0.01	0.000
17.87	1.90	185.19	1.24	229.13	46	1959	0.49	0.056	0.02	11.89	0.01	0.000
17.95	1.88	184.24	1.23	226.00	45	1916	0.50	0.059	0.02	11.89	0.01	0.000
17.99	1.87	183.09	1.22	222.95	44	1877	0.50	0.062	0.02	11.89	0.01	0.000
18.06	1.86	182.23	1.21	220.60	44	1850	0.50	0.064	0.03	11.89	0.02	0.000
18.15	1.85	181.89	1.20	219.05	43	1833	0.50	0.066	0.03	11.89	0.02	0.000
18.19	1.85	182.22	1.20	218.74	43	1828	0.50	0.067	0.03	11.89	0.02	0.000
18.26	1.84	185.33	1.19	220.34	43	1832	0.50	0.067	0.03	11.89	0.02	0.000
18.33	1.84	184.61	1.19	220.03	43	1837	0.50	0.067	0.03	11.89	0.02	0.000
18.41	1.85	182.07	1.20	218.65	43	1842	0.50	0.067	0.03	11.89	0.02	0.000
18.44	1.89	175.07	1.23	214.91	43	1857	0.50	0.066	0.03	11.89	0.02	0.000
18.52	1.91	170.47	1.25	212.29	43	1875	0.50	0.065	0.03	11.89	0.02	0.000
18.59	1.93	167.54	1.26	210.90	43	1897	0.50	0.064	0.03	11.89	0.02	0.000
18.67	1.94	167.26	1.26	211.08	43	1912	0.50	0.063	0.03	11.89	0.02	0.000
18.72	1.94	168.92	1.26	213.19	43	1934	0.50	0.062	0.02	11.89	0.02	0.000
18.79	1.94	170.54	1.26	215.67	44	1968	0.50	0.060	0.02	11.89	0.01	0.000
18.86	1.95	172.09	1.27	218.29	45	2005	0.50	0.058	0.02	11.89	0.01	0.000
18.90	1.95	175.55	1.27	222.45	45	2044	0.50	0.056	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
18.98	1.93	183.61	1.26	230.50	47	2095	0.50	0.054	0.02	11.89	0.01	0.000
19.06	1.90	195.20	1.24	241.76	48	2160	0.50	0.051	0.02	11.89	0.01	0.000
19.10	1.87	212.52	1.22	258.62	51	2262	0.50	0.047	0.02	11.89	0.01	0.000
19.17	1.84	231.23	1.19	275.27	54	2363	0.50	0.044	0.01	11.89	0.01	0.000
19.25	1.80	249.16	1.16	288.53	56	2445	0.50	0.041	0.01	11.89	0.01	0.000
19.32	1.78	259.79	1.13	293.10	56	2474	0.50	0.041	0.01	11.89	0.01	0.000
19.36	1.76	264.69	1.11	292.56	56	2470	0.50	0.041	0.01	11.89	0.01	0.000
19.43	1.75	260.11	1.08	280.40	53	2379	0.50	0.044	0.01	11.89	0.01	0.000
19.51	1.71	251.16	1.02	255.88	48	2212	0.50	0.051	0.02	11.89	0.01	0.000
19.59	1.69	240.15	1.00	240.15	45	2041	0.50	0.060	0.02	11.89	0.01	0.000
19.63	1.68	232.74	1.00	232.74	43	1954	0.50	0.066	0.03	11.89	0.02	0.000
19.71	1.69	226.31	1.00	226.31	42	1942	0.50	0.067	0.03	11.89	0.02	0.000
19.79	1.70	219.83	1.00	219.83	41	1926	0.50	0.069	0.03	11.89	0.02	0.000
19.83	1.73	209.69	1.05	219.36	41	1897	0.50	0.071	0.03	11.89	0.02	0.000
19.90	1.74	203.29	1.07	216.82	41	1870	0.50	0.074	0.03	11.89	0.02	0.000
19.98	1.76	198.10	1.10	217.08	41	1869	0.50	0.074	0.03	11.89	0.02	0.000
20.05	1.76	199.85	1.10	219.94	42	1897	0.50	0.072	0.03	11.89	0.02	0.000
20.08	1.77	200.80	1.12	223.98	43	1934	0.50	0.070	0.03	11.89	0.02	0.000
20.16	1.77	201.53	1.12	225.37	43	1950	0.51	0.069	0.03	11.89	0.02	0.000
20.24	1.77	202.31	1.12	225.64	43	1957	0.51	0.069	0.03	11.89	0.02	0.000
20.31	1.77	202.17	1.12	226.01	43	1965	0.51	0.068	0.03	11.89	0.02	0.000
20.36	1.79	200.71	1.14	228.02	44	1989	0.51	0.067	0.03	11.89	0.02	0.000
20.43	1.81	199.37	1.16	231.78	45	2041	0.51	0.064	0.02	11.89	0.01	0.000
20.50	1.83	198.28	1.19	235.08	46	2099	0.51	0.060	0.02	11.89	0.01	0.000
20.58	1.85	197.52	1.20	236.93	47	2142	0.51	0.058	0.02	11.89	0.01	0.000
20.62	1.87	193.74	1.22	235.61	47	2164	0.51	0.057	0.02	11.89	0.01	0.000
20.69	1.91	184.35	1.24	229.41	46	2180	0.51	0.057	0.02	11.89	0.01	0.000
20.77	1.96	173.88	1.28	222.12	46	2202	0.51	0.056	0.02	11.89	0.01	0.000
20.81	2.01	165.44	1.32	218.35	46	2253	0.51	0.054	0.02	11.89	0.01	0.000
20.88	2.04	166.33	1.34	223.42	47	2347	0.51	0.050	0.02	11.89	0.01	0.000
20.95	2.03	178.88	1.33	238.01	50	2487	0.51	0.045	0.02	11.89	0.01	0.000
21.03	1.99	196.43	1.30	255.29	53	2612	0.51	0.042	0.01	11.89	0.01	0.000
21.07	1.94	219.57	1.27	277.81	57	2742	0.51	0.039	0.01	11.89	0.01	0.000
21.14	1.91	238.12	1.24	295.70	59	2843	0.51	0.037	0.01	11.89	0.01	0.000
21.21	1.88	254.21	1.22	310.36	62	2919	0.51	0.035	0.01	11.89	0.01	0.000
21.29	1.86	260.63	1.21	315.29	62	2940	0.51	0.035	0.01	11.89	0.01	0.000
21.33	1.85	261.13	1.20	314.00	62	2912	0.51	0.036	0.01	11.89	0.01	0.000
21.41	1.85	257.80	1.20	308.80	61	2860	0.51	0.037	0.01	11.89	0.01	0.000
21.49	1.83	254.96	1.19	302.39	59	2784	0.51	0.039	0.01	11.89	0.01	0.000
21.56	1.82	254.15	1.17	297.57	58	2722	0.51	0.041	0.01	11.89	0.01	0.000
21.59	1.80	255.30	1.15	294.47	57	2677	0.51	0.042	0.01	11.89	0.01	0.000
21.67	1.78	258.31	1.13	292.26	56	2648	0.51	0.043	0.01	11.89	0.01	0.000
21.74	1.78	255.75	1.13	288.14	55	2615	0.51	0.044	0.01	11.89	0.01	0.000
21.82	1.78	250.71	1.13	283.71	54	2582	0.51	0.045	0.01	11.89	0.01	0.000
21.85	1.81	240.79	1.16	279.09	54	2562	0.51	0.046	0.01	11.89	0.01	0.000
21.93	1.81	235.37	1.17	274.71	53	2536	0.51	0.047	0.01	11.89	0.01	0.000
22.01	1.82	228.17	1.17	267.52	52	2481	0.51	0.049	0.02	11.89	0.01	0.000
22.09	1.82	221.57	1.17	259.70	51	2414	0.51	0.052	0.02	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
22.12	1.84	209.42	1.19	249.15	49	2343	0.51	0.055	0.02	11.89	0.01	0.000
22.20	1.87	194.58	1.21	236.37	47	2276	0.51	0.058	0.02	11.89	0.01	0.000
22.28	1.90	179.89	1.24	222.70	45	2207	0.51	0.062	0.02	11.89	0.01	0.000
22.32	1.92	168.27	1.25	210.85	43	2132	0.51	0.067	0.03	11.89	0.02	0.000
22.39	1.92	161.82	1.25	201.99	41	2035	0.51	0.074	0.03	11.89	0.02	0.000
22.47	1.89	158.09	1.23	194.15	39	1912	0.51	0.086	0.04	11.89	0.02	0.000
22.51	1.85	158.87	1.20	191.23	38	1838	0.51	0.095	0.04	11.89	0.02	0.000
22.58	1.85	164.15	1.20	197.34	39	1898	0.51	0.088	0.04	11.89	0.02	0.000
22.67	1.88	171.27	1.22	209.49	42	2063	0.51	0.074	0.03	11.89	0.02	0.000
22.74	1.91	178.11	1.24	220.95	44	2226	0.51	0.063	0.02	11.89	0.01	0.000
22.78	1.93	184.17	1.26	231.43	47	2383	0.52	0.055	0.02	11.89	0.01	0.000
22.86	1.90	202.48	1.24	250.45	50	2521	0.52	0.050	0.02	11.89	0.01	0.000
22.94	1.85	227.45	1.20	272.73	54	2643	0.52	0.046	0.01	11.89	0.01	0.000
22.98	1.77	262.65	1.11	291.49	56	2731	0.52	0.044	0.01	11.89	0.01	0.000
23.05	1.71	290.19	1.00	290.19	54	2783	0.52	0.043	0.01	11.89	0.01	0.000
23.12	1.65	317.57	1.00	317.57	58	2825	0.52	0.042	0.01	11.89	0.01	0.000
23.19	1.62	336.13	1.00	336.13	61	2872	0.52	0.041	0.01	11.89	0.01	0.000
23.23	1.62	353.30	1.00	353.30	64	3027	0.52	0.038	0.01	11.89	0.01	0.000
23.31	1.65	364.11	1.00	364.11	67	3233	0.52	0.034	0.01	11.89	0.00	0.000
23.37	1.67	373.57	1.00	373.57	69	3444	0.52	0.031	0.01	11.89	0.00	0.000
23.44	1.69	374.09	1.00	374.09	70	3530	0.52	0.030	0.01	11.89	0.00	0.000
23.50	1.70	368.73	1.00	368.73	69	3522	0.52	0.031	0.01	11.89	0.00	0.000
23.56	1.71	354.53	1.00	355.12	66	3449	0.52	0.032	0.01	11.89	0.00	0.000
23.63	1.73	338.97	1.04	352.70	66	3389	0.52	0.033	0.01	11.89	0.00	0.000
23.69	1.76	322.54	1.09	352.62	67	3366	0.52	0.033	0.01	11.89	0.00	0.000
23.77	1.79	309.41	1.14	352.38	68	3385	0.52	0.033	0.01	11.89	0.00	0.000
23.82	1.81	301.89	1.16	351.38	68	3411	0.52	0.033	0.01	11.89	0.00	0.000
23.90	1.82	298.52	1.17	350.39	68	3426	0.52	0.032	0.01	11.89	0.00	0.000
23.96	1.83	294.25	1.18	347.51	68	3418	0.52	0.033	0.01	11.89	0.00	0.000
24.02	1.85	286.04	1.20	342.42	67	3413	0.52	0.033	0.01	11.89	0.00	0.000
24.10	1.86	278.80	1.21	337.89	67	3422	0.52	0.033	0.01	11.89	0.00	0.000
24.16	1.89	272.52	1.23	334.32	67	3449	0.52	0.033	0.01	11.89	0.00	0.000
24.23	1.91	266.11	1.24	330.12	66	3472	0.52	0.032	0.01	11.89	0.00	0.000
24.30	1.92	258.17	1.25	323.37	65	3462	0.52	0.033	0.01	11.89	0.00	0.000
24.38	1.93	254.34	1.26	319.34	65	3440	0.52	0.033	0.01	11.89	0.00	0.000
24.41	1.93	251.52	1.25	315.34	64	3392	0.52	0.034	0.01	11.89	0.00	0.000
24.49	1.91	252.96	1.25	315.08	63	3359	0.52	0.034	0.01	11.89	0.00	0.000
24.56	1.89	258.11	1.23	317.39	63	3322	0.52	0.035	0.01	11.89	0.00	0.000
24.64	1.84	271.67	1.20	324.99	64	3291	0.52	0.036	0.01	11.89	0.00	0.000
24.70	1.81	283.10	1.16	328.47	64	3257	0.52	0.037	0.01	11.89	0.00	0.000
24.74	1.79	285.13	1.14	324.55	62	3197	0.52	0.038	0.01	11.89	0.01	0.000
24.82	1.79	279.97	1.14	318.39	61	3141	0.52	0.039	0.01	11.89	0.01	0.000
24.89	1.80	269.35	1.15	310.13	60	3079	0.52	0.040	0.01	11.89	0.01	0.000
24.97	1.81	260.45	1.17	303.64	59	3039	0.52	0.041	0.01	11.89	0.01	0.000
25.01	1.83	250.11	1.19	296.38	58	3004	0.52	0.042	0.01	11.89	0.01	0.000
25.09	1.84	243.41	1.20	291.06	57	2981	0.52	0.043	0.01	11.89	0.01	0.000
25.17	1.85	238.57	1.20	286.83	56	2960	0.52	0.044	0.01	11.89	0.01	0.000
25.20	1.85	236.55	1.20	284.48	56	2940	0.52	0.044	0.01	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
25.28	1.85	236.71	1.20	283.80	56	2929	0.52	0.045	0.01	11.89	0.01	0.000
25.36	1.84	238.34	1.19	284.35	56	2926	0.52	0.045	0.01	11.89	0.01	0.000
25.40	1.82	245.71	1.17	287.25	56	2911	0.52	0.045	0.01	11.89	0.01	0.000
25.47	1.77	255.77	1.12	285.98	55	2856	0.52	0.047	0.01	11.89	0.01	0.000
25.55	1.73	265.24	1.06	280.39	53	2812	0.52	0.049	0.02	11.89	0.01	0.000
25.62	1.72	268.38	1.02	274.75	52	2782	0.52	0.050	0.02	11.89	0.01	0.000
25.66	1.73	264.18	1.05	276.68	52	2788	0.52	0.050	0.02	11.89	0.01	0.000
25.73	1.76	250.80	1.10	275.79	53	2768	0.52	0.050	0.02	11.89	0.01	0.000
25.79	1.80	235.73	1.15	272.23	53	2767	0.52	0.051	0.02	11.89	0.01	0.000
25.89	1.84	223.42	1.19	266.61	52	2780	0.52	0.050	0.02	11.89	0.01	0.000
25.93	1.86	220.52	1.21	266.89	53	2830	0.52	0.049	0.02	11.89	0.01	0.000
26.01	1.88	223.72	1.22	272.97	54	2933	0.52	0.046	0.01	11.89	0.01	0.000
26.08	1.89	230.20	1.23	283.25	57	3088	0.52	0.043	0.01	11.89	0.01	0.000
26.12	1.90	241.57	1.24	298.87	60	3290	0.52	0.039	0.01	11.89	0.01	0.000
26.19	1.88	254.93	1.22	311.97	62	3381	0.52	0.037	0.01	11.89	0.00	0.000
26.26	1.85	266.22	1.20	320.39	63	3403	0.53	0.037	0.01	11.89	0.00	0.000
26.34	1.83	270.24	1.19	320.51	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.41	1.84	266.89	1.19	318.34	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.44	1.87	250.82	1.22	304.94	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.52	1.89	233.86	1.23	287.91	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.59	1.90	217.53	1.24	269.08	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.66	1.92	196.86	1.25	246.31	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.73	1.97	172.69	1.28	221.15	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.79	2.05	143.90	1.36	195.02	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.86	2.12	124.08	1.45	180.22	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.92	2.20	106.02	1.61	171.02	0	0	0.53	0.000	0.00	11.89	0.00	0.000
26.99	2.28	91.62	1.84	168.73	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.05	2.33	83.81	2.05	172.05	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.11	2.37	79.94	2.20	176.06	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.19	2.38	77.71	2.29	177.76	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.26	2.39	76.46	2.32	177.17	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.30	2.38	76.36	2.27	172.97	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.38	2.36	77.37	2.15	166.59	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.45	2.32	79.03	2.01	159.03	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.52	2.29	80.70	1.90	153.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.56	2.26	82.67	1.80	148.55	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.64	2.24	84.49	1.72	145.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.71	2.21	86.11	1.65	142.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.76	2.20	87.06	1.62	140.80	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.84	2.20	87.27	1.60	140.04	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.91	2.19	87.33	1.60	139.54	0	0	0.53	0.000	0.00	11.89	0.00	0.000
27.99	2.19	87.40	1.59	139.22	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.03	2.19	88.03	1.58	139.16	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.10	2.18	89.01	1.56	139.20	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.18	2.17	90.65	1.54	139.59	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.25	2.16	92.38	1.52	140.17	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.29	2.14	94.91	1.49	141.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.37	2.10	98.61	1.41	139.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
28.44	2.03	102.99	1.33	137.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.48	1.96	107.61	1.28	137.32	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.56	1.93	110.38	1.26	138.70	0	0	0.53	0.000	0.00	11.89	0.00	0.000
28.63	1.93	111.59	1.26	140.23	28	1683	0.53	0.183	0.12	11.89	0.06	0.000
28.71	1.94	111.16	1.26	140.16	28	1695	0.53	0.180	0.12	11.89	0.05	0.001
28.75	1.99	102.44	1.30	132.88	28	1685	0.53	0.183	0.13	11.89	0.06	0.000
28.82	2.00	100.21	1.31	131.12	27	1686	0.53	0.184	0.13	11.89	0.06	0.000
28.89	2.02	97.94	1.32	129.47	27	1688	0.53	0.184	0.13	11.89	0.06	0.000
28.96	1.99	102.86	1.30	134.02	28	1719	0.53	0.175	0.12	11.89	0.05	0.000
29.04	2.01	101.22	1.32	133.43	28	1740	0.53	0.170	0.11	11.89	0.05	0.000
29.08	2.03	99.55	1.34	133.08	28	1763	0.53	0.164	0.11	11.89	0.05	0.000
29.15	2.05	97.73	1.36	132.57	28	1782	0.53	0.159	0.11	11.89	0.05	0.000
29.23	2.07	95.93	1.38	132.04	28	1797	0.53	0.156	0.10	11.89	0.05	0.000
29.27	2.08	94.66	1.39	132.01	28	1813	0.53	0.153	0.10	11.89	0.05	0.000
29.35	2.09	95.18	1.40	133.19	29	1836	0.53	0.148	0.10	11.89	0.04	0.000
29.43	2.07	99.15	1.38	136.60	29	1869	0.53	0.142	0.09	11.89	0.04	0.000
29.50	2.04	105.26	1.34	141.45	30	1902	0.53	0.136	0.08	11.89	0.04	0.000
29.53	1.99	115.13	1.30	149.59	31	1935	0.53	0.130	0.08	11.89	0.03	0.000
29.61	1.94	125.45	1.26	158.66	32	1968	0.53	0.125	0.07	11.89	0.03	0.000
29.68	1.90	136.42	1.23	168.33	34	2000	0.53	0.121	0.06	11.89	0.03	0.000
29.76	1.87	143.20	1.21	173.88	34	2018	0.53	0.119	0.06	11.89	0.03	0.000
29.80	1.85	145.98	1.20	175.74	35	2018	0.53	0.119	0.06	11.89	0.03	0.000
29.87	1.86	143.31	1.21	173.15	34	2000	0.53	0.122	0.06	11.89	0.03	0.000
29.95	1.88	137.26	1.22	167.79	33	1974	0.53	0.126	0.07	11.89	0.03	0.000
30.03	1.91	130.15	1.24	161.48	32	1951	0.53	0.131	0.07	11.89	0.03	0.000
30.07	1.93	123.54	1.26	155.54	32	1932	0.53	0.134	0.08	11.89	0.03	0.000
30.15	1.96	118.53	1.27	151.08	31	1922	0.53	0.137	0.08	11.89	0.04	0.000
30.19	1.98	113.45	1.29	146.81	30	1916	0.53	0.138	0.08	11.89	0.04	0.000
30.26	2.01	109.90	1.31	144.19	30	1921	0.53	0.138	0.08	11.89	0.04	0.000
30.34	2.03	107.13	1.33	142.52	30	1934	0.53	0.136	0.08	11.89	0.04	0.000
30.41	2.04	106.15	1.34	142.21	30	1946	0.53	0.134	0.08	11.89	0.04	0.000
30.45	2.04	106.38	1.34	142.78	30	1959	0.53	0.132	0.08	11.89	0.04	0.000
30.52	2.03	107.53	1.34	143.91	30	1973	0.53	0.130	0.08	11.89	0.03	0.000
30.60	2.02	109.92	1.33	145.87	31	1985	0.53	0.129	0.08	11.89	0.03	0.000
30.68	2.01	112.48	1.31	147.85	31	1993	0.53	0.128	0.08	11.89	0.03	0.000
30.71	1.99	115.30	1.30	150.17	31	2001	0.53	0.127	0.07	11.89	0.03	0.000
30.79	1.99	115.81	1.30	150.68	31	2008	0.53	0.126	0.07	11.89	0.03	0.000
30.87	2.00	114.60	1.31	149.81	31	2013	0.53	0.126	0.07	11.89	0.03	0.000
30.91	2.02	110.96	1.33	147.08	31	2012	0.53	0.126	0.07	11.89	0.03	0.000
30.98	2.04	108.07	1.34	145.07	31	2015	0.53	0.126	0.08	11.89	0.03	0.000
31.06	2.05	106.20	1.36	143.98	31	2021	0.53	0.126	0.08	11.89	0.03	0.000
31.13	2.05	106.65	1.35	144.43	31	2029	0.53	0.125	0.07	11.89	0.03	0.000
31.17	2.04	109.34	1.34	146.42	31	2037	0.53	0.124	0.07	11.89	0.03	0.000
31.24	2.01	114.35	1.31	150.17	31	2047	0.53	0.123	0.07	11.89	0.03	0.000
31.32	1.97	120.40	1.29	154.87	32	2051	0.53	0.122	0.07	11.89	0.03	0.000
31.40	1.94	125.09	1.26	157.78	32	2022	0.53	0.127	0.07	11.89	0.03	0.000
31.44	1.87	128.75	1.22	156.78	31	1890	0.53	0.152	0.09	11.89	0.04	0.000
31.51	1.82	129.29	1.17	151.39	29	1749	0.53	0.190	0.12	11.89	0.05	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.59	1.78	126.59	1.13	143.53	28	1632	0.53	0.236	0.16	11.89	0.07	0.001
31.66	1.82	120.35	1.17	140.78	27	1629	0.53	0.238	0.16	11.89	0.07	0.001
31.70	1.87	111.60	1.21	135.50	27	1634	0.53	0.236	0.17	11.89	0.07	0.000
31.78	1.96	97.34	1.28	124.22	25	1638	0.53	0.235	0.18	11.89	0.07	0.001
31.83	2.05	85.42	1.36	115.77	25	1652	0.53	0.229	0.18	11.89	0.07	0.000
31.91	2.15	74.72	1.49	111.68	25	1670	0.53	0.222	0.17	11.89	0.07	0.001
31.99	2.20	70.24	1.61	113.07	25	1703	0.53	0.210	0.16	11.89	0.06	0.001
32.03	2.28	63.65	1.84	117.19	27	1739	0.53	0.198	0.14	11.89	0.06	0.000
32.10	2.34	58.93	2.10	123.68	30	1782	0.53	0.185	0.12	11.89	0.05	0.000
32.18	2.38	56.97	2.29	130.60	32	1838	0.53	0.170	0.10	11.89	0.04	0.000
32.25	2.39	57.74	2.33	134.42	33	1886	0.53	0.158	0.09	11.89	0.04	0.000
32.29	2.37	61.31	2.20	134.96	33	1928	0.53	0.150	0.08	11.89	0.03	0.000
32.37	2.33	65.87	2.03	133.66	32	1956	0.53	0.144	0.08	11.89	0.03	0.000
32.44	2.27	71.89	1.83	131.65	31	1976	0.53	0.141	0.08	11.89	0.03	0.000
32.51	2.23	76.88	1.69	130.26	30	1980	0.53	0.141	0.09	11.89	0.04	0.000
32.55	2.20	79.94	1.61	128.77	29	1965	0.53	0.144	0.09	11.89	0.04	0.000
32.63	2.19	79.93	1.59	126.73	28	1937	0.53	0.150	0.10	11.89	0.04	0.000
32.71	2.19	78.33	1.59	124.38	28	1905	0.53	0.157	0.11	11.89	0.04	0.000
32.75	2.21	74.76	1.63	121.97	28	1869	0.53	0.166	0.11	11.89	0.05	0.000
32.82	2.23	70.22	1.70	119.53	27	1829	0.53	0.177	0.12	11.89	0.05	0.000
32.90	2.26	65.57	1.79	117.12	27	1784	0.53	0.190	0.13	11.89	0.05	0.000
32.98	2.27	63.68	1.81	115.16	27	1754	0.53	0.201	0.14	11.89	0.06	0.001
33.02	2.27	62.72	1.82	113.99	26	1736	0.53	0.208	0.15	11.89	0.06	0.000
33.09	2.26	63.57	1.78	113.39	26	1735	0.53	0.209	0.15	11.89	0.06	0.001
33.17	2.26	63.82	1.77	113.22	26	1737	0.53	0.208	0.15	11.89	0.06	0.001
33.21	2.25	65.20	1.75	114.04	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.28	2.27	64.24	1.81	116.43	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.36	2.30	61.94	1.93	119.72	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.40	2.35	58.08	2.14	124.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.47	2.40	54.42	2.37	128.76	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.55	2.44	51.10	2.61	133.54	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.62	2.47	49.21	2.80	137.63	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.70	2.49	48.39	2.91	140.63	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.74	2.50	48.11	2.99	143.89	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.82	2.51	48.19	3.03	146.02	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.86	2.50	48.97	3.00	146.91	0	0	0.53	0.000	0.00	11.89	0.00	0.000
33.93	2.49	50.38	2.91	146.55	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.01	2.47	52.20	2.80	146.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.08	2.46	53.85	2.71	145.68	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.13	2.44	56.02	2.57	144.09	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.20	2.41	58.62	2.41	141.03	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.28	2.37	61.95	2.22	137.32	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.35	2.33	65.07	2.05	133.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.39	2.28	68.67	1.86	127.69	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.46	2.24	72.12	1.73	124.44	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.54	2.20	75.64	1.63	122.96	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.61	2.19	77.78	1.59	123.83	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.65	2.18	79.37	1.56	123.62	0	0	0.53	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
34.72	2.17	79.99	1.54	123.09	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.80	2.16	80.28	1.53	122.55	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.86	2.16	80.45	1.52	122.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.94	2.15	80.85	1.51	122.22	0	0	0.53	0.000	0.00	11.89	0.00	0.000
34.97	2.14	82.55	1.49	122.86	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.06	2.12	85.40	1.45	123.92	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.14	2.10	88.50	1.42	125.23	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.17	2.08	90.53	1.39	125.98	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.24	2.09	89.23	1.40	124.78	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.32	2.11	84.58	1.44	121.67	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.40	2.15	78.66	1.51	118.56	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.44	2.20	72.32	1.61	116.29	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.52	2.24	67.12	1.72	115.78	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.59	2.29	61.91	1.90	117.48	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.67	2.34	58.35	2.07	120.62	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.70	2.38	55.43	2.27	125.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.78	2.43	52.58	2.52	132.60	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.86	2.48	49.62	2.83	140.51	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.90	2.53	46.69	3.18	148.37	0	0	0.53	0.000	0.00	11.89	0.00	0.000
35.97	2.57	44.19	3.49	154.18	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.05	2.59	43.01	3.66	157.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.12	2.60	42.10	3.76	158.10	0	0	0.53	0.000	0.00	0.00	0.00	0.000
36.16	2.59	42.71	3.64	155.27	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.24	2.56	43.71	3.45	150.94	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.32	2.53	45.82	3.17	145.42	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.35	2.50	47.77	2.95	140.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.43	2.46	49.58	2.74	135.98	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.50	2.42	52.36	2.48	129.98	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.58	2.38	55.17	2.27	124.98	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.62	2.34	57.97	2.09	121.28	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.70	2.32	59.93	1.99	119.43	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.77	2.30	61.43	1.93	118.41	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.81	2.29	62.76	1.88	118.12	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.89	2.27	64.86	1.81	117.61	0	0	0.53	0.000	0.00	11.89	0.00	0.000
36.96	2.23	69.33	1.69	117.34	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.04	2.19	74.47	1.58	117.97	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.08	2.14	80.87	1.49	120.21	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.15	2.10	86.29	1.42	122.83	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.23	2.07	90.63	1.38	125.26	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.28	2.06	91.90	1.37	125.49	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.36	2.05	90.66	1.35	122.64	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.43	2.04	88.35	1.34	118.82	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.47	2.05	84.37	1.35	114.16	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.55	2.08	78.49	1.40	109.59	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.63	2.13	72.15	1.47	105.72	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.67	2.18	66.03	1.56	102.71	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.75	2.24	58.86	1.72	101.41	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.80	2.29	54.26	1.89	102.79	0	0	0.53	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
37.87	2.34	51.08	2.08	106.45	0	0	0.53	0.000	0.00	11.89	0.00	0.000
37.94	2.37	50.55	2.21	111.56	0	0	0.53	0.000	0.00	11.89	0.00	0.000
38.02	2.42	47.99	2.48	119.00	0	0	0.53	0.000	0.00	11.89	0.00	0.000
38.09	2.47	45.65	2.76	126.22	0	0	0.52	0.000	0.00	11.89	0.00	0.000
38.13	2.51	43.47	3.05	132.73	0	0	0.52	0.000	0.00	11.89	0.00	0.000
38.20	2.54	42.03	3.28	137.81	0	0	0.52	0.000	0.00	11.89	0.00	0.000
38.28	2.56	41.44	3.41	141.20	0	0	0.52	0.000	0.00	11.89	0.00	0.000
38.36	2.56	41.73	3.40	141.99	38	2040	0.52	0.158	0.07	11.89	0.02	0.000
38.39	2.54	42.60	3.30	140.45	37	2040	0.52	0.158	0.08	11.89	0.02	0.000
38.47	2.52	43.97	3.14	138.19	36	2041	0.52	0.158	0.08	11.89	0.02	0.000
38.54	2.50	45.82	2.99	137.06	35	2060	0.52	0.154	0.08	11.89	0.02	0.000
38.61	2.49	47.31	2.91	137.76	35	2091	0.52	0.149	0.08	11.89	0.02	0.000
38.66	2.50	47.40	2.97	140.56	36	2123	0.52	0.143	0.07	11.89	0.02	0.000
38.73	2.53	45.65	3.17	144.57	38	2143	0.52	0.140	0.07	11.89	0.02	0.000
38.81	2.56	43.20	3.45	148.97	40	2153	0.52	0.139	0.06	11.89	0.02	0.000
38.85	2.62	39.87	3.89	155.08	0	0	0.52	0.000	0.00	0.00	0.00	0.000
38.92	2.67	36.27	4.45	161.42	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.00	2.73	33.11	5.03	166.60	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.08	2.76	31.42	5.37	168.55	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.12	2.76	31.07	5.40	167.91	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.19	2.76	31.00	5.41	167.63	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.26	2.76	31.09	5.42	168.45	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.34	2.77	31.25	5.44	169.93	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.38	2.77	31.47	5.47	172.06	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.45	2.78	31.31	5.57	174.44	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.53	2.79	31.06	5.69	176.80	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.60	2.80	30.70	5.80	178.19	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.64	2.81	29.90	5.95	177.80	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.72	2.82	28.68	6.16	176.64	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.76	2.86	26.63	6.58	175.27	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.84	2.90	24.41	7.16	174.74	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.91	2.93	22.37	7.71	172.48	0	0	0.52	0.000	0.00	0.00	0.00	0.000
39.99	2.94	21.58	7.82	168.81	0	0	0.52	0.000	0.00	0.00	0.00	0.000
40.03	2.89	23.06	7.09	163.56	0	0	0.52	0.000	0.00	0.00	0.00	0.000
40.12	2.81	26.49	5.96	157.99	0	0	0.52	0.000	0.00	0.00	0.00	0.000
40.19	2.73	30.67	5.00	153.39	0	0	0.52	0.000	0.00	0.00	0.00	0.000
40.23	2.65	35.51	4.24	150.43	0	0	0.52	0.000	0.00	0.00	0.00	0.000
40.30	2.57	42.16	3.46	145.96	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.38	2.46	51.11	2.70	137.84	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.46	2.36	59.34	2.20	130.50	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.50	2.30	65.09	1.94	126.10	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.57	2.26	69.26	1.80	124.37	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.65	2.22	73.69	1.67	122.96	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.72	2.19	76.09	1.60	121.59	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.75	2.17	76.93	1.56	119.64	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.82	2.17	76.32	1.54	117.40	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.90	2.16	75.89	1.52	115.59	0	0	0.52	0.000	0.00	11.89	0.00	0.000
40.97	2.17	74.10	1.54	114.29	0	0	0.52	0.000	0.00	11.89	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
41.04	2.19	71.38	1.59	113.46	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.08	2.22	67.82	1.67	113.37	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.15	2.27	63.91	1.80	115.11	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.22	2.32	60.03	1.99	119.62	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.30	2.36	57.70	2.17	125.10	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.37	2.38	57.03	2.26	129.06	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.41	2.38	57.62	2.28	131.55	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.49	2.39	57.86	2.33	134.88	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.56	2.41	57.10	2.44	139.35	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.60	2.46	53.98	2.71	146.26	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.67	2.53	48.51	3.18	154.49	0	0	0.52	0.000	0.00	11.89	0.00	0.000
41.76	2.61	42.57	3.81	162.23	0	0	0.52	0.000	0.00	0.00	0.00	0.000
41.83	2.67	38.15	4.36	166.21	0	0	0.51	0.000	0.00	0.00	0.00	0.000
41.87	2.68	36.89	4.46	164.65	0	0	0.51	0.000	0.00	0.00	0.00	0.000
41.94	2.67	36.48	4.42	161.23	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.03	2.65	37.04	4.23	156.54	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.07	2.63	37.82	4.00	151.12	0	0	0.51	0.000	0.00	0.00	0.00	0.000
42.14	2.59	39.62	3.64	144.11	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.22	2.54	41.52	3.29	136.76	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.30	2.51	42.97	3.06	131.69	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.33	2.49	44.51	2.89	128.63	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.41	2.46	46.42	2.73	126.68	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.48	2.43	49.28	2.53	124.63	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.55	2.40	52.26	2.36	123.08	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.59	2.36	55.84	2.18	121.70	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.66	2.33	59.16	2.04	120.55	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.74	2.30	61.79	1.94	119.61	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.79	2.29	62.50	1.90	118.54	0	0	0.51	0.000	0.00	11.89	0.00	0.000
42.86	2.30	61.33	1.91	117.00	27	2160	0.51	0.149	0.10	11.89	0.03	0.000
42.94	2.30	59.24	1.94	114.91	27	2119	0.51	0.157	0.11	11.89	0.03	0.000
43.01	2.31	57.14	1.98	113.00	27	2079	0.51	0.164	0.12	11.89	0.03	0.000
43.05	2.33	54.99	2.03	111.83	27	2048	0.51	0.171	0.12	11.89	0.03	0.000
43.13	2.35	52.93	2.12	112.24	27	2040	0.51	0.173	0.12	11.89	0.03	0.000
43.21	2.37	51.03	2.23	113.74	28	2046	0.51	0.172	0.12	11.89	0.03	0.000
43.24	2.40	49.87	2.35	117.23	29	2082	0.51	0.164	0.11	11.89	0.03	0.000
43.32	2.42	49.36	2.46	121.45	30	2133	0.51	0.155	0.09	11.89	0.02	0.000
43.39	2.43	49.28	2.56	126.00	31	2193	0.51	0.145	0.08	11.89	0.02	0.000
43.47	2.44	49.43	2.62	129.47	32	2242	0.51	0.137	0.08	11.89	0.02	0.000
43.51	2.44	50.49	2.62	132.22	33	2291	0.51	0.131	0.07	11.89	0.02	0.000
43.59	2.43	52.80	2.54	134.16	33	2348	0.51	0.124	0.07	11.89	0.02	0.000
43.66	2.41	56.26	2.41	135.85	34	2414	0.51	0.116	0.06	11.89	0.01	0.000
43.73	2.39	58.96	2.33	137.18	34	2465	0.51	0.111	0.06	11.89	0.01	0.000
43.77	2.34	65.47	2.09	136.78	33	2523	0.51	0.106	0.06	11.89	0.01	0.000
43.84	2.27	74.30	1.83	136.30	32	2576	0.51	0.101	0.06	11.89	0.01	0.000
43.92	2.19	87.56	1.58	138.69	31	2635	0.51	0.097	0.06	11.89	0.01	0.000
43.99	2.13	98.29	1.46	143.38	31	2675	0.51	0.094	0.05	11.89	0.01	0.000
44.03	2.06	110.40	1.37	151.23	32	2716	0.51	0.091	0.05	11.89	0.01	0.000
44.10	2.01	122.50	1.31	160.92	34	2756	0.51	0.089	0.05	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
44.18	1.95	135.26	1.27	172.11	35	2789	0.51	0.087	0.04	11.89	0.01	0.000
44.26	1.92	144.52	1.25	180.30	36	2806	0.51	0.086	0.04	11.89	0.01	0.000
44.30	1.89	150.96	1.23	185.68	37	2809	0.51	0.086	0.04	11.89	0.01	0.000
44.36	1.87	154.21	1.22	187.97	37	2799	0.51	0.086	0.04	11.89	0.01	0.000
44.44	1.86	155.32	1.21	188.22	37	2778	0.51	0.088	0.04	11.89	0.01	0.000
44.52	1.86	154.56	1.21	186.94	37	2753	0.51	0.089	0.04	11.89	0.01	0.000
44.56	1.86	153.29	1.21	185.49	37	2735	0.51	0.091	0.04	11.89	0.01	0.000
44.64	1.86	152.29	1.21	184.52	36	2730	0.50	0.091	0.04	11.89	0.01	0.000
44.71	1.87	151.12	1.21	183.60	36	2731	0.50	0.091	0.04	11.89	0.01	0.000
44.78	1.87	150.04	1.22	182.85	36	2738	0.50	0.091	0.04	11.89	0.01	0.000
44.82	1.88	149.12	1.22	182.11	36	2738	0.50	0.091	0.04	11.89	0.01	0.000
44.89	1.88	148.40	1.22	181.26	36	2729	0.50	0.091	0.05	11.89	0.01	0.000
44.97	1.88	147.81	1.22	180.44	36	2717	0.50	0.092	0.05	11.89	0.01	0.000
45.01	1.88	147.18	1.22	179.70	36	2708	0.50	0.093	0.05	11.89	0.01	0.000
45.10	1.88	146.27	1.22	178.98	36	2711	0.50	0.093	0.05	11.89	0.01	0.000
45.17	1.88	145.40	1.23	178.36	36	2717	0.50	0.092	0.05	11.89	0.01	0.000
45.25	1.89	144.88	1.23	178.01	36	2723	0.50	0.092	0.05	11.89	0.01	0.000
45.29	1.89	144.73	1.23	177.86	35	2724	0.50	0.092	0.05	11.89	0.01	0.000
45.36	1.89	145.54	1.23	178.57	36	2729	0.50	0.092	0.05	11.89	0.01	0.000
45.44	1.88	146.78	1.22	179.67	36	2737	0.50	0.091	0.05	11.89	0.01	0.000
45.48	1.87	149.01	1.22	181.64	36	2747	0.50	0.091	0.04	11.89	0.01	0.000
45.55	1.86	151.45	1.21	183.48	36	2749	0.50	0.091	0.04	11.89	0.01	0.000
45.63	1.85	154.93	1.20	185.57	36	2735	0.50	0.092	0.04	11.89	0.01	0.000
45.71	1.83	157.55	1.18	186.39	36	2708	0.50	0.094	0.05	11.89	0.01	0.000
45.75	1.82	157.27	1.18	185.00	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.82	1.83	152.27	1.19	180.54	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.90	1.85	146.10	1.20	175.19	0	0	0.50	0.000	0.00	11.89	0.00	0.000
45.93	1.87	138.88	1.22	168.88	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.01	1.90	130.47	1.24	161.62	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.09	1.95	120.79	1.27	153.02	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.13	2.01	108.28	1.31	142.16	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.20	2.09	93.05	1.41	130.91	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.28	2.21	75.26	1.65	124.08	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.35	2.33	61.30	2.05	125.97	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.40	2.42	51.95	2.51	130.27	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.48	2.49	45.88	2.92	133.96	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.56	2.55	41.27	3.34	137.98	0	0	0.50	0.000	0.00	11.89	0.00	0.000
46.60	2.60	38.51	3.76	144.75	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.67	2.64	37.42	4.11	153.69	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.74	2.61	41.03	3.88	159.14	0	0	0.50	0.000	0.00	0.00	0.00	0.000
46.81	2.56	47.01	3.45	162.43	43	2771	0.50	0.091	0.04	11.89	0.01	0.000
46.88	2.51	53.66	3.04	163.30	42	2892	0.50	0.083	0.03	11.89	0.01	0.000
46.92	2.52	55.11	3.08	169.98	44	3001	0.50	0.078	0.03	11.89	0.01	0.000
47.00	2.56	52.36	3.45	180.45	48	3093	0.50	0.074	0.03	11.89	0.00	0.000
47.08	2.61	49.15	3.88	190.86	0	0	0.50	0.000	0.00	0.00	0.00	0.000
47.12	2.65	47.14	4.17	196.67	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.19	2.64	47.14	4.15	195.86	0	0	0.49	0.000	0.00	0.00	0.00	0.000
47.26	2.62	48.50	3.91	189.67	0	0	0.49	0.000	0.00	0.00	0.00	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.34	2.58	50.86	3.56	180.90	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.38	2.51	55.60	3.04	169.08	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.45	2.44	61.38	2.57	157.76	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.52	2.35	68.17	2.14	145.60	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.60	2.28	73.20	1.87	136.82	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.64	2.23	77.07	1.68	129.50	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.72	2.17	80.61	1.55	124.82	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.79	2.11	85.40	1.44	122.58	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.87	2.06	89.96	1.37	123.18	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.91	2.02	95.30	1.32	126.10	0	0	0.49	0.000	0.00	11.89	0.00	0.000
47.99	1.98	100.88	1.29	130.31	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.06	1.95	106.34	1.27	134.85	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.10	1.93	110.12	1.25	138.10	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.18	1.92	111.58	1.25	139.33	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.26	1.91	112.03	1.25	139.67	0	0	0.49	0.000	0.00	11.89	0.00	0.000
48.30	1.92	111.39	1.25	139.03	28	2291	0.49	0.137	0.09	11.89	0.01	0.000
48.37	1.92	110.18	1.25	137.84	28	2284	0.49	0.138	0.09	11.89	0.02	0.000
48.45	1.93	108.53	1.25	136.19	28	2275	0.49	0.140	0.09	11.89	0.02	0.000
48.52	1.93	106.92	1.26	134.62	27	2267	0.49	0.141	0.10	11.89	0.02	0.000
48.56	1.94	105.52	1.26	133.28	27	2262	0.49	0.142	0.10	11.89	0.02	0.000
48.63	1.94	104.58	1.27	132.45	27	2262	0.49	0.142	0.10	11.89	0.02	0.000
48.71	1.95	104.20	1.27	132.19	27	2269	0.49	0.141	0.10	11.89	0.02	0.000
48.78	1.95	104.72	1.27	132.84	27	2281	0.49	0.139	0.10	11.89	0.02	0.000
48.85	1.95	105.63	1.27	133.86	27	2296	0.49	0.137	0.09	11.89	0.01	0.000
48.89	1.94	107.18	1.26	135.54	28	2315	0.49	0.134	0.09	11.89	0.01	0.000
48.96	1.94	108.98	1.26	137.40	28	2334	0.49	0.132	0.09	11.89	0.01	0.000
49.03	1.93	111.47	1.26	139.93	28	2356	0.49	0.129	0.09	11.89	0.01	0.000
49.11	1.92	113.64	1.25	142.07	29	2373	0.49	0.127	0.08	11.89	0.01	0.000
49.15	1.91	115.97	1.24	144.34	29	2389	0.49	0.125	0.08	11.89	0.01	0.000
49.22	1.90	118.12	1.24	146.43	29	2405	0.49	0.124	0.08	11.89	0.01	0.000
49.30	1.87	122.04	1.22	148.48	29	2352	0.49	0.130	0.08	11.89	0.01	0.000
49.37	1.98	79.42	1.29	102.62	21	2754	0.48	0.094	0.09	11.89	0.01	0.000
49.41	1.95	80.91	1.27	102.76	21	2700	0.48	0.097	0.09	11.89	0.01	0.000
49.49	1.95	82.22	1.27	104.27	21	2738	0.48	0.095	0.09	11.89	0.01	0.000
49.57	1.96	83.36	1.28	106.34	22	2820	0.48	0.089	0.08	11.89	0.01	0.000
49.61	1.97	84.51	1.28	108.33	22	2893	0.48	0.085	0.07	11.89	0.01	0.000
49.68	2.02	80.00	1.32	105.88	22	2928	0.48	0.083	0.07	11.89	0.01	0.000
49.75	2.03	81.87	1.33	108.89	23	3028	0.48	0.078	0.07	11.89	0.01	0.000
49.81	2.03	83.14	1.33	110.87	23	3093	0.48	0.076	0.06	11.89	0.01	0.000

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

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)

Total estimated settlement: 1.44

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
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

APPENDIX G

GENERAL GRADING GUIDELINES

Updated Geotechnical and Infiltration Evaluation
Xenia Apartment Project, Beaumont, California
Project No. 2784-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.

6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
   a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
   b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).

2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
   a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
   b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
   a) They are not placed in concentrated pockets;
   b) There is a sufficient percentage of fine-grained material to surround the rocks;
   c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

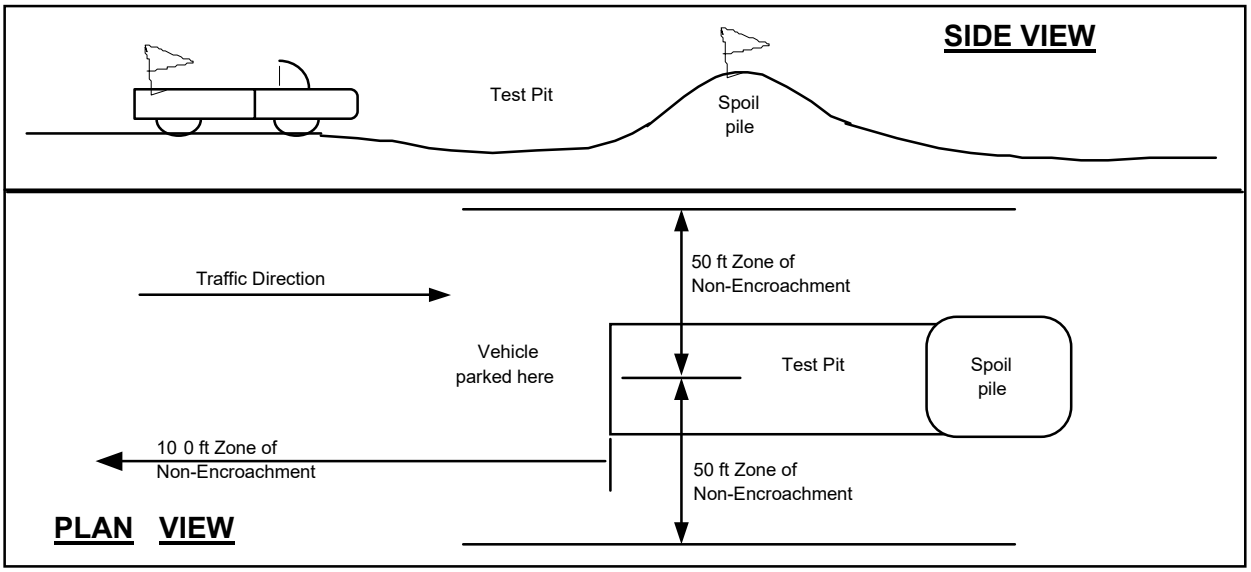
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

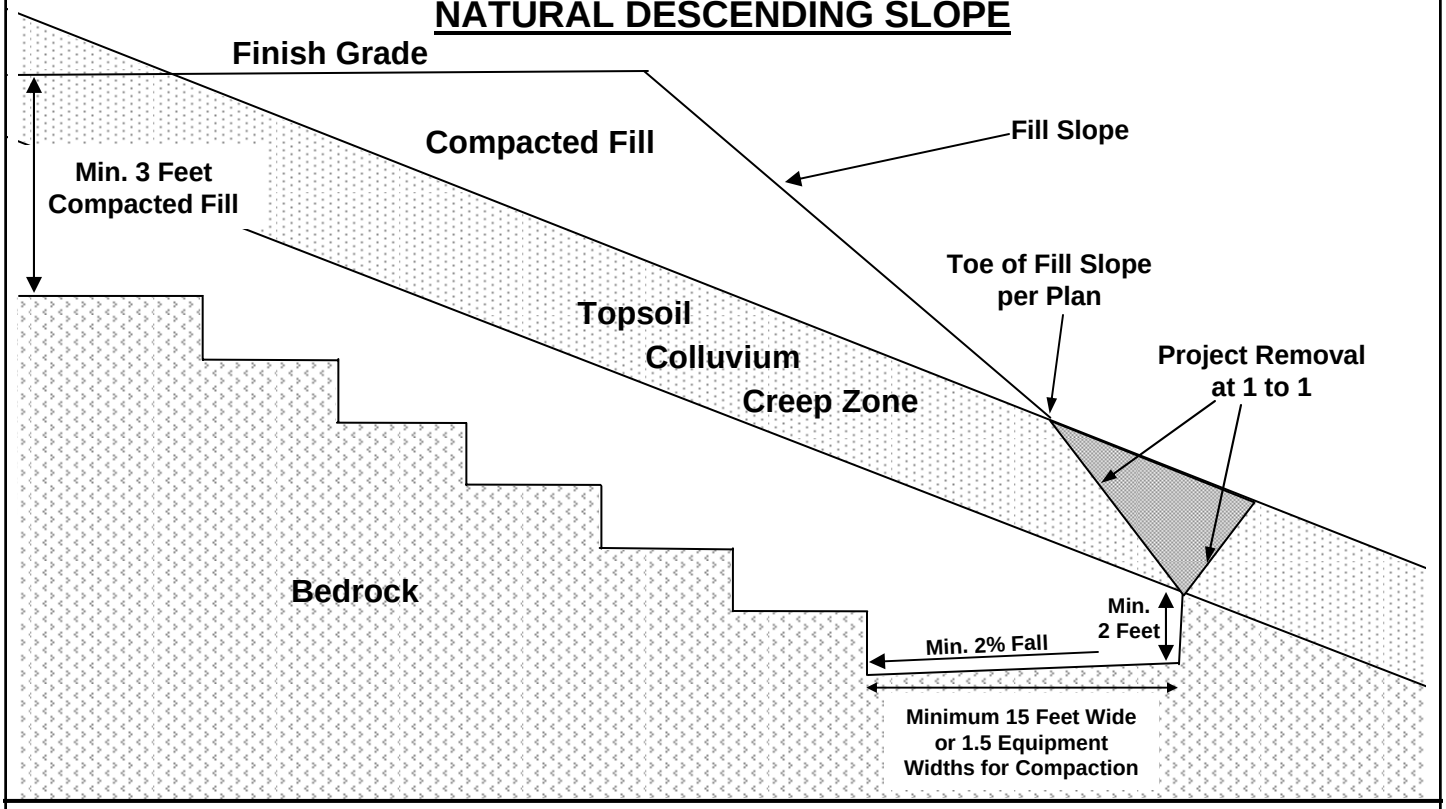
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

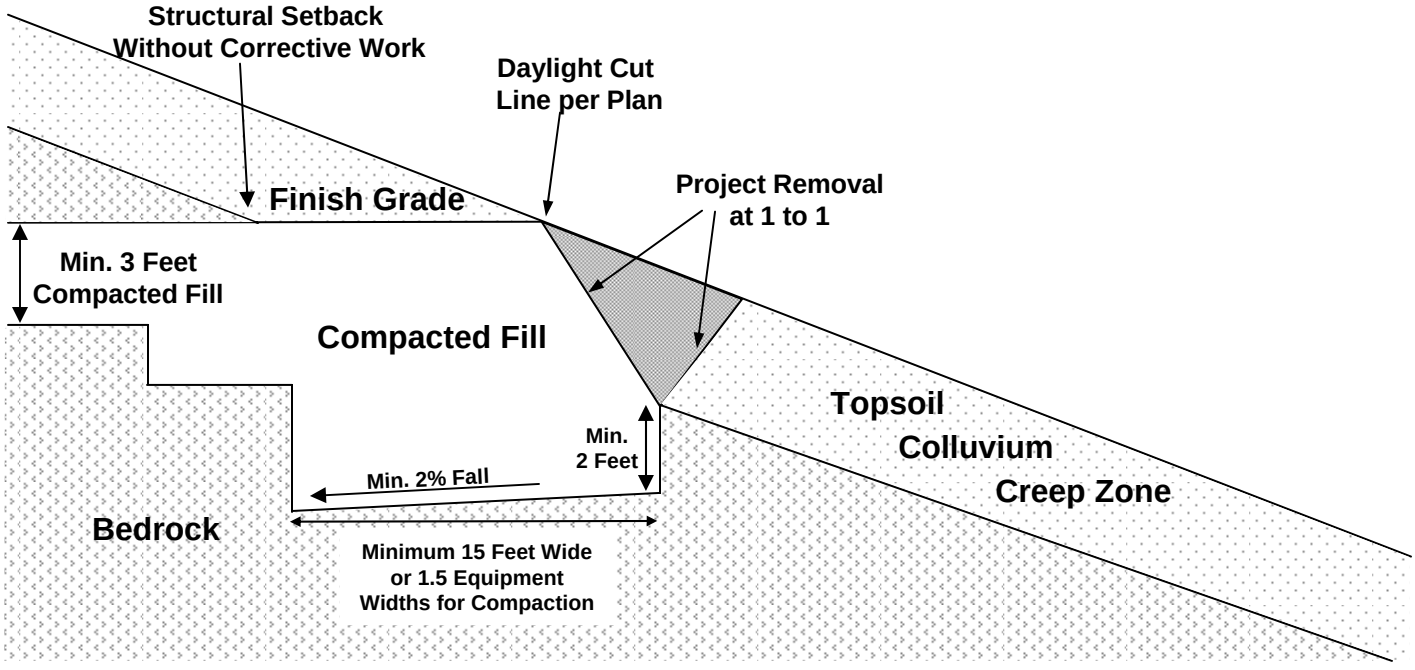
The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



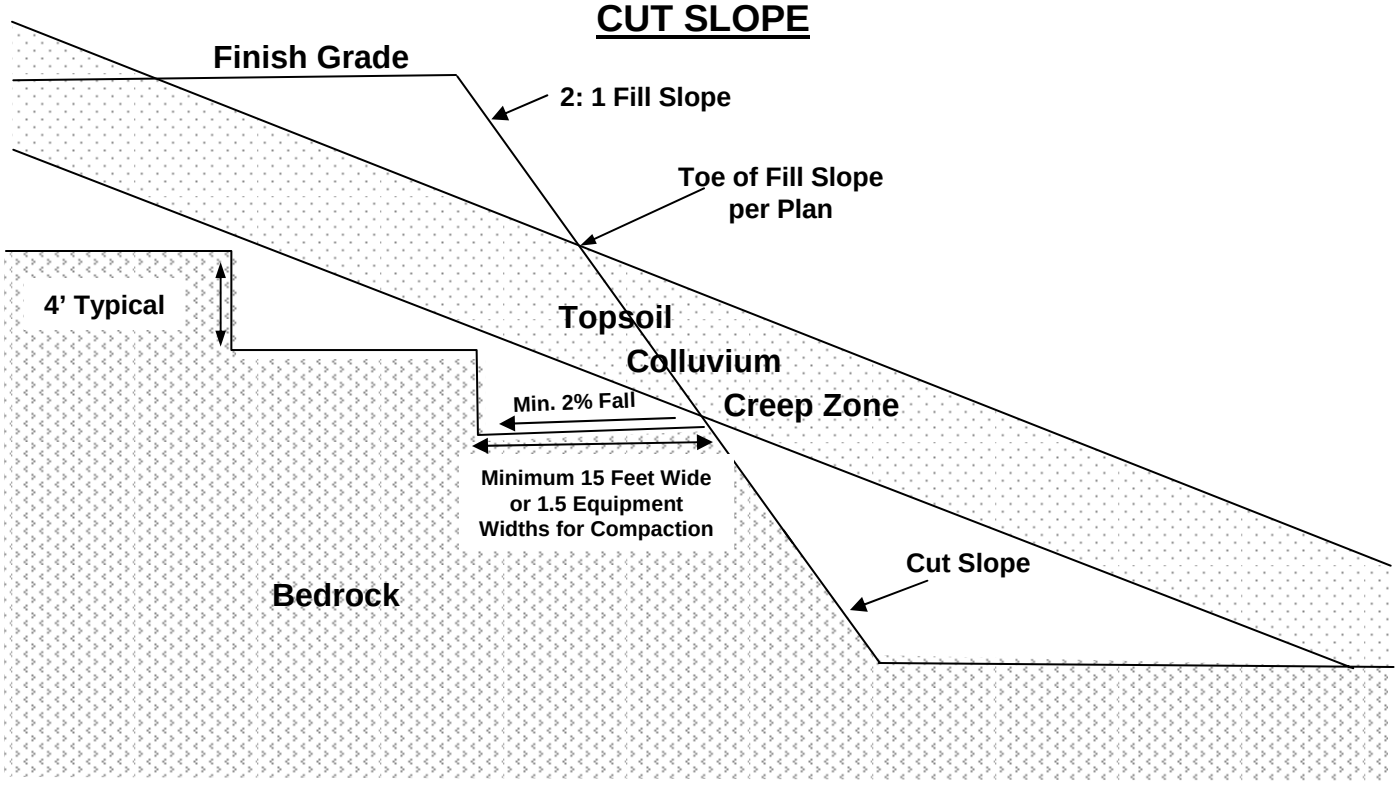
GEOTEK
1548 North Maple Street
Corona, California 92880

TREATMENT ABOVE NATURAL SLOPES

STANDARD GRADING GUIDELINES

PLATE G-1

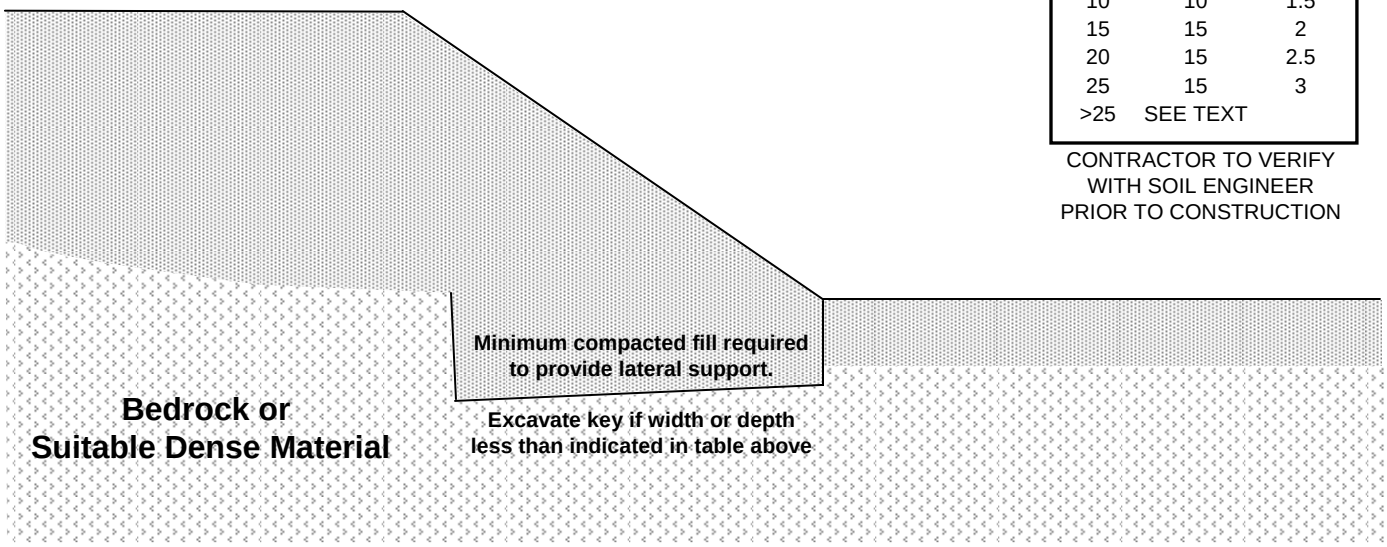
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY WITH SOIL ENGINEER PRIOR TO CONSTRUCTION



GEOTEK

1548 North Maple Street
Corona, California 92880

COMMON FILL SLOPE KEYS

STANDARD GRADING GUIDELINES

PLATE G-2

Appendix 4: Historical Site Conditions

Not Applicable

Appendix 5: LID Infeasibility

Not Applicable

Appendix 6: BMP Design Details

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SP2 | Date: 5/26/2022

Designed by: A. Jaramillo | Case No: PW2021-0822

Company Project Number/Name: Xenia Apartments

BMP Identification

BMP NAME / ID: DMA 1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E — D_{85}= 0.85 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Imperv: Roofs, Sidewalks & Parking/ Streets	*201,250*	*Concrete or Asphalt*	*1*	*0.89*	*179515*			
Pervious: Open Space/Landscaping	*44,922*	*Ornamental Landscaping*	*0.1*	*0.11*	*4962*			
Basin	*21341*	*Ornamental Landscaping*	*0.1*	*0.11*	*2357.3*			
	267513	***Total***			**186834.3**	**0.85**	***13234.1***	***97162***

Notes:

Extended Detention Basin Design Procedure	BMP Subarea No. Basin "A"	Legend:	Required Entries / Calculated Cells

Company Name: SP2 Date: 9/18/2022

Designed by: Alex Jaramillo County/City Case No.: W2021-082

Design Volume

Tributary Area (BMP Subarea) A_T = 6.14 acres

Enter V_{BMP}, determined from Section 2.1 of this Handbook V_{BMP} = 13,234 ft^3

Basin Footprint

Overall Geometry

Length at Basin Bottom Surface Length = 241 ft

Width at Basin Bottom Surface Width = 87 ft

Meets 1.5 : 1 requirement? ✓

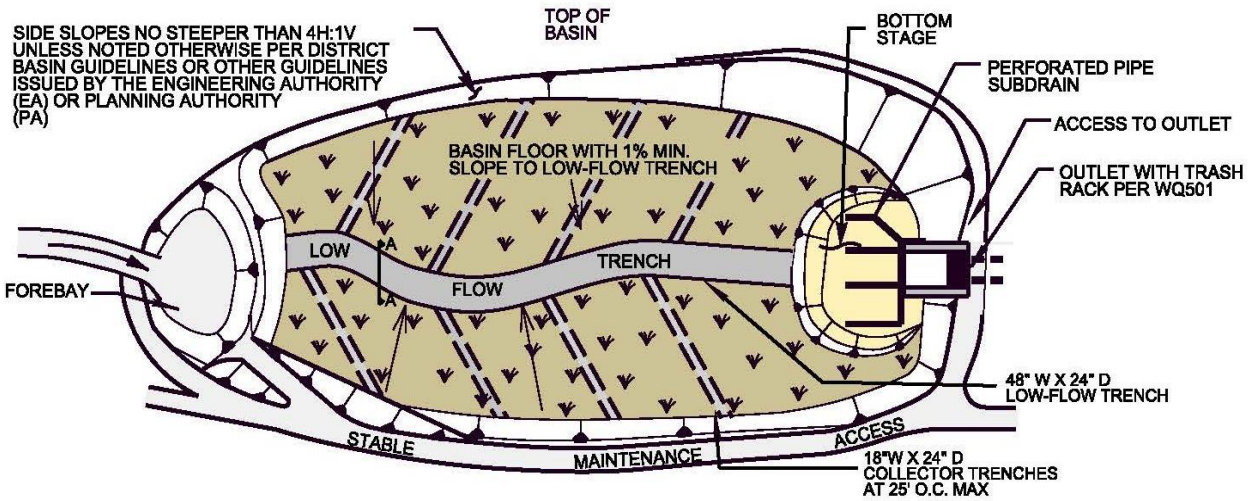
Side Slopes per "Basin Guidelines", Sect. 1.2 z = 4 :1

Proposed Basin Depth (with no freeboard) D_B = 3.00 ft

Depth of freeboard (if used) D_{FB} = 1.00 ft

Minimum Required Allowance for Total Depth (including proposed basin depth, freeboard, minimum depth of bottom stage (D_{BS}=0.33') and minimum filter depth (D_{FD}=2.33')) D_{REQ} = 6.7 ft

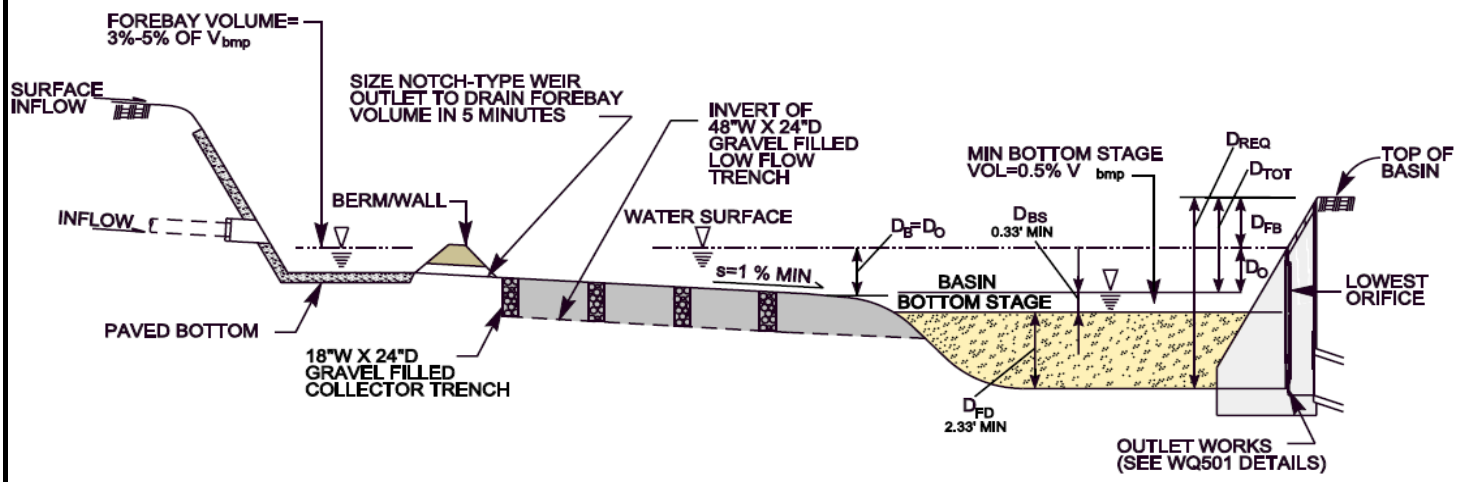
Depth from design water surface elevation to lowest orifice D_O = 3.0 ft



Basin Design

Basin Design

Proposed Total Basin Depth (proposed depth plus freeboard)	D_{TOT} =	4.00	ft
Basin Invert Longitudinal Slope	Slope =	1.00	%
Basin Invert Transverse Slope (1% min)	Slope =	1	%
Basin Volume	V_{Basin} =	89066	ft^3



Forebay Design

Forebay Volume (3 - 5% V_{BMP})	V_{FB} =	530	ft^3
Forebay Depth (height of berm)	D_{FBY} =	1	ft
Minimum Forebay Surface Area	A_{FB} =	530	ft^2
Rectangular weir (notch)	W =	6.00	in

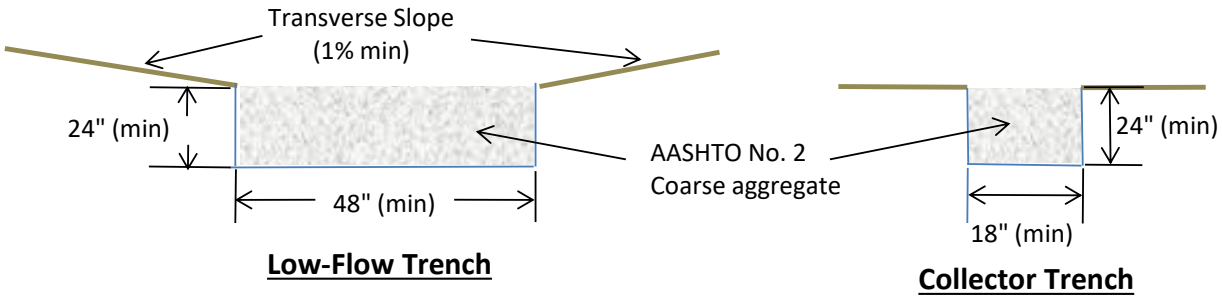
Dry Weather and Low-Flow Management

Low-Flow Trench (see graphic below)

Depth (24 inches minimum, gravel filled)	Depth =	24	inches
Width (48 inches minimum)	Width =	48	inches
Trench Invert Longitudinal Slope	Slope =	1	%

Collector Trenches (see graphic below)

Depth (24 inches minimum)	Depth =	24	inches
Width (18 inches minimum)	Width =	18	inches
Trench Invert Longitudinal Slope	Slope =	1	%
Spacing (25 feet on center maximum)	S =	20	feet



Low-Flow Trench **Collector Trench**

Bottom Stage (Sand Filter) Design

Depth of the Bottom Stage (4" minimum ponding)	D_{BS} =	6	in
Surface Area of Bottom Stage	A_{BS} =	132	ft^2
Dry Weather Ponded Volume (above sand layer)	V_{BS} =	66	ft^3

Is V_{BS} no less than 0.5% V_{BMP}? OK

Depth of ASTM-C33 sand (18 inch minimum)

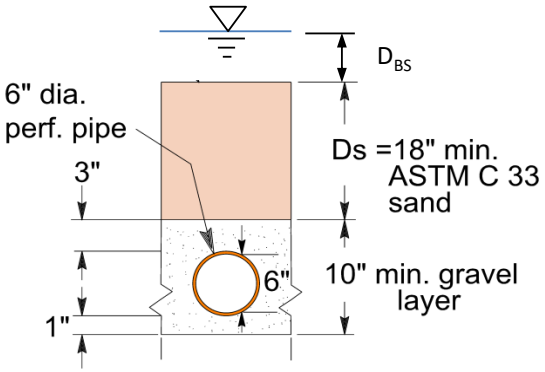
Ds = 18 inches

Diameter of Subdrains

ϕ = 6 in

Subdrain Spacing

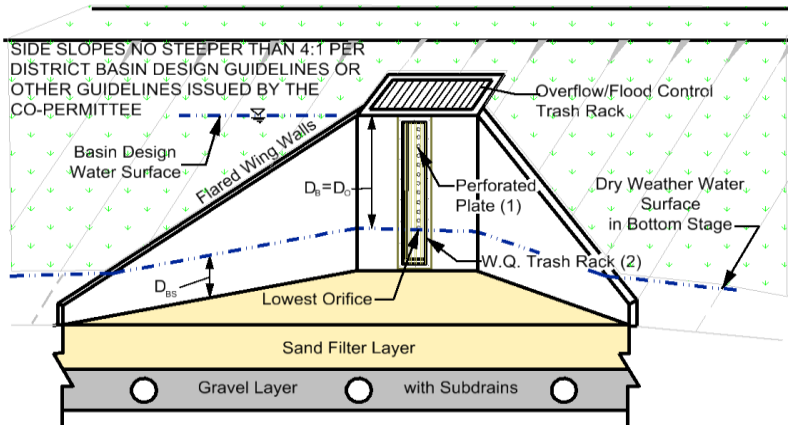
s = 10 ft. on center



Basin Outlet Design

Outlet Design

Assume an orifice area. Based on the information provided above, the spreadsheet provides discharge vs. stage data. Enter the volume vs. stage data for each interval. This information is used to route the volume through the basin. The size of the orifice is acceptable when the data shows that less than 50% of V_{BMP} has drained in 24 hours, and that 100% drawdown occurs within 72 hours.



Flow Rate, Q (cfs)

$$Q=CA[2g(H-H_o)]^{0.5}$$

Discharge Coefficient,

Default, C = 0.66

Other, C =

Orifice Area (ft^2)

Orifice Diameter, d; number of orifices per row, n; and number of orifice rows, N (from the bottom up).

d = 1.85 inches

n = 1 per row

N = 1 rows

Aeff = 0.019 ft^2 per row

or

Aeff = 2.687 in^2 per row

From outflow hydrograph, the time where 50% of V_{BMP} has drained from the basin (24 hour minimum):

Time (50%) = 24.93 hrs

OK

From outflow hydrograph, the time where 100% V_{BMP} has drained from the basin(within 72 hours):

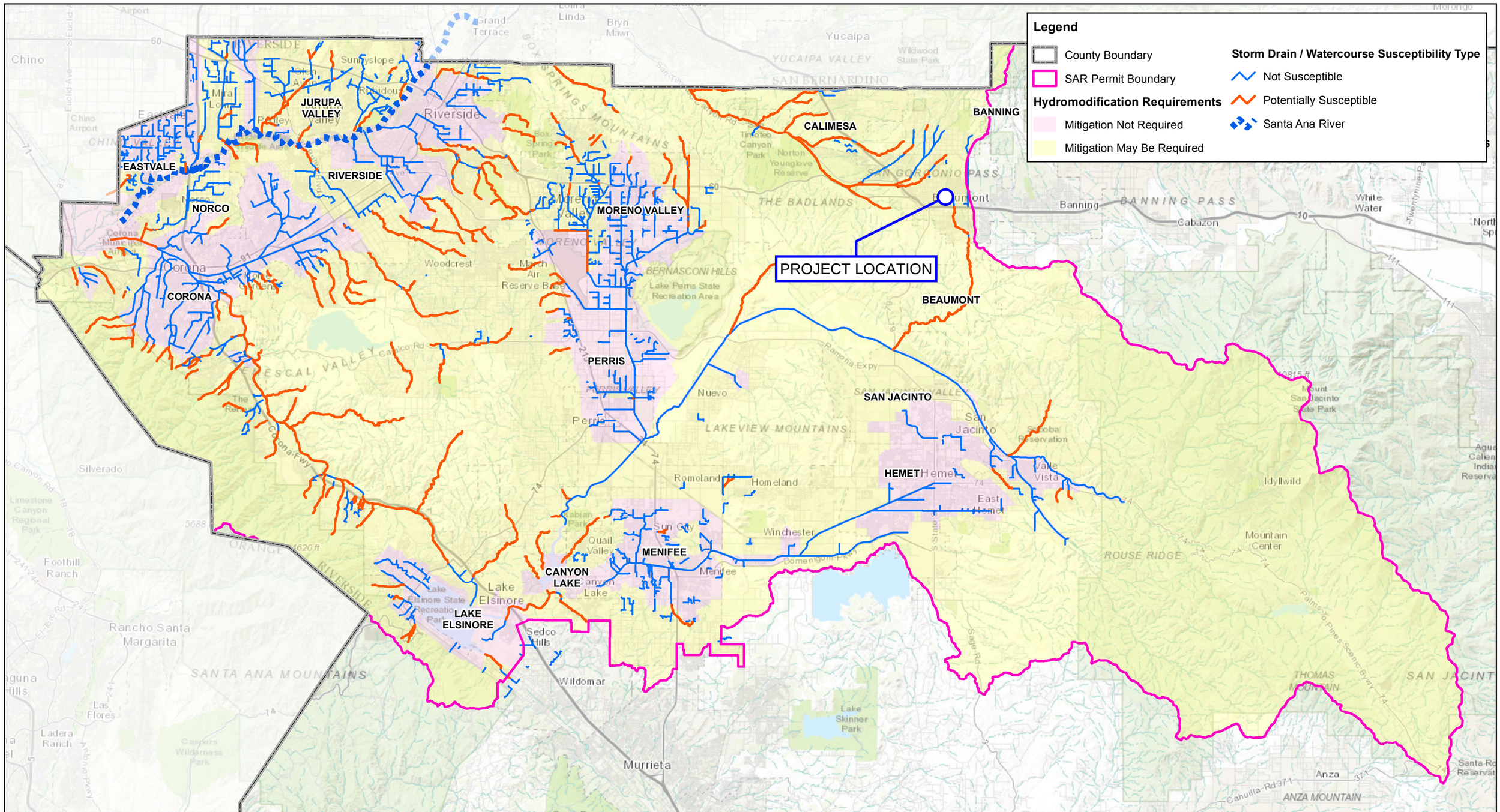
Time (100 %) = 68.55 hrs

OK

Headwater Elev. / Stage (ft)	Discharge (cfs)	Volume (acre-ft)	Δt (hrs.)
0	0.0000	0.0000	
0.33	0.0570	0.070	29.71
0.67	0.0807	0.140	12.30
1.00	0.0988	0.210	9.44
1.33	0.1141	0.290	9.09
1.67	0.1276	0.370	8.01
2.00	*0.1398*	*0.450*	
2.33	*0.1509*	*0.540*	
2.67	*0.1614*	*0.630*	
3.00	*0.1712*	*0.730*	
3.33			
3.67			
4.00			
4.33			
4.67			
5.00			
5.33			
5.67			
6.00			
6.33			
6.67			
7.00			
7.33			
7.67			
8.00			
8.33			
8.67			
9.00			
9.33			
9.67			
10.00			
		∑ =	68.55

Notes:

Appendix 7: Hydromodification


Legend
County Boundary
SAR Permit Boundary
Hydromodification Requirements
Mitigation Not Required
Mitigation May Be Required
Storm Drain / Watercourse Susceptibility Type
Not Susceptible
Potentially Susceptible
Santa Ana River
PROJECT LOCATION
EASTVALE
JURUPA VALLEY
RIVERSIDE
NORCO
CORONA
MORENO VALLEY
PERRIS
CALIMESA
BANNING
BEAUMONT
SAN JACINTO
HEMET
MENIFEE
CANYON LAKE
LAKE ELSINORE
Riverside
Corona
Norco
Eastvale
Jurupa Valley
Moreno Valley
Perris
Calimesa
Banning
Beaumont
San Jacinto
Hemet
Menifee
Canyon Lake
Lake Elsinore
Murrieta
Wildomar
Temecula
Yucaipa
Chino
Silverado
Rancho Santa Margarita
Foothill Ranch
Ladera Ranch
Las Flores
Idyllwild
Mountain Center
Anza
Cahuilla
Romoland
Homeland
Winchester
Sun City
Quail Valley
Sedco Hills
Lake Skinner Park
Lake Elsinore State Recreation Park
Lake Perris State Recreation Area
March Air Reserve Base
Woodcrest
Nuevo
Lakeview Mountains
San Bernardino Mountains
Santa Ana Mountains
Box Spring Mountains
Bernasconi Hills
The Badlands
San Gorgonio Pass
Banning Pass
Rouse Ridge
Anza Mountain
Cajalco Rd
Ramona Expy
Temescal Valley
Riverside
Orange
San Diego
N
0 2.5 5 10 Miles
Updated February 2017
HCOC Applicability Map
SAR Permittees
Map 2

XENIA - PRESENT CONDITION



Xenia Unit Hydrograph Flow Rates

Undeveloped								
Area X1	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Peak Flow (cfs) 3.81 Ac.	3.1	1.6	1.1	0.3	10.3	6.7	6.2	2.9
Volume (cf)	3,258	3,730	4,127	7,480	15,457	23,173	29,060	53,504
Volume (ac/ft)	0.07	0.09	0.09	0.17	0.35	0.53	0.67	1.23
Area X2	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Peak Flow (cfs) 10.08 Ac.	8.7	3.8	2.6	0.7	28.1	16.9	15.2	7.6
Volume (cf)	8,512	9,630	10,561	18,959	40,916	61,375	77,008	141,320
Volume (ac/ft)	0.20	0.22	0.24	0.44	0.94	1.41	1.77	3.24
Area X3	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Peak Flow (cfs) 1.41 Ac.	1.4	0.6	0.5	0.2	4.2	2.5	2.4	1.1
Volume (cf)	1,427	1,857	2,254	4,382	5,668	8,432	10,530	20,422
Volume (ac/ft)	0.03	0.04	0.05	0.10	0.13	0.19	0.24	0.47

Xenia Unit Hydrograph Flow Rates

Developed								
Area D1	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Peak Flow (cfs) 0.27 Ac.	0.4	0.2	0.2	0.07	1.0	0.5	0.5	0.2
Volume (cf)	443	718	923	1,835	1,161	1,841	2,488	5,240
Volume (ac/ft)	0.01	0.02	0.02	0.04	0.03	0.04	0.06	0.12
Area D2	2Y 1H	2Y 3H	2Y 6H	2Y 24H	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Peak Flow (cfs) 14.83 Ac.	16.2	8.9	7.3	3.4	41.9	25.6	23.8	11.8
Volume (cf)	22,544	35,641	45,689	90,759	62,432	97,213	129,550	270,069
Volume (ac/ft)	0.52	0.82	1.05	2.08	1.43	2.23	2.97	6.20
Area D3	2Y 1H	2Y 3H	2Y 6H	2Y 24H	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Peak Flow (cfs) 0.14 Ac.	0.16	0.04	0.02	0.01	0.5	0.3	0.2	0.1
Volume (cf)	85	66	69	129	514	694	782	1,419
Volume (ac/ft)	0.002	0.002	0.002	0.003	0.012	0.016	0.018	0.033
Area D2 w/Detention	2Y 1H	2Y 3H	2Y 6H	2Y 24H	2Y 1H	2Y 3H	2Y 6H	2Y 24H
Peak Flow 14.83 Ac.	0.6	0.8	0.9	1.2	5.7	24.4	22.5	11.7
Peak Basin Depth	2.2	3.1	3.8	5.3	5.6	6.0	5.9	5.7

Xenia - Preliminary Drainage Study

Preliminary Extended Detention Basin "A"

Input	Basin Depth (ft)	El. (ft)	Contour Area (sf)	Inc. Vol (cf)	Inc. Vol (af)	Total Vol. (af)	WQ Orifice Outflow (cfs) [D=2.06"]	Stage 1: Orifice Outflow (cfs) [d=4.1"]	Stage 2: CB110 Rec. Weir Outflow (cfs) [L=20 ft]	Stage 3: V-Ditch (cfs)	Total Q_{out} (cfs)
1	0	2,597.50	8,640				0.00				**0.00**
2	0.33	2,597.83	9,067	2,921	0.07	**0.07**	0.06				**0.06**
3	0.67	2,598.17	9,532	3,069	0.07	**0.14**	0.08				**0.08**
4	1	2,598.50	9,984	3,220	0.07	**0.21**	0.10				**0.10**
5	1.33	2,598.83	10,440	3,370	0.08	**0.29**	0.11				**0.11**
6	1.67	2,599.17	10,907	3,522	0.08	**0.37**	0.13	0.27			**0.39**
7	2	2,599.50	11,394	3,679	0.08	**0.45**	0.14	0.39			**0.53**
8	2.33	2,599.83	11,904	3,844	0.09	**0.54**	0.15	0.48			**0.63**
9	2.67	2,600.17	12,385	4,007	0.09	**0.63**	0.16	0.55			**0.72**
10	3	2,600.50	12,900	4,172	0.10	**0.73**	0.17	0.62			**0.79**
11	3.5	2,601.00	13,696	4,388	0.10	**0.83**	0.18	0.71			**0.89**
12	4	2,601.50	14,522	4,655	0.11	**0.94**	0.20	0.79			**0.99**
13	4.5	2,602.00	15,372	4,932	0.11	**1.05**	0.21	0.86			**1.07**
14	5	2,602.50	16,235	5,215	0.12	**1.17**	0.22	0.93			**1.15**
15	5.5	2,603.00	17,110	5,501	0.13	**1.30**	0.23	0.99	0.00		**1.22**
16	6	2,603.50	17,998	5,792	0.13	**1.43**	0.24	1.04	23.55	0.59	**25.42**
17	6.5	2,604.00	18,900	6,088	0.14	**1.57**	0.25	1.10	66.60	3.73	**71.68**
18	7	2,604.50	19,824	6,389	0.15	**1.72**	0.26	1.15	122.35	8.71	**132.48**
19	7.5	2,605.00	20,768	6,697	0.15	**1.87**	0.27	1.20	188.37	16.57	**206.42**

Weir Flow	Q=(Cw)(L)(	Stage 1	Stage 2
	L (ft)	0	20
	Cw	3.33	3.33

Orifice Outflow	Q=Ca(2gh)^0.5	
d (in)=	1.85	4.1
C=	0.66	0.66
A (ft^2)=	0.019	0.092

Site Flow Rate Summary								
Undeveloped	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Total Site Peak Flow (cfs) 15.3 Ac.	13.2	6.0	4.2	1.2	42.7	26.1	23.9	11.6
Developed	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Total Site Peak Flow (cfs) 15.3 Ac.	16.8	9.2	7.5	3.5	43.5	26.4	24.5	12.1
Mitigation Status	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
Developed w/ Detention Routing	2Y 1H	2Y 3H	2Y 6H	2Y 24H	100Y 1H	100Y 3H	100Y 6H	100Y 24H
Total Site Peak Flow (cfs) 68.7 Ac.	1.2	1.0	1.1	1.3	7.3	25.2	23.2	12.0
Percent Difference	-91%	-83%	-73%	6%	-83%	-3%	-3%	4%
Mitigation Status	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Maximum Basin W.S.E. (ft)	2600.7	2601.6	2602.3	2603.8	2604.1	2604.5	2604.4	2604.2

See drainage report for supporting model output files and calculations for unit hydrographs and basin routing.

Appendix 8: Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **A. On-site storm drain inlets**	☒ **Locations of inlets.** **(shown on Rough Grading Plans)**	☒ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☒ **Maintain and periodically repaint or replace inlet markings.** ☒ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☒ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
☐ **B. Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ **C. Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☒ **D1.** Need for future indoor & structural pest control		☒ Note building design features that discourage entry of pests.	☒ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ **D2.** Landscape/ Outdoor Pesticide Use	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☐ Show self-retaining landscape areas, if any. ☐ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ☐ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater by following manufacturers guidelines. ☒ pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated ☒ soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in **"What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** Provide IPM information to new ☐ owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **E.** Pools, spas, ponds, decorative fountains, and other water features.	☒ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☒ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ **F.** Food service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

☒ **G.** Refuse areas	☒ Show where site refuse and recycled materials will be handled and stored securely for pickup. See local municipal requirements for sizes and other details of refuse areas. ☒ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.	☒ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☒ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☒ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. See Fact Sheet WM-4 "Spill Prevention and Control" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **H.** Industrial processes.	☐ Show process area.	☐ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	☐ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☐ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **J.** Vehicle and Equipment Cleaning	☐ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	☐ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ☐ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☐ **K.** Vehicle/Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ☐ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ☐ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☐ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ☐ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☐ **L.** Fuel Dispensing Areas	☐ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ **M.** Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **N.** Fire Sprinkler Test Water		☒ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☒ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ☐ Condensate drain lines ☐ Rooftop equipment ☐ Drainage sumps ☒ Roofing, gutters, and trim. ☐ Other sources		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☐ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. Include controls for other sources as specified by local reviewer.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ **P.** Plazas, sidewalks, and parking lots.			☒ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Use absorbent to collect fluids, oil and greases and dispose of properly to prevent entry into the storm drain system. In the event washwater is required, it is to be contained and collected without entering the storm drain system.

Appendix 9: O&M

Section 6
Long-term Maintenance of BMPs

6.1 Introduction

The long-term performance of BMPs hinges on ongoing and proper maintenance. In order for this to occur, detailed maintenance plans are needed that include specific maintenance activities and frequencies for each type of BMP. In addition, these should include indicators for assessing when "as needed" maintenance activities are required. The fact sheets included in this volume contain the basic information needed to develop these maintenance plans, but municipalities and other regulatory agencies also need to identify the responsible party and potentially to address funding requirements. The following discussion is based primarily on data developed by Horner et al. (1994) and information available at http://www.stormwatercenter.net/

6.2 Critical Regulatory Components

Critical regulatory components identified by Horner et al. (1994) include:

- Regulations should officially designate a responsible party, frequently the development site owner, to have ultimate responsibility for the continued maintenance of stormwater facilities. This official designation provides the opportunity for appropriate preparation and budgeting prior to actually assuming responsibilities. It also facilitates enforcement or other legal remedies necessary to address compliance or performance problems once the facility has been constructed.

- Regulations should clearly state the inspection and maintenance requirements. Inspection and maintenance requirements should also comply with all applicable statutes and be based on the needs and priorities of the individual measure or facility. A clear presentation will help owners and builders comply, and inspectors enforce requirements.

- Regulations should contain comprehensive requirements for documenting and detailing maintenance. A facility operation and maintenance manual should be prepared containing accurate and comprehensive drawings or plans of the completed facility and detailed descriptions and schedules of inspection and maintenance.

- The regulations should delineate the procedure for maintenance noncompliance. This process should provide informal, discretionary measures to deal with periodic, inadvertent noncompliance and formal and severe measures to address chronic noncompliance or performance problems. In either case, the primary goal of enforcement is to maintain an effective BMP – the enforcement action should not become an end in itself.

- Regulations should also address the possibility of total default by the owner or builder by providing a way to complete construction and continue maintenance. For example, the public might assume maintenance responsibility. If so, the designated public agency must be alerted and possess the necessary staffing, equipment, expertise, and funding to assume this responsibility. Default can be addressed through bonds and other performance

guarantees obtained before the project is approved and construction begins. These bonds can then be used to fund the necessary maintenance activities.

- The regulations must recognize that adequate and secure funding is needed for facility inspection and maintenance, and provide for such funding.

6.3 Enforcement Options

A public agency will sometimes need to compel those responsible for facility construction or maintenance to fulfill their obligations. Therefore, the maintenance program must have enforcement options for quick corrective action. Rather than a single enforcement measure, the program should have a variety of techniques, each with its own degree of formality and legal weight. The inspection program should provide for nonconforming performance and even default, and contain suitable means to address all stages.

Prior to receiving construction approval, the developer or builder can be forced to provide performance guarantees. The public agency overseeing the construction can use these guarantees, usually a performance bond or other surety in an amount equal to some fraction of the facility's construction cost, to fund maintenance activities.

Enforcement of maintenance requirements can be accomplished through a stormwater maintenance agreement, which is a formal contract between a local government and a property owner designed to guarantee that specific maintenance functions are performed in exchange for permission to develop that property (http://www.stormwatercenter.net/). Local governments benefit from these agreements in that responsibility for regular maintenance of the BMPs can be placed upon the property owner or other legally recognized party, allowing agency staff more time for plan review and inspection.

6.4 Maintenance Agreements

Maintenance agreements can be an effective tool for ensuring long-term maintenance of on-site BMPs. The most important aspect of creating these maintenance agreements is to clearly define the responsibilities of each party entering into the agreement. Basic language that should be incorporated into an agreement includes the following:

1. Performance of Routine Maintenance

Local governments often find it easier to have a property owner perform all maintenance according to the requirements of a Design Manual. Other communities require that property owners do aesthetic maintenance (i.e., mowing, vegetation removal) and implement pollution prevention plans, but elect to perform structural maintenance and sediment removal themselves.

2. Maintenance Schedules

Maintenance requirements may vary, but usually governments require that all BMP owners perform at least an annual inspection and document the maintenance and repairs performed. An annual report must then be submitted to the government, who may then choose to perform an inspection of the facility.

3. Inspection Requirements

Local governments may obligate themselves to perform an annual inspection of a BMP, or may choose to inspect when deemed necessary instead. Local governments may also wish to include language allowing maintenance requirements to be increased if deemed necessary to ensure proper functioning of the BMP.

4. Access to BMPs

The agreement should grant permission to a local government or its authorized agent to enter onto property to inspect BMPs. If deficiencies are noted, the government should then provide a copy of the inspection report to the property owner and provide a timeline for repair of these deficiencies.

5. Failure to Maintain

In the maintenance agreement, the government should repeat the steps available for addressing a failure to maintain situation. Language allowing access to BMPs cited as not properly maintained is essential, along with the right to charge any costs for repairs back to the property owner. The government may wish to include deadlines for repayment of maintenance costs, and provide for liens against property up to the cost of the maintenance plus interest.

6. Recording Of The Maintenance Agreement

An important aspect to the recording of the maintenance agreement is that the agreement be recorded into local deed records. This helps ensure that the maintenance agreement is bound to the property in perpetuity.

Finally, some communities elect to include easement requirements into their maintenance agreements. While easement agreements are often secured through a separate legal agreement, recording public access easements for maintenance in a maintenance agreement reinforces a local government's right to enter and inspect a BMP.

Examples of maintenance agreements include several available on the web at http://www.stormwatercenter.net/

6.5 Public Funding Sources

If local agencies are willing to assume responsibility for stormwater BMPs, it is essential to identify the long-term funding sources. Several of these are described below:

General Tax Revenues

Tax revenues are an obvious source of funding, particularly for the long-term inspection and maintenance of existing runoff and drainage facilities. The benefits and protection to the public from continued safe and effective operation of the facility justifies using revenues from general funds.

To use tax revenues, particularly from a general fund, the inspection and maintenance program must annually compete with all other programs included in the government's annual operating budget. This inconsistent and unreliable funding makes securing a long-term financial

commitment to inspection and maintenance difficult and subject to political pressures. Nevertheless, tax revenues remain a popular funding source because the collection and disbursement system is already in place and familiar.

Utility Charges

Using utility charges to fund inspection and maintenance is a somewhat recent application of an already established financing technique. In addition, several municipalities and counties throughout the country have runoff management, drainage, and flood control authorities or districts to provide residents with runoff related services.

Using utility charge financing has several advantages. By addressing only runoff needs and benefits, utility funding avoids competing with other programs and needs. Utility funding also demonstrates a direct link between the funding and the services it provides. This approach can require an entirely new operating system and organization that needs legal authorization to exist, operate, and assess charges. The effort required to create such an entity can deter many, although the continued success of established authorities and growth of new ones have done much to allay concerns over the effort required.

In a runoff utility, the user charges are often based on the need for services rather than the benefits derived from them. While charges are based on actual costs to inspect and maintain runoff facilities and measures within the service area, the assessed rate structure should relate to site characteristics. These include property area size, extent of impervious coverage, and other factors with a direct and demonstrable effect on runoff. To be fair, the rate structure should also remain simple and understandable to the ratepayer.

To finance the stormwater utility in Prince William County, Virginia, residential and nonresidential owners of developed property pay based on the amount of impervious area (rooftops, paved areas, etc.) on their property. Residents pay $10.38 billed twice a year ($20.76 total annual fee) for detached singe-family homes. Town home and condominium owners will pay $7.785 billed twice a year ($15.57 total annual fee). Nonresidential property owners pay $0.84 per 1,000 ft2 of impervious area per month. Fee adjustments or credits may be available if a stormwater management system is already in place. The fee will be on the real estate bills.

Fees for the stormwater utility in Austin, Texas are higher with residential users billed $5.79/mo, while commercial users pay $94.62/mo/acre of impervious cover. These fees cover not only maintenance of existing BMPs, but also capital improvement projects related to the drainage infrastructure.

Permit Fees

Collecting permit fees to finance runoff inspection and maintenance is a long standing funding procedure. Most governmental entities, local, county, and state, can establish and collect fees and other charges to obtain operating funds for programs and services. Many inspection services, most notably the construction inspection of both ESC measures and permanent drainage and runoff management facilities, are financed at least in part through fees collected by permitting agencies. Unlike taxes or some utility charges, inspection costs are borne by those who need them.

The permit fee collection program should have a demonstrable link to the runoff management or drainage systems. The public agency should demonstrate a direct link between the permit fees collected and the permitted project. One method is using dedicated accounts for individual projects and facilities. Finally, the rate structure should reflect site characteristics such as area size or imperviousness that directly relate to the measure or facility by affecting runoff or erosion.

Dedicated Contributions

Public agencies at times have used developer contributions to fund long-term facility maintenance. This approach is particularly appropriate in single-family residential subdivisions, where numerous individual property owners served by a single runoff facility can result in confusion over who has maintenance responsibility.

The exact funding technique depends on many factors, including community attitude and knowledge, economic and political viability, and program needs and costs. Some techniques, including permit fees and dedicated contributions, may be more appropriate for short-term activities, such as construction inspection. Other utility charges and specialized tax revenues may apply to all phases of an inspection and maintenance program but require considerable effort and special legal authorization to operate.

TO BE COMPLETE PRIOR TO FINAL APPROVAL

Recording requested by and mail to:

City Clerk
City of Beaumont
550 E. Sixth Street
Beaumont, CA 92223

SPACE ABOVE THIS LINE FOR RECORDER'S USE
EXEMPT FROM RECORDER'S FEES PURSUANT TO GOVERNMENT CODE SECTION 6103 AND 27383

APN:

STORM WATER MANAGEMENT WQMP/BMP FACILITIES

COVENANT AND AGREEMENT NO. _

City of Beaumont, Riverside County, California

THIS COVENANT AND AGREEMENT is made and entered into this of 2019, by and between _____, ("Owner"), and the City of Beaumont, California, ("City").

The Owner hereby certifies I am (we are) the sole owner of certain real property located at _____(Site Address) in the City of Beaumont, County of Riverside, State of California, more specifically described in **Exhibit "A"** and depicted in **Exhibit "B" (**"Property").

The Owner covenants and agrees to comply with the Project Water Quality Management Plan ("WQMP"), attached hereto as **Exhibit "C"**, providing for storm water quality treatment within the confines of the Property.

The Owner covenants and agrees that the health, safety and welfare of the residents of the City of Beaumont, require that the Best Management Practice ("BMP") facilities, more specifically described in the WQMP (for example bio- swales, catch basins, roof drains and appurtenances) be constructed and maintained to minimize pollutants in urban runoff by the Owner.

The Owner further covenants and agrees as follows:

1. The on-site storm water management/BMP facilities mentioned above shall be constructed by the Owner at its sole cost and expense, in accordance with the plans and specifications identified in the WQMP approved by City.

2. The Owner shall adequately maintain the storm water management/BMP facilities in a manner assuring peak performance at all times, including source control BMPs at all times as its sole responsibility, at its sole cost and expense. This includes all pipes and channels built to convey storm water on the Property, including

catch basin inserts, underground detention ponds, swales and vegetation provided to control the quantity and quality of the storm water. Adequate maintenance is herein defined as good working condition so that these facilities are performing in accordance with their design functions continuously at all times.

3. The Owner shall annually inspect the storm water management/BMP facilities mentioned above and submit an inspection report annually to the Public Works Department by the anniversary of the date of this Agreement of each year. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the storm water management BMPs listed in the WQMP such as bio-swales, catch basins and related filter units, etc. Deficiencies shall be noted in the inspection report and corrected by Owner promptly.

4. The Owner hereby grants permission to City, its authorized agents and employees, to enter upon the Property and to inspect the storm water management/BMP facilities, take samples and perform testing whenever the City deems necessary and as required by the City's most current National Pollutant Discharge Elimination System (NPDES) Permit. The purpose of the inspection, testing and sampling is to follow up on apparent and reported deficiencies and/or to respond to citizen complaints and meet the requirements of the City's NPDES Permit issued by the State Water Resources Control Board – Santa Ana River Region. The City shall provide the Owner with advanced notice of entering upon the Property, except in the event of an emergency, as determined by the City. The City shall provide the Owner copies of the inspection findings and a directive to commence with the repairs if necessary. Owner or Owner's successors or assigns shall pay City for all costs incurred by City in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of City invoice.

5. In the event the Owner fails to maintain the storm water management/BMP facilities in good working condition acceptable to the City, upon five (5) days advanced written notice, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in any inspection report and to charge the costs of such repairs to the Owner the cost of which shall constitute a lien against the Property. In the event of an emergency, as determined by City, advanced notice as aforesaid, shall not be required. Notwithstanding the forgoing, it is expressly understood and agreed that the City is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation to the City.

6. The Owner will perform the work necessary to keep these facilities in good working order as appropriate. The maintenance schedule for the storm water management BMP facilities (including sediment removal) is outlined in the approved WQMP and the schedule must be followed at all times. In the future, City of Beaumont may adopt an annual Stormwater Inspection Fee that would be assessed to the Owner.

7. In the event the City, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials and the like, the Owner, its successors and assigns shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the City. Owner agrees to indemnify, defend (with counsel reasonably approved by the City) and hold harmless the City and its authorized officers, employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and

TO BE COMPLETE PRIOR TO FINAL APPROVAL

for any costs or expenses incurred by the City on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the City's "active" as well as "passive" negligence but does not apply to the City's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the City under this Agreement.

9. This Agreement shall be recorded with the County Recorder for the County of Riverside and shall constitute a covenant running with the land, equitable servitude and lien against the Property, and shall be binding on the Owner, its successors, assigns, transferees, administrators, executors, heirs, encumbrancers and any other successors in interests, including any homeowner's association.

10. In addition to any remedy available to City under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the City if said cure reasonably requires more than the subject time, the City may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the City may recover any damages to which the City may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. Owner shall provide printed educational materials with any sale of the Property which provide information on what storm water management facilities are present, the types and locations of maintenance signs that are required and how the necessary maintenance can be maintained.

12. Owner shall provide actual notice of this Agreement and its terms to any respective buyers or successor(s) in interest.

13. In order to be valid, amendment or change to this Agreement including the WQMP and BMPs requires an amendment executed by the City and Owner which is recorded with the Riverside County Recorder.

WITNESS the following signatures:

OWNER:

By: _____ By: _____

Name: _____ Name: _____

Title: _____ Title: _____

TO BE COMPLETE PRIOR TO FINAL APPROVAL

CITY OF BEAUMONT

By: _____
Director of Public Works, Beaumont

ATTEST:

_____
City Clerk, City of Beaumont

All signatures on this Agreement on behalf of the Owner must be acknowledged before a Notary Public. In the event that the owner is a corporation, the President/Vice President and the corporate secretary of the corporation must sign.

TO BE COMPLETE PRIOR TO FINAL APPROVAL

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: _____ (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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WITNESS my hand and official seal.

Signature: (Seal)

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WITNESS my hand and official seal.

Signature: (Seal)

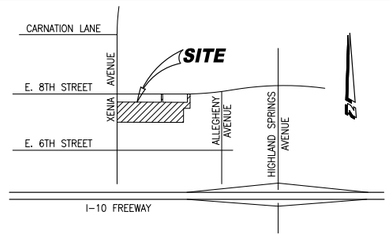
TO BE COMPLETE PRIOR TO FINAL APPROVAL

EXHIBIT "A"
LEGAL DESCRIPTION

TO BE COMPLETE PRIOR TO FINAL APPROVAL

EXHIBIT "B"
DIAGRAM OF PROPERTY





VICINITY MAP

NTS

OWNER/APPLICANT:

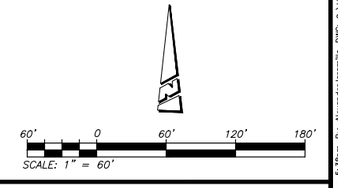
BEAUMONT LAND PARTNERS, LLC
16133 VENTURA BLVD. #633
ENCINO, CA 91436
CONTACT: PAUL ONUFER
OFFICE PH: 626-263-4205
EMAIL: PONUFER@AVPRE.NET

GENERAL MAP NOTES:

1. ASSESSOR'S PARCEL NUMBER:
   419-160-005, 419-160-024, 419-170-016, 419-170-017, 419-170-018, 419-170-022, & 419-170-027.
2. SITE ZONING:
   - (R-MF) RESIDENTIAL MULTI-FAMILY (20 DU ACRE)
3. SITE GENERAL PLAN DESIGNATION:
   -MULTI-FAMILY RESIDENTIAL
4. LAND USE:
   -EXIST: VACANT
   -PROPOSED: APARTMENTS
5. SITE ACREAGE:
   - GROSS AREA: 10.931 ACRES (476,164.12 SF)
   - NET AREA: 10.927 NET (475,964.1 SF)
6. NO OFF-SITE RIGHT-OF-WAY IS REQUIRED FOR FOR SITE ACCESSIBILITY.
7. THIS PARCEL MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
8. WATER QUALITY AND DETENTION AREAS TO BE MAINTAINED BY LAND OWNER.
9. NO HAZARDOUS MATERIALS HAVE BEEN KNOWN TO BE STORED ON SITE.
10. THE PROPERTY IS NOT SUBJECT TO LIQUEFACTION OR GEOLOGICAL HAZARDS. OR SUBJECT TO OVERFLOW, INUNDATION, OR FLOOD HAZARDS.
11. THERE ARE NO KNOWN WELLS ON-SITE OR WITHIN 200' OF THE SITE.

LEGEND:

- FLOW ARROW
- DMA BOUNDARY
- SELF-RETAINING AREA BOUNDARY
- IMPERVIOUS AREAS: (STREET, PARKING, AND SIDEWALKS)
- IMPERVIOUS AREAS: (ROOFS)
- PERVIOUS AREAS: (OPEN SPACE AND LANDSCAPING)
- PERVIOUS AREAS: (SELF-RETAINING LANDSCAPED AREAS)
- PROPOSED BMP AREAS
- PROPOSED STORM DRAIN
- (7) PROPOSED TRASH ENCLOSURE
- PROPOSED INLETS (TYPICAL)

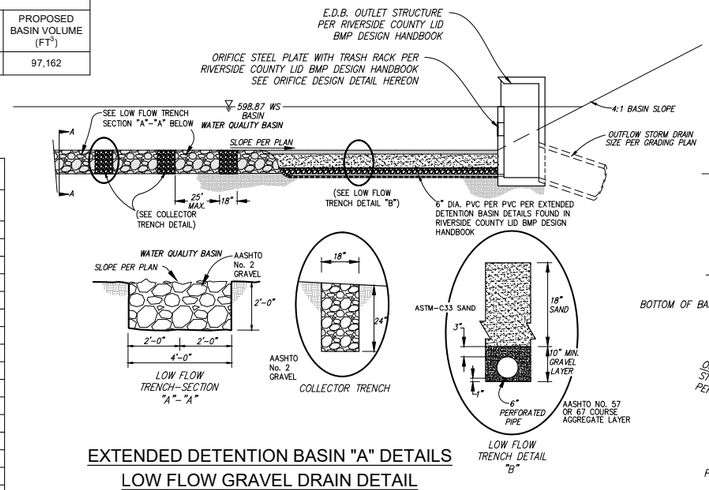


BMP DESIGN VOLUME SUMMARY: DMA 1

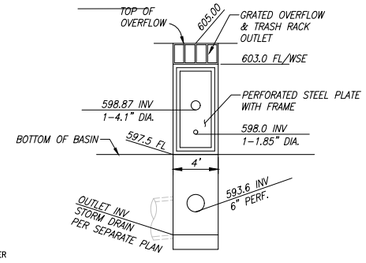
IMPERVIOUS AREAS: ROOFS, SIDEWALKS, & STREETS/PARKING (FT^2)	PERVIOUS AREAS: OPEN SPACES & LANDSCAPING (FT^2)	BASIN AREA (FT^2)	TOTAL AREA (AC.)	VBMP (FT^3)	PROPOSED BASIN VOLUME (FT^3)
201,250	44,922	21,341	6.14	13,234	97,162

SELF-RETAINING AREA SUMMARY

AREA ID	PERVIOUS AREA (SQ-FT.)	IMPERVIOUS AREA (SQ-FT.)	TOTAL AREA (SQ-FT.)	REQ. RETENTION DEPTH (IN)	RATIO
SRA-1	6,410	7,780	14,190	1.88	1.12 < 2
SRA-2	3,354	6,615	9,969	2.53	1.97 < 2
SRA-3	3,683	7,137	10,820	2.50	1.94 < 2
SRA-4	4,008	7,471	11,479	2.43	1.86 < 2
SRA-5	4,439	7,811	12,250	2.35	1.76 < 2
SRA-6	4,777	7,671	12,448	2.21	1.61 < 2
SRA-7	4,258	7,430	11,688	2.33	1.74 < 2
SRA-8	4,610	7,445	12,055	2.22	1.61 < 2
SRA-9	4,124	7,664	11,788	2.43	1.86 < 2
SRA-10	3,961	7,640	11,601	2.49	1.93 < 2
SRA-11	4,703	7,438	12,141	2.19	1.58 < 2
SRA-12	4,824	7,457	12,281	2.16	1.55 < 2
SRA-13	4,151	7,760	11,911	2.44	1.87 < 2
SRA-14	4015	7,598	11,613	2.46	1.89 < 2
SRA-15	4,672	7,412	12,084	2.20	1.59 < 2
SRA-16	4,802	7,192	11,994	2.12	1.50 < 2



EXTENDED DETENTION BASIN "A" DETAILS
LOW FLOW GRAVEL DRAIN DETAIL
N.T.S.



BASIN "A" OUTLET DETAIL
PER RIVERSIDE COUNTY LID BMP DESIGN HANDBOOK

SOURCE CONTROL

- LANDSCAPED AREAS WITHIN THE RESIDENTIAL LOTS AND RIGHT-OF-WAYS SHALL BE MAINTAINED USING MINIMUM TO NO PESTICIDES
- POOLS SHALL BE PLUMBED TO THE SANITARY SEWER IF REQUESTED BY THE CO-PERMITTEE.
- PROPERTY OWNERS SHALL KEEP TRASH RECEPTACLES CLOSE AT ALL TIMES.
- CAR WASHING AND MAINTENANCE SHALL BE PROHIBITED ONSITE.
- FIRE SPRINKLERS TEST WATER SHALL DRAIN TO THE SANITARY SEWER.
- CONDENSATION DRAIN LINES MAY DISCHARGE TO LANDSCAPED AREAS IF THE FLOW IS SMALL ENOUGH THAT RUNOFF WILL NOT OCCUR. CONDENSATE DRAIN LINES MAY NOT DISCHARGE TO THE STORM DRAIN SYSTEM.
- AVOID ROOFING, GUTTERS, AND TRIM MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF.
- STREET SHALL BE SWEPT BY A PRIVATE CONTRACTOR EVERY TWO WEEKS.

85TH PERCENTILE, 24-HOUR RAIN FALL DEPTH FROM ISOHYETAL MAP: D_{85} = 0.85 IN

PREPARED BY:
SP2 & Co.
A LAND DEVELOPMENT SERVICES COMPANY
265 S. RANDOLPH AVENUE #105
BREA, CA 92821
PHONE: (714) 490-1500
"SERVING THE DEVELOPMENT COMMUNITY SINCE 1985"

XENIA APARTMENTS

PRELIMINARY WATER QUALITY MANAGEMENT PLAN
SITE PLAN

Plotted: Sep 16, 2022 - 5:38pm By: Alexander.Jaramillo DWG: C:\Users\Alexander.Jaramillo\OneDrive - sp2inc.com\Projects\Xenia\Beaumont-10\Stormwater\Water Quality\Drawings\Xenia-PWQMP Site Plan.dwg

EXHIBIT "C"
WQMP

Preliminary Operation and Maintenance Plan for the Stormwater Quality BMP Facilities for Xenia

May 27, 2022

I. PURPOSE

The primary purpose of this Operations & Maintenance Plan (O&M Plan) shall be to provide a routine maintenance program that maintains the treatment facilities effectiveness.

II. COVERAGE AREA

This project will utilize one (1) primary treatment facility type located on-site:

1. Bioretention Basin "A" – Located in the middle of the southern property line, adjacent to the southern property line.
   Lat: 33.931031
   Long: -116.952433

These facilities treat stormwater runoff from the site and outlet into existing drainage patterns located in the adjacent golf course. Ultimately, the runoff drains to the Santa Ana River through San Timoteo Creek before ending up at the Pacific Ocean.

III. ROUTINE MAINTENANCE ACTIVITIES

The POA will be responsible for the O&M of the extend detention basin. Primary maintenance activities include vegetation management, trash and sediment removal, irrigation maintenance and storm drain outlet inspections. Although mosquito abatement is a concern, the basins and swales are designed to fully drain within 24-72 hours and not include permanent pools or standing water. Routine maintenance activities, and the frequency at which they will be conducted, are shown in Table 1 below.

NOTE: Landscape Maintenance Plan should also be reviewed for consistency with vegetation maintenance and any applicable needs for specific plants, shrubs or trees.

Table 1 Routine Maintenance Activities for Basins		
No.	**Maintenance Task**	**Frequency of Task**
1	Conduct annual vegetation management during the summer, removing weeds and harvesting vegetation. Remove all grass cuttings and other green waste.	Once a year prior to the beginning of the wet season (September)
2	Trim vegetation at beginning and end of wet season to prevent establishment of woody vegetation, and for aesthetics and mosquito control.	Twice a year (spring and fall)
3	Evaluate health of vegetation and remove or replace any dead or dying plants. Remove all green waste and dispose of properly.	Twice a year
4	If turf grass is included in basin/swale design, conduct regular mowing and remove all grass cuttings. Avoid producing ruts when mowing.	As necessary to not allow grass over-growth
7	Remove accumulated trash and debris from the middle and end of the wet season and dispose of trash and debris properly.	Twice a year (January and April)
8	Irrigate during dry weather.	Per Landscape Plans
9	Inspect basins and swales using the attached inspection checklists.	Quarterly, or as needed

IV. PROHIBITIONS

The use of pesticides and quick release fertilizers shall be minimized, and the principles of integrated pest management (IPM) followed:

1. Employ non-chemical controls (biological, physical and cultural controls) before using chemicals to treat a pest problem.
2. Prune plants properly and at the appropriate time of year.
3. Provide adequate irrigation for landscape plants. Do not over water.
4. Limit fertilizer use unless soil testing indicates a deficiency. Slow-release or organic fertilizer is preferable. Check with municipality for specific requirements.
5. Pest control should avoid harming non-target organisms, or negatively affecting air and water quality and public health. Apply chemical controls only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, apply the least toxic and the least persistent pesticide that will provide adequate pest control. Do not apply pesticides on a prescheduled basis.
6. Sweep up spilled fertilizer and pesticides. Do not wash away or bury such spills.
7. Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
8. Only licensed, trained pesticide applicators shall apply pesticides.

9. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.

10. Unwanted/unused pesticides shall be disposed as hazardous waste.

Standing water shall not remain in the treatment and/or hydromodification management measures for more than five days, to prevent mosquito generation. Should any mosquito issues arise, contact the City of Beaumont for the appropriate contact for Mosquito Abatement, as needed for assistance. Mosquito larvicides shall be applied only when absolutely necessary and then only by a licensed professional or contractor. Contact information for the Riverside County Environmental Health – Vector Control is provided below.

Riverside County Department of Environmental Health – Vector Control

Downtown Riverside Office
3880 Lemon Street, 2nd Floor
Riverside, CA 92501
Phone: (951) 955-8980
Emergency After Hours: (951) 782-2968
http://www.rivcoeh.org/opencms/rivcoeh/ProgServices/Food_Program/Vector.html

V. INSPECTIONS

The attached Inspection and Maintenance Checklists shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

Basin Inspection and Maintenance Checklist

Property Address: _____ Property Owner: _____

Treatment Measure No.: _____ Date of Inspection: _____ Type of Inspection: □ Monthly □ Pre-Wet Season
□ After heavy runoff □ End of Wet Season

Inspector(s): _____ □ Other:_____

Defect	**Conditions When Maintenance Is Needed**	**Maintenance Needed? (Y/N)**	**Comments** (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	**Results Expected When Maintenance Is Performed**
General				
Trash & Debris	• Trash and debris accumulated in basin. • Visual evidence of dumping.			Trash and debris cleared from site and disposed of properly.
Poisonous Vegetation and noxious weeds	Poisonous or nuisance vegetation or noxious weeds, e.g., morning glory, English ivy, reed canary grass, Japanese knotweed, purple loosestrife, blackberry, Scotch broom, poison oak, stinging nettles, or devil's club.			Use Integrated Pest Management techniques to control noxious weeds or invasive species.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			No contaminants or pollutants present.
Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam, berm or into slopes via rodent holes.			The design specifications are not compromised by holes. Any rodent control activities are in accordance with applicable laws and do not affect any protected species.
Insects	Insects such as wasps and hornets interfere with maintenance activities.			Insects do not interfere with maintenance activities.

Basin & Swales Inspection and Maintenance Checklist

Date of Inspection:_____

Property Address: _____

Treatment Measure No.:_____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Tree/Brush Growth and Hazard Trees	• Growth does not allow maintenance access or interferes with maintenance activity. • Dead, diseased, or dying trees/shrubs.			• Trees do not hinder maintenance activities. • Remove hazard trees as approved by the City. (Use a certified Arborist to determine health of tree or removal requirements).
Drainage time	Standing water remains in basin more than five days.			Correct any circumstances that restrict the flow of water from the system. Restore drainage to design condition. If the problem cannot be corrected and problems with standing water recur, then mosquitoes should be controlled with larvicides, applied by a licensed pesticide applicator.
Outfall structure	Debris or silt build-up obstructs an outfall structure.			Remove debris and/or silt build-up and dispose of properly.
Side Slopes				
Erosion	• Eroded over 2 in. deep where cause of damage is still present or where there is potential for continued erosion. • Any erosion on a compacted berm embankment.			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.
Storage Area				
Sediment	Accumulated sediment >10% of designed basin depth or affects inletting or outletting condition of the facility.			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion. Sediment disposed of properly.
Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Emergency Overflow / Spillway and Berms				
Settlement	Berm settlement 4 inches lower than the design elevation.			Dike is built back to the design elevation.

Basin & Swales Inspection and Maintenance Checklist

Date of Inspection:_____

Property Address: _____

Treatment Measure No.:_____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Tree Growth	Tree growth on berms or emergency spillway >4 ft in height or covering more than 10% of spillway.			• Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. • A civil engineer should be consulted for proper berm/spillway restoration.
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed and disposed of properly.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack.
Fencing and Gates				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.
Flow Duration Control Outlet (if included in design to meet Hydromodification Management Standard)				
Risers, orifices and screens	Any debris or clogging			Restore unobstructed flow through discharge structure; to meet original design; dispose of debris properly.
Drawdown time	Noticeable ponding exceeding 72-hours after a design storm event			Restore infiltration and ponded waters permeate. Scarification should only be performed when there are signs of clogging rather than on a routine basis. Always remove deposited sediments before scarification and use a hand-guided rotary tiller.
Swales (in addition to general items listed above)				

Basin & Swales Inspection and Maintenance Checklist

Date of Inspection:_____

Property Address: _____

Treatment Measure No.:_____

Defect	**Conditions When Maintenance Is Needed**	**Maintenance Needed? (Y/N)**	**Comments** (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	**Results Expected When Maintenance Is Performed**
Impeded Flow	Twice annually at beginning and end of wet season. After heavy runoff. Visible blockage or impediments.			Trash and debris cleared from swale and disposed of properly especially prior to mowing.
Landscaping or Vegetative Overgrowth	Twice annually at beginning and end of wet season or as needed for aesthetics.			Maintained flow and healthy vegetation.
Miscellaneous				
Miscellaneous	Any condition not covered above that needs attention to restore infiltration basin to design conditions.			Meets the design specifications.

Maintenance for Self-Treating Areas.		
Area ID	Location	Maintenance
SRA-1	Landscaped areas around building 1	• Grassed areas to trimmed weekly. • Landscape overflow inlets and drains to be cleared of debris weekly. • Check irrigation sprinkler heads for leaks and over spray weekly
SRA-2	Landscaped areas around building 2	
SRA-3	Landscaped areas around building 3	
SRA-4	Landscaped areas around building 4	
SRA-5	Landscaped areas around building 5	
SRA-6	Landscaped areas around building 6	
SRA-7	Landscaped areas around building 7	
SRA-8	Landscaped areas around building 8	
SRA-9	Landscaped areas around building 9	
SRA-10	Landscaped areas around building 10	
SRA-11	Landscaped areas around building 11	
SRA-12	Landscaped areas around building 12	
SRA-13	Landscaped areas around building 13	
SRA-14	Landscaped areas around building 14	
SRA-15	Landscaped areas around building 15	
SRA-16	Landscaped areas around building 16	

Drainage System Maintenance SC-44



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

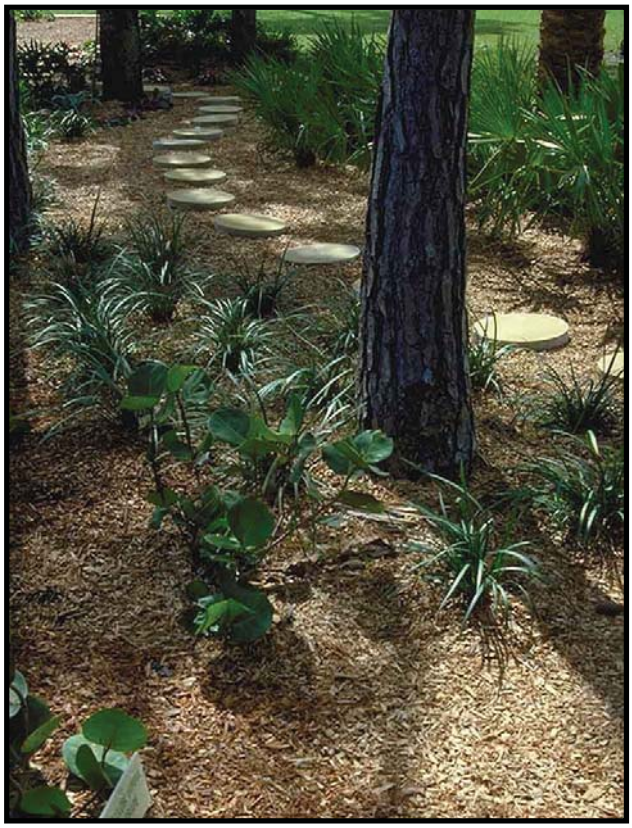
Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Appendix 10: Education Materials

Site Design & Landscape Planning SD-10



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- ✓ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11



Rain Garden

Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ✓ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12



Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ✓ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING –

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DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers



Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

Do you know where street flows actually go?

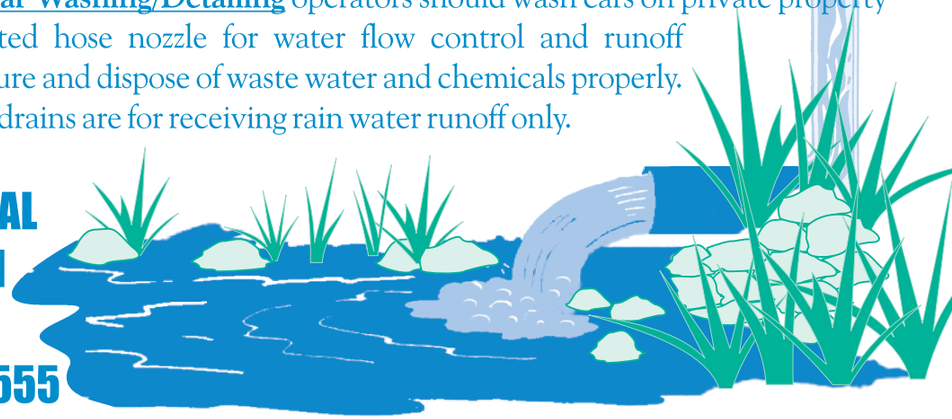
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.



Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.



When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

After the Storm

A Citizen's Guide to Understanding Stormwater



For more information contact:

or visit

www.epa.gov/npdes/stormwater

www.epa.gov/nps

United States Environmental Protection Agency

EPA 833-B-03-002

January 2003

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THE YEAR OF CLEAN WATER Celebration & Recommitment

What is stormwater runoff?



Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?



Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution



Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.



- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.



- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater Pollution Solutions



Residential

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care



Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Septic systems



Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Auto care



Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Pet waste



Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.



Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.



Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.



Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.



Commercial

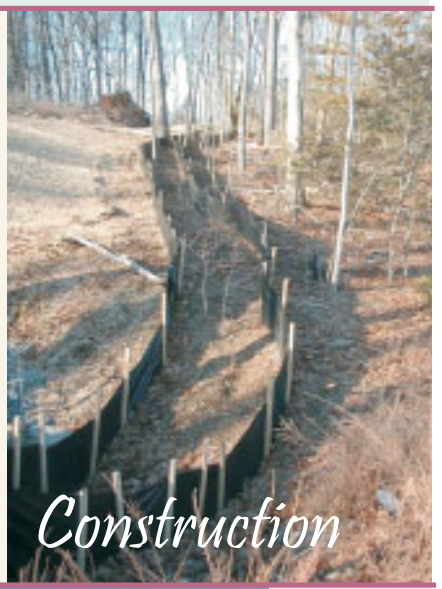
Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



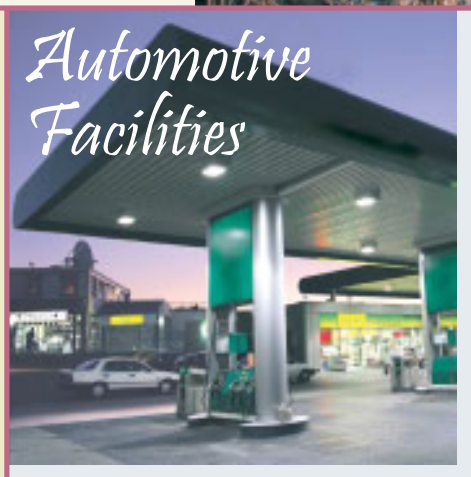


Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.



- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



Automotive Facilities

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

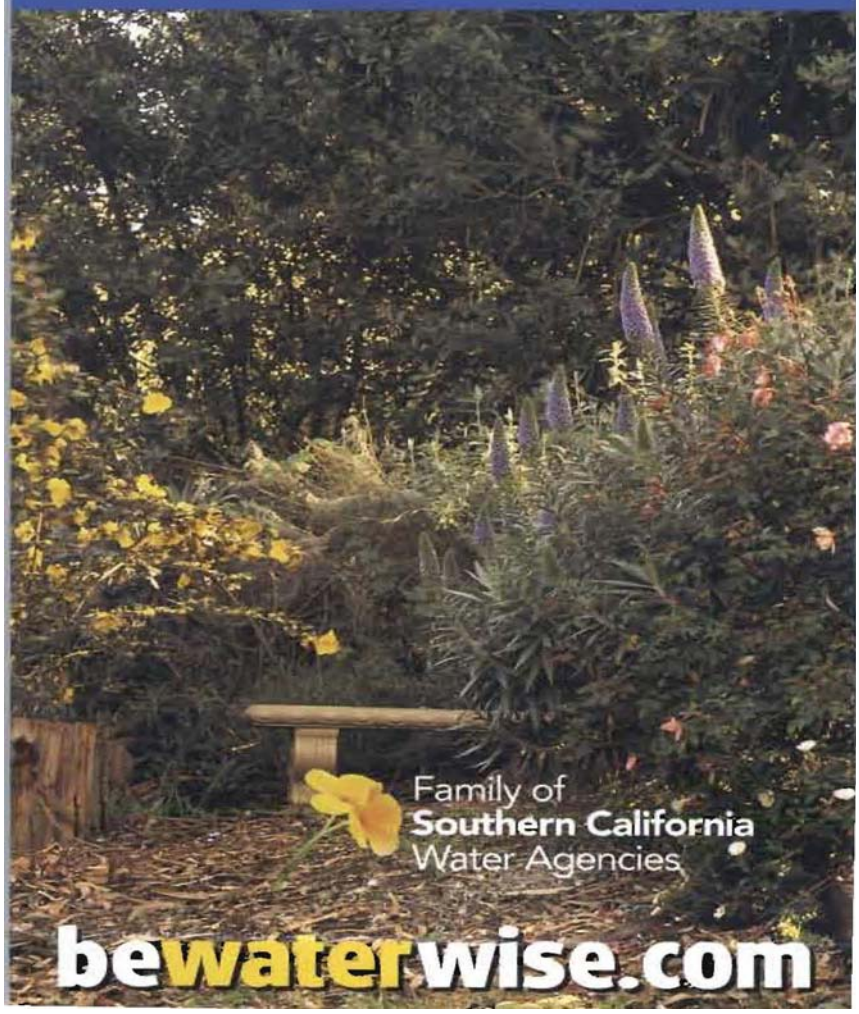


Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

10 Ways to Save Water Outdoors



TIP #1 The average homeowner uses twice the amount of water needed to keep plants healthy. Use the watering calculator and index at **bewaterwise.com** to know exactly how much water your plants need.

TIP #2 Check your sprinkler system for leaks, overspray and broken sprinkler heads. Update with drip or other more water-efficient sprinklers where appropriate.

TIP #3 This fall, plant a portion of your garden with beautiful native and California Friendly plants. Browse the plant database at **bewaterwise.com** to find just the right look for your outdoor spaces.

TIP #4 Reduce the amount of water-thirsty grass. Keep only what you need and replace the rest with less-thirsty plants or permeable paving.

TIP #5 For the grass you keep, set your lawnmower blade higher.

TIP #6 Adjust your sprinkler timer downward in September. Plants need less water when days are shorter.

TIP #7 Use a broom instead of the hose for cleaning sidewalks and patios.

TIP #8 Mulch! A layer of bark, gravel, compost, sawdust or low-growing groundcover evens out soil temperature and allows better water retention.

TIP #9 Check the list of invasive plants that hurt our environment at **caleppc.org** and remove any from your garden.

TIP #10 Share these tips with your gardener, neighbors and friends. Water conservation should be a part of every Southern Californian's lifestyle, but that doesn't mean we can't have lush and beautiful outdoor spaces.

bewaterwise.com

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

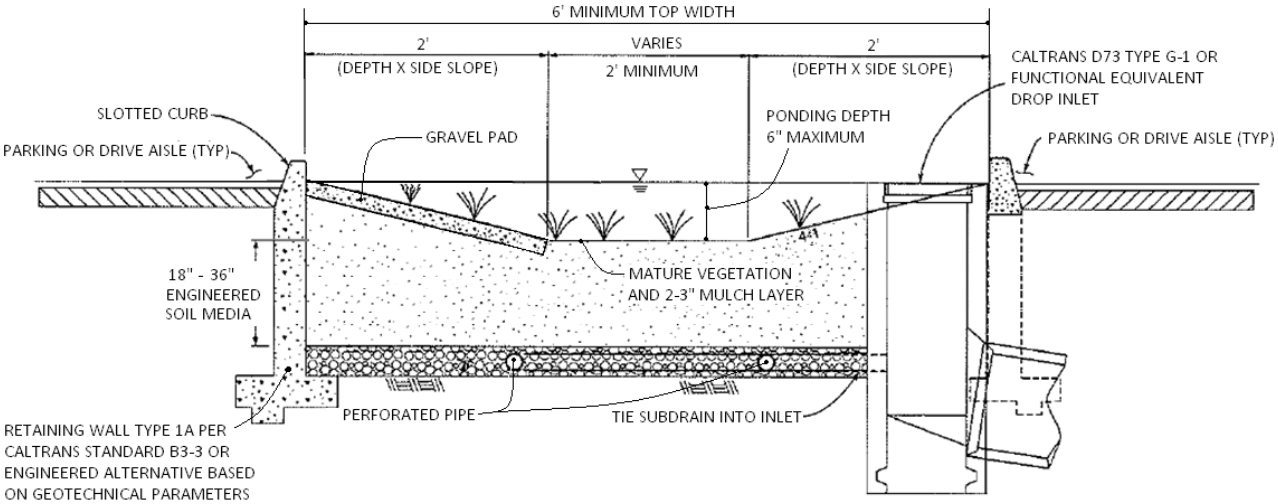
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/



Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

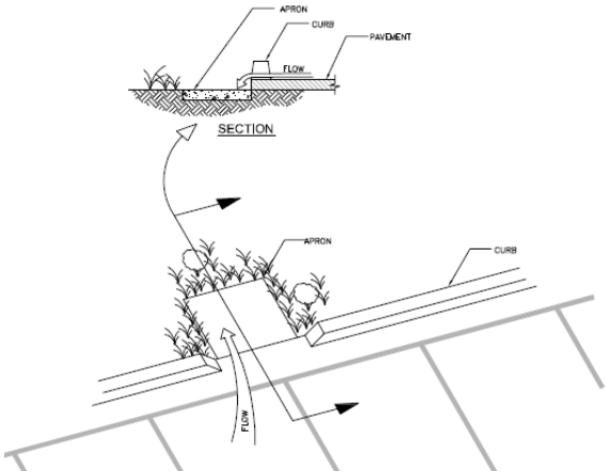


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

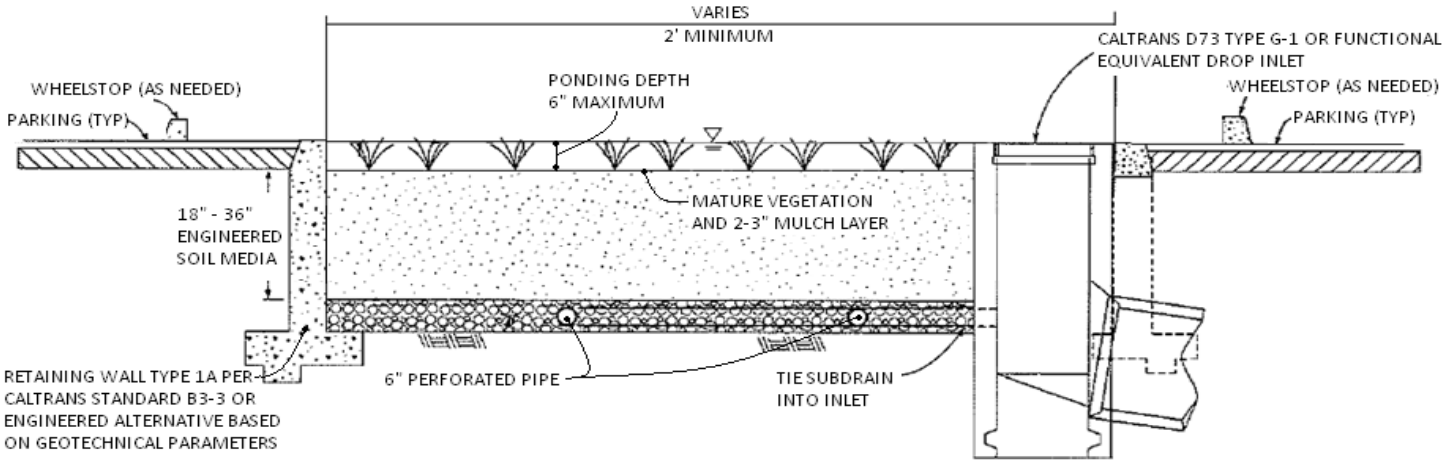
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.



Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.



Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

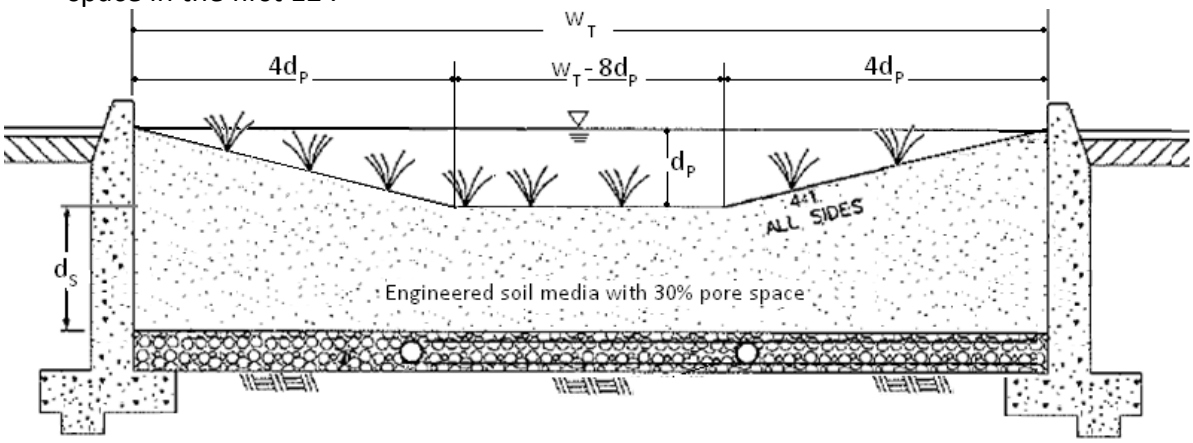
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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