REPORT
GEOTECHNICAL INVESTIGATION
OXFORD RETENTION BASIN MULTIUSE
ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LOS ANGELES COUNTY DEPARTMENT OF
PUBLIC WORKS/GMED

URS JOB NO. 29404462
MARCH 23, 2012

URS

March 23, 2012

Los Angeles County Department of Public Works
Geotechnical and Materials Engineering Division
900 South Fremont Avenue
Alhambra, California 91803.1331

Attention: Ms. Karin Burger

Re: Report
Geotechnical Investigation
Oxford Retention Basin Multi Use Project
Marina Del Rey, California
URS Project No. 29404462

Dear Ms. Burger:

This letter transmits our report of a geotechnical investigation performed by URS for the proposed Oxford Retention Basin Multi Use Project located in Marina Del Rey, California. Our services were performed in general accordance with the scope of services outlined in our proposal dated April 11, 2011 and included a comprehensive geotechnical exploration and testing program as well as environmental soil characterization.

We have greatly appreciated this opportunity to assist you with this challenging project. We are looking forward to providing continuing services throughout the design and construction phases.

Sincerely,
URS Corporation

Shapoor Hamid, PhD, REA
Project Manager

S. Nesarajah, PhD, PE, GE
Principal Engineer

URS Corporation
915 Wilshire Boulevard, Suite 700
Los Angeles, CA 90017-3437
Tel: 213.996.2200
Fax: 213.996.2290

DESIGN SUMMARY SHEET

Subsurface Conditions:

- Subsurface materials can be divided into three distinct categories: 1. Fill and artificial fill materials; 2. Wetland deposits; 3. Alluvium.
- Fills consist of loose to dense silty sands, sands, and gravels and very stiff to hard sandy silts and silts. Thickness of fills varies between 4.5 and 15 feet.
- Wetland deposits consist of soft to very stiff clays and silts. Depth of wetland deposits extends 15 to 25 feet below the existing ground surface or below the mud-line.
- Alluvium deposits consist of interbedded layers of dense to very dense silty sands and sands, stiff to hard clays and silts.

Subsurface Material Properties:

- Fills: total unit weight of 120 pcf; internal friction angle of 32 degrees; cohesion of 50 psf.
- Wetland Deposits: total unit weight of 120 pcf; internal friction angle of 27 degrees; cohesion of 150 psf.
- Alluvium Soils: total unit weight of 130 pcf; internal friction angle of 32 degrees; cohesion of 0 psf.

Geotechnical Design Input:

- Soil Profile Type: D.
- Design groundwater level at Elevation +0 feet MSL.
- Potential for liquefaction is low to medium. Seismic induced settlement is on the order of ½ inch or less.
- Slope performance is good under static and pseudo static loading.

Foundation Recommendations:

- Recommended foundation type: Shallow foundations
CIDH piles
- Allowable bearing capacity: 1,500 psf.
- Minimum pile tip elevation: -20 feet MSL.
- Nominal compression resistance: presented in Table 6.
- Nominal tension resistance: presented in Table 6.
- Lateral capacities: presented in Table 7.
- Construction should be avoided during wet season, or construction dewatering may be required.
- Relief drilling may be required during pile installation.
- Corrosion potential is moderate to very severe.

TABLE OF CONTENTS

Section Page No.

1.0 INTRODUCTION 1
1.1 GENERAL 1
1.2 PROJECT DESCRIPTION 1
2.0 PURPOSE AND SCOPE OF SERVICES 2
2.1 SITE CHARACTERIZATION 2
2.2 ENGINEERING EVALUATION AND ANALYSIS 2
2.3 REPORT PREPARATION 3
3.0 FIELD AND LABORATORY TESTING PROGRAMS 3
3.1 SOIL BORINGS 3
3.2 GEOTECHNICAL LABORATORY TESTING 4
4.0 SITE CONDITIONS 4
4.1 GEOLOGY AND SEISMICITY 4
4.2 SURFACE 5
4.3 SUBSURFACE 5
4.4 GROUNDWATER 6
5.0 GEOLOGIC AND SEISMIC HAZARDS 6
5.1 GEOLOGIC HAZARDS 6
5.1.1 Landslides 6
5.1.2 Expansive Soils 6
5.1.3 Collapsible Soils 7
5.2 SEISMIC HAZARDS 7
5.2.1 Surface Fault Rupture 8
5.2.2 Strong Ground Motion 8
5.2.3 Liquefaction 8
5.2.4 Lateral Spreading of Liquefied Materials 8
6.0 ENGINEERING ANALYSES 9
6.1 LIQUEFACTION AND DYNAMIC SETTLEMENT OF DRY SAND 9
6.2 LIQUEFACTION-INDUCED LATERAL SPREADING 9

TABLE OF CONTENTS

Section Page No.

6.3 STATIC SETTLEMENT 10
6.4 SLOPE STABILITY 10
6.4.1 Technical Approach 10
6.4.2 Analysis Results 10
6.4.3 Proposed Slope Mitigation 14
6.4.4 Slope Erosion Control 14
7.0 DISCUSSION AND RECOMMENDATIONS 16
7.1 GENERAL 16
7.2 SPREAD FOOTINGS 16
7.3 CAST-IN-DRILLED-HOLE PILES (CIDH) 17
7.4 LATERAL EARTH PRESSURES 19
7.5 RESISTANCE TO LATERAL LOADS 19
7.6 SITE PREPARATION AND EARTHWORK 20
7.6.1 Site Stripping 20
7.6.2 Dewatering 20
7.6.3 Overexcavation 20
7.6.4 Fills and Backfills 21
7.7 TEMPORARY EXCAVATIONS 21
7.7.1 Sloped Excavations 21
7.7.2 Shored Excavations 21
7.8 SEISMIC DESIGN PARAMETERS 22
7.9 CORROSION POTENTIAL 23
8.0 DESIGN REVIEW 23
9.0 CONSTRUCTION MONITORING 24
10.0 SECTION 111 STATEMENT 24
11.0 LIMITATIONS 24
12.0 REFERENCES 26

FIGURES

Figure 1	Vicinity Map
Figure 2	Plot Plan
Figure 3	Cross Sections A-A', B-B', C-C"
Figure 4	Regional Geologic Map
Figure 5	Seismic Hazards Map
Figure 6	Regional Fault and Epicenter Map

APPENDICES

Appendix A	Exploratory Borings
Appendix B	Geotechnical Laboratory Testing
Appendix C	Liquefaction Analysis
Appendix D	Slope Stability Analysis
Appendix E	Pile Analysis

1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed by URS Corporation (URS) for the proposed Oxford Retention Basin Multi Use Project (Project). The Project is located between Admiralty Way, Washington Boulevard and Oxford Street in Marina Del Rey, California. The approximate location of the site is shown on the Vicinity Map in Figure 1.

This report was prepared according to the scope of work agreed to between Los Angeles County Department of Public Works (LACDPW) and URS Corporation included in our proposal for the Oxford Retention Basin dated April 11, 2011. The scope of services was developed based on meetings between LACDPW and URS, review of previous reports provided by LACDPW, an understanding of the purpose of the proposed redevelopment, and conditions at the project site.

1.2 PROJECT DESCRIPTION

Historically, a portion of the site and vicinity to the east and south was used for Municipal Solid Waste disposal and was known as the Venice Dump Site (Venice Dump) by the County of Los Angeles, Department of County Engineer, Project Planning and Pollution Control Division, October 1976 (Map No. 42.160-435 (084-117)). Additional historical information regarding the Venice Dump Site can be found in the Environmental Investigation Report.

Currently, the Oxford Retention Basin serves primarily as a flood control facility and is an integral part of the Marina Del Rey local drainage system. The purpose of the drainage is to retain urban and storm water runoff until it can be safely discharged into Basin E of the Marina Del Rey Harbor. During the storms, contaminants associated with development and street runoff are carried into Oxford Retention Basin and then into Basin E through two tide gates. The project site is approximately 10.7 acres in size and includes the interior submerged basin, dry slopes, peninsulas, and adjoining perimeter. Based on our review of the 60 percent design plan prepared by the County of Los Angeles Department of Public Works, the proposed project site major improvements include:

- Construction of approximately 1,250 lineal feet of retaining walls to increase storage capacity in the event of a storm. The heights of the walls vary from approximately 2 to 8 feet;
- Construction of several other retaining walls along Decomposed Granite (DG) walking trails and boat rams. The wall height varies between 2 and 10.5 feet;
- Construction of approximately 500 lineal feet of diversion berms about 9 feet high with 2:1 (h:v) slopes;
- Construction of five observation decks;
- Addition of approximately 3,500 lineal feet of DG walking trail;
- Steepening or improving existing slopes to accommodate the DG walking trail;
- Removal of sediment in the basin to elevation -5 feet Mean Sea Level (MSL);
- Construction of a boat ramp at the corner of Admiralty Way and Oxford Avenue and a low flow access ramp; and,
- Modification of tide gate structures.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of our geotechnical investigation was to explore and evaluate the subsurface conditions at the site of the proposed multi-use improvements, and develop recommendations for design and construction of the Project. Results of an environmental site assessment performed simultaneously with this geotechnical investigation will be performed in a separate report. The scope of our geotechnical services included the following tasks:

2.1 SITE CHARACTERIZATION

The geotechnical site characterization involved field exploration and testing programs including the following subtasks:

- Preparation of a site specific health & safety plan;
- Site reconnaissance and marking boring locations;
- Notification of Underground Service Alert (USA);
- Drilling three (3), 50-foot deep mud-rotary borings and five (5), 25-foot deep hollow-stem auger borings.
- Logging of the borings by Mr. Joseph Gratzer, California Certified Engineering Geologist No. 8308. The subsurface materials were classified according to the Unified Soil Classification System (USCS). Undisturbed geotechnical samples were collected at 2.5-foot to 5-foot intervals using Standard Penetration Test (SPT) and California samplers. Both the California and SPT samplers were driven with a standard 140-pound hammer dropping 30 inches. Blow counts were recorded at 6-inch intervals for each sample taken.
- Backfilling the borings with bentonite/cement slurry. All soil cuttings were drummed and disposed off-site to a State-licensed facility, pre-approved by Public Works.
- Geotechnical Laboratory soil testing on samples retrieved from the field to determine soil classification, grain size distribution, shear strength, and corrosion potential.

2.2 ENGINEERING EVALUATION AND ANALYSIS

Our geotechnical engineering analysis included the following:

- Liquefaction analysis including lateral spreading and dry sand settlement;
- Stability analysis of proposed slopes under normal and rapid-draw down conditions;
- Lateral earth pressure for retaining wall design;
- Bearing capacity for shallow foundations;
- Capacities of drilled piers;
- Settlement analysis; and
- Foundation evaluation.

2.3 REPORT PREPARATION

URS' conclusions and recommendations, and supporting field and laboratory test results, are presented in this engineering report. The report includes pertinent findings with respect to seismic, geologic, and geotechnical engineering issues, including the following items:

- A brief description of the proposed project and site improvements;
- A summary of the field and laboratory programs;
- A summary of site reconnaissance and literature review;
- Discussion of the site surface and subsurface geotechnical and geologic conditions;
- Recommendations pertaining to seismic design parameters based on the 2010 CBC;
- Conclusions pertaining to feasibility of the project (from a geotechnical standpoint);
- Evaluation of geologic and seismic hazards, including site liquefaction potential;
- Recommended slopes for embankments, foundation schemes, and retaining walls;
- Recommendations for earthwork, site preparation/grading, backfill, and compaction requirements;
- Evaluation of soil corrosivity and recommendations for protection; and
- Recommendations for construction monitoring and testing.

3.0 FIELD AND LABORATORY TESTING PROGRAMS

3.1 SOIL BORINGS

Our field exploration program was initiated on September 12, 2011 and completed on September 20, 2011. Three (3) mud-rotary geotechnical borings and five (5) hollow stem auger geotechnical borings were drilled at the locations shown in Plot Plan, Figure 2, under the technical supervision of Mr. Joseph Gratzer, a California Certified Engineering Geologist from our Los Angeles office. Exploratory borings accessible from the land were drilled using a truck-mounted hollow-stem auger rig and on water borings were drilled using a barge-mounted mud-rotary rig.

The borings were advanced to depths of about 25 to 50 feet below ground surface (bgs). Relatively undisturbed soil samples were obtained using a California Sampler. Standard Penetration Tests (per ASTM D-1586) were performed at selected depths. Bulk samples of representative near-surface soils were also obtained at selected locations. The locations of the borings are shown in Plot Plan, Figure 2. A detailed description of the field exploration program including the boring logs and other pertinent information is presented in Appendix A. Three cross sections (A-A', B-B', and C-C") depicting the site subsurface conditions based on the boring logs are presented on Figure 3.

Upon completion, the borings were backfilled with bentonite/cement grout. Excess drill cuttings and drilling fluids from the borings were initially placed in labeled DOT-approved 55-gallon metal drums and temporarily stored at the site. Following completion of the laboratory soil profile analysis of the materials, the cuttings and/or water were disposed of appropriately.

3.2 GEOTECHNICAL LABORATORY TESTING

Soil samples obtained from the borings were packaged and sealed in the field to prevent moisture loss and disturbance, and transported to our Los Angeles laboratory where they were further examined and classified. All testing was conducted in accordance with the ASTM and/or California test standard procedures and included the following tests:

- Moisture content and dry unit weight test (ASTM D-2216 and D-2937)
- Grain size analyses / Percent passing No. 200 (ASTM D-422, D-1140)
- Atterberg Limits Test (ASTM D-4318)
- Expansion Index Test (ASTM D-4829)
- Direct Shear testing for soil (ASTM D-3080)
- Consolidation test (ASTM D-2435)
- Chemical (Corrosion) Test (Resistivity, Sulfate, pH and Chloride) (California Test Methods 417, 422, 532, & 643)

A detailed description of the laboratory testing program is presented in Appendix B.

4.0 SITE CONDITIONS

4.1 GEOLOGY AND SEISMICITY

The site is located within the northern portion of the Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges Province is characterized by a series of generally northwest-trending mountain ranges and intervening valleys. A broad sediment-filled trough generally referred to as the Los Angeles Basin characterizes the northern portion of the Peninsular Ranges Province.

The project area lies approximately in an area known as the Coastal Plain within the northwestern portion of the Los Angeles basin near the northern portion of the onshore segment of the northwest trending Newport/Inglewood fault zone (NIFZ). Two domal uplifts associated with continued tectonic activity along the NIFZ, referred to as the Baldwin Hills and Rosecrans Hills are located southeast of the site. Quarternary age (within the last 1.6 million years) sediments are over 1,000 feet thick in some areas of the Coastal Plain associated with rapid sedimentation of the basin.

The site is located in the southern portion of the gently sloping Santa Monica Plain. The Santa Monica Plain was formed from several alluvial fans extending from the Santa Monica Mountains to the north.

According to the Quaternary Geologic Map of the Venice Quadrangle (California Division of Mines and Geology Open File Report 98-27) Figure 4, the site is located on artificial fill which overly

younger alluvium and floodplain deposits consisting of very fine- to medium-grained sand intermixed with silt and clay.

The Project site, like most of California, is within a seismically active region that will be subjected to future seismic shaking during earthquakes generated by any of several surrounding active faults. Significant historical earthquakes that have occurred near the Project site include:

The 1812 Wrightwood Earthquake (M7.5) on the San Andreas fault;

The 1857 Fort Tejon Earthquake (M7.9) on the San Andreas fault;

The 1971 Sylmar Earthquake (M7.1) on the San Fernando fault; and

The 1994 Northridge earthquake (M6.7) on the Northridge thrust.

The Seismic Hazard Zones Map for the Venice Quadrangle, Figure 5, identifies the project site within an area susceptible to liquefaction.

4.2 SURFACE

The existing surface conditions include a storm water retention basin with sparsely to heavily vegetated basin slopes. Surface elevations vary from 15 feet Mean Sea Level (MSL) at the perimeter of the basin to -7 feet MSL in the lowest portion of the basin.

4.3 SUBSURFACE

The site of the proposed improvements anticipated to be within artificial fill which is underlain by wetland deposits and alluvial sediments. Fills consist of loose to dense silty sands, sands, and gravels and very stiff to hard sandy silts and silts. Based on the borings drilled, thickness of fills outside the edge of the basin (Venice Dump Fill) varies between 4.5 and 10 feet (elevations -3 to 10 in borings G1, G2, GE1, GE3 and GE4) and the thickness of fill within the basin (man-made fill and basin deposits) varies between 12.5 and 15 feet (elevations -21.5 and 0 in borings G3, GE2 and GE5). The Venice Dump Fill in the higher elevations is readily distinguishable as it contains debris (brick, asphalt, concrete, wood, glass, PVC, and pieces of cable). Based on the boring information, we have interpreted the subsurface conditions to indicate that the Wetland deposits within the basin area were removed (likely through dredging) to allow increased water percolation. Wetland deposits were encountered in the borings outside the perimeter of the basin underlying the fill soils and depth of the wetland deposits extend 15 to 22 feet below the existing ground surface. The wetland deposits consist of soft to very stiff clays and silts. Below the fill and wetland deposits, alluvial deposits were encountered which consist of interbedded layers of dense to very dense silty sands and sands and stiff to hard clays and silts. The alluvial deposits extend to at least 50 feet, the maximum depth drilled for this investigation.

Based on the results of laboratory tests and published data, material properties of the subsurface soils are presented below:

Table 2 Idealized Soil Profile

Soil Type	USCS	Thickness (feet)	Depth (feet)	Unit Weight (psf)	Ultimate Cohesion (psf)	Ultimate Friction Angle
Qf	SP, SP-SM, SM	5-15	0-15	120	50	32
Qw	CL, ML	8-12	5-22	120	150	27
Qal	SP, SP-SM, SM, CH, MH, CL, ML	>25	15-50	130	0	32

4.4 GROUNDWATER

Current depth to groundwater as measured in our land-based borings varied between 9 and 17 feet below the existing ground surface at the time of drilling which appears to correlate with the water level in the basin.

According to CGS, the highest historic groundwater recorded near the site is less than 5 feet below ground surface (bgs) at the site (CDMG, 1998).

5.0 GEOLOGIC AND SEISMIC HAZARDS

5.1 GEOLOGIC HAZARDS

Geologic hazards are those hazards that could impact a site due to the surrounding geologic seismic conditions. Geologic hazards include landslides, subsidence, volcanic activity, flooding, expansive soils, collapsible soils, and methane hazard. Our assessment of these hazards was based on current guidelines established by the California Geological Survey (CGS), previously known as the California Division of Mines and Geology (CDMG). Subsidence, volcanic activity and methane hazards are not expected at the site.

5.1.1 Landslides

The levees at the project site are about 15 to 20 feet high with a slope of 1.5:1 (horizontal: vertical) or flatter. Stability analysis performed for the slopes indicate that the existing slopes are considered stable under static, pseudostatic and rapid drawdown conditions.

5.1.2 Expansive Soils

Expansive soils are fine-grained soils (generally high plasticity clays) that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures constructed upon the soil. Based on our field investigation and laboratory analysis, the soils underlying the project area consist primarily of clayey soils with medium to high

expansion potential. Therefore, expansive soils are anticipated to pose some hazard to the proposed site.

5.1.3 Collapsible Soils

Collapsible soils are soils that undergo settlement upon wetting, even without the application of additional load. Water weakens or destroys the bonds between soil particles and severely reduces the bearing capacity of the soil. Typical collapsible soils are lightly colored, are low in plasticity and have relatively low densities. Based on our current investigation, laboratory analysis and experience with similar projects in the vicinity, it is not anticipated that the soils underlying the subject site are susceptible to collapse. Therefore, potential impacts due to collapsible soil conditions are expected to be low.

5.2 SEISMIC HAZARDS

The geoseismic characteristics of some of the faults considered by the California Geological Survey (CGS, 2003) as potential seismic sources within about 50 kilometers (31 miles) of the site are listed in a table below. Locations of significant historical earthquakes in the region and their relative proximity to the proposed Project are shown on the Regional Fault and Epicenter Map, Figure 6.

Table 1 Potential Seismic Sources

Fault	Maximum Earthquake Magnitude[1]	Estimated Closest Distance from Site (km)[2]
Santa Monica	6.6	6.0
Newport-Inglewood (LA Basin)	7.1	8.4
Malibu Coast	6.7	8.7
Palos Verdes	7.3	10.2
Hollywood	6.4	11.9
Puente Hills Blind Thrust	7.1	17.4
Upper Elysian Park Blind Thrust	6.4	20.6
Anacapa-Dume	7.5	22.0
Raymond	6.5	26.2
Northridge	7.0	26.8
Verdugo	6.9	27.5
Sierra Madre	7.2	34.2
Santa Susana	6.7	36.1
Whittier	6.8	40.3
San Gabriel	7.2	40.4
Simi-Santa Rosa	7.0	41.7
Holser	6.5	45.6

Fault	Maximum Earthquake Magnitude[1]	Estimated Closest Distance from Site (km)[2]
Clamshell-Sawpit	6.5	47.0
Oak Ridge (Onshore)	7.0	49.1
San Andreas	8.0	70.3

Notes:
[1]Cao et al. (2003), Appendix A, 2002 California Fault Parameters.
[2]Distance shown represents distance to seismic sources at depth and does not always represent distance to projections of fault planes at ground surface (Blake, 1998).

5.2.1 Surface Fault Rupture

The Project site is outside of any Alquist-Priolo Earthquake Fault Zone (CDMG, 1977 and 1997b). There are no known surface faults that cross the Project site. Therefore, the potential for surface fault rupture at the site is considered to be low.

5.2.2 Strong Ground Motion

The site is expected to experience future seismic shaking from ruptures along both local and regional faults, as indicated by the numbers and distribution of recorded earthquake epicenters shown on Figure 6. The degree of shaking that is felt at a given site depends on the distance from the earthquake source and the type of subsurface material on which the site is situated.

5.2.3 Liquefaction

Liquefaction is defined as significant and relatively sudden reduction in shear strength of saturated sandy soils caused by a shaking-induced increase in pore water pressures. Potential for liquefaction exists when relatively loose, sandy soils with high groundwater level are subjected to seismic shaking. Potential damage caused by liquefaction includes lateral spreading, settlements of above-ground structures, and/or heaving/flotation of buried structures.

The CGS has designated certain areas as potential liquefaction-hazard zones (CDMG, 1998) based upon mapped surficial deposits and the presence of a relatively shallow water table. According to the Seismic Hazard Zones Map of the Venice Quadrangle (CDMG, 1999, Figure 5) the site is located within a liquefaction hazard zone. The historic high groundwater depth at the site is less than 5 feet below existing grade (CDMG, 1998). Some of the on-site granular soils below the water level are expected to be susceptible to liquefaction and detailed calculations are discussed in Section 6.0.

5.2.4 Lateral Spreading of Liquefied Materials

Lateral spreading is a failure within a nearly horizontal soil zone (possibly due to liquefaction) that causes the overlying soil mass to move toward a free face or down a gentle slope. Although no potential free-face conditions have been identified, the Project site has significant slopes and slopes which may be underlain by liquefiable soils; therefore, an evaluation for lateral spreading was

performed as part of this current investigation. Detailed analysis of the site lateral spreading hazards is discussed in Section 6.0.

6.0 ENGINEERING ANALYSES

6.1 LIQUEFACTION AND DYNAMIC SETTLEMENT OF DRY SAND

We have performed liquefaction and dynamic settlement of dry sand evaluations in accordance with the provisions of the Los Angeles County Manual for the Preparation of Geotechnical Reports dated July 2010. A seismic-induced (liquefaction and dynamic settlement of dry sands) settlement analysis was performed using the SPT data from the current borings and the results of the laboratory tests.

Input data for the liquefaction analysis utilized the Maximum Considered Earthquake ground motion parameters obtained using the USGS Ground Motion Parameter Calculator Version 5.1.0 dated 2-11-11. The site coordinates used were N33.9852° and W118.4554°. The peak horizontal ground acceleration used in the liquefaction analysis was 0.40g ($S_{DS}/2.5$) in accordance with procedures outlined in 2008 CGS 117A. Groundwater was assumed at Elevation +0 feet MSL in the liquefaction analysis, representing the design water level in the basin which is higher than historic-high water level.

Two potential modes of seismic-induced settlement were analyzed: (1) Liquefaction settlement of the saturated loose granular soils below the design groundwater level; and (2) Dynamic dry sand settlement of partially-saturated, granular soils (from ground surface to elevation +0 MSL). Due to medium dense nature of the partially-saturated sands above groundwater, dry sand settlement is low to nil.

Results of the liquefaction analyses identified a few thin layers of saturated granular soils in the upper 15 feet below the ground surface to be susceptible to liquefaction-induced settlement under a design earthquake, potentially resulting on the order of less than ½ inch of settlement. It should not pose any significant design issues for structures supported on shallow or deep foundations.

The differential settlements resulting from seismic-induced settlement within proposed structures are within ½ inch. Hence, the likelihood of damage due to liquefaction-induced differential settlements for any structures is low.

The above settlements are based on the in-situ soil conditions and should be taken into consideration when designing the foundation schemes for the proposed structures.

6.2 LIQUEFACTION-INDUCED LATERAL SPREADING

Lateral spread displacement analysis was performed using Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement developed by Youd et al. 2002 in accordance with the provisions of the CGS Special Publication 117A (SP 117A).

Based on our liquefaction analyses presented in Appendix C, the likelihood of a free face condition developing along the edge of the basin during a design seismic event is low due to absence of potentially liquefiable materials above the bottom of the basin. It follows that the risk of

displacement due to lateral spreading of liquefied materials is also low. It should not be necessary to account for any additional lateral pressures due to lateral spreading in the pile or retaining wall designs.

6.3 STATIC SETTLEMENT

Settlements as a result of new foundation loads were calculated under the design groundwater conditions. The majority of the settlements resulting from the loads imposed by foundations for observation decks or retaining walls will be generated in the underlying engineered fill and 8 to 12 foot thick wetland deposits of silt and clay layers, generally in the upper 5 to 22 feet bgs. Based on our analyses, static settlements under the new foundations are anticipated to be on the order of 1 inch.

In general, static settlements that would occur would be due to compression of the underlying engineered fill and would be completed immediately after construction. Long term settlement of the wetland deposits is estimated to be negligible.

6.4 SLOPE STABILITY

Slope stability analyses were performed to evaluate the static and pseudostatic stability of the proposed slopes and diversion berm. Pseudostatic slope stability analyses used an earthquake load of 0.15g (1/3 of peak ground acceleration of 0.40 g).

6.4.1 Technical Approach

Slope stability analyses were performed using SLOPE/W (SLOPE/W, 2007), which is a computer program for the general solution of slope stability problems by two-dimensional limiting equilibrium methods. The calculation of the factor of safety against instability of a slope can be performed using one of the following methods: Bishop Simplified Method (applicable to circular shaped failure surfaces), Ordinary Method, Janbu Simplified Method (applicable to failure surfaces of general shape), or Spencer's Method (applicable to any type of surface).

SLOPE/W features unique random techniques for generation of potential failure surfaces for subsequent determination of the more critical surfaces and their corresponding factors of safety. These techniques generate circular failure surfaces, surfaces of sliding block character, or more general irregular surfaces of random shape. For the purposes of our analyses, we utilized Spencer's Method in compliance with LACDPW Manual for Preparation of Geotechnical Reports, August 2010.

6.4.2 Analysis Results

Static and Pseudostatic Analyses for Existing Slopes with Proposed Cut

Location-specific slope stability analyses were conducted on Cross-Section at Station 7+00. The cross-section location is presented on Sheet 3 of the 60% Design Plans and the cross-section is presented on Sheet 4 of the 60% Design Plans. The cross-section illustrates the generalized subsurface profile by adopting soil and alluvial groundwater conditions interpreted from our field investigation and the design plans. Existing fill slopes assume static alluvial groundwater

conditions at 4.5 feet and 10 feet above the bottom of basin elevation and elevation -0.5 and 5 MSL for rapid draw down conditions after the maximum flooding event.

As mandated by LACDPW (2010), the slopes must satisfy the minimum required safety factors (SF) of 1.5 and 1.1 for static and pseudostatic conditions, respectively. Calculated factors of safety for the slopes are summarized in the table below. A horizontal acceleration of 0.15g was used for the psuedostatic stability analysis in accordance with the current California Building Code (Code).

The shear strength parameters of Table 2 were used in calculating the theoretical failure surface determined to have the lowest factor of safety. The results of the slope stability analyses are presented in Table 3a and 3b below for the proposed grades. Detailed graphical results of the analyses are presented in Appendix D.

Table 3a Factor of Safety for Static and Pseudostatic Analysis
Design Capacity Water Level (El. 5.0 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
East Existing/Proposed Slope	2.02	1.21
West Existing/Proposed Slope	2.53	1.34

Table 3b Factor of Safety for Static and Pseudostatic Analysis
Proposed Operational Water Level (El. -0.5 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
East Existing/Proposed Slope	1.98	1.28
West Existing/Proposed Slope	2.33	1.36

The existing / proposed slopes meet the minimum static and pseudo-static factors of safety. Details of the slope stability analyses are presented in Appendix D.

Static and Pseudostatic Analyses for Proposed Diversion Berm

The proposed berm is shown on the cross-section mentioned above and is modeled using the same groundwater conditions.

The shear strength parameters shown in the table below were considered. The strength parameters selected are based on the direct shear test performed on the existing fill material. Fill material used for the construction of the berm should be tested for above these minimum strength parameters.

Soil Type	USCS	Unit Weight (psf)	Ultimate Cohesion (psf)	Ultimate Friction Angle
Qf	SM-SP	120	50	32

The results of the slope stability analyses are presented in Tables 3c and 3d below for the proposed grades. Detailed graphical results of the analyses are presented in Appendix D.

Table 3c Factor of Safety for Static and Pseudostatic Analysis
Design Capacity Water Level (El. 5.0 feet MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
Proposed Berm	2.38	1.37

Table 3d Factor of Safety for Static and Pseudostatic Analysis
Proposed Operational Water Level (El. -0.5 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
Proposed Berm	2.04	1.33

The proposed berm slopes are considered stable under both static and pseudostatic conditions. Since the pseudostatic factor of safety was above the minimum accepted value per LACDPW (2010), Newmark deformation analysis was not considered to be necessary. Details of the slope stability analyses are presented in Appendix D.

Rapid Drawdown-Slope Stability Analysis

Rapid draw down slope stability analyses were completed using SLOPE/W and a conservative flood water elevation of -0.5 and 5 feet MSL. In general, the proposed site slopes within the rapid draw down zone would be at slope gradients of 2:1 or flatter and protected with slope improvements (e.g. improved fill soil or rip-rap). The shear strength parameters used in our analysis were based on the existing fill soils. The estimated factor of safety of 1.5 is considered adequate and meets the Code requirement. Details of the rapid draw down slope stability analyses are presented in Appendix D.

Table 3e Factor of Safety for Rapid Drawdown Analysis
Design Capacity Water Level (El. 5.0 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY
Proposed Berm	1.90
East Existing/Proposed Slope	1.88
West Existing/Proposed Slope	2.26

Table 3f Factor of Safety for Rapid Drawdown Analysis
Proposed Operational Water Level (El. -0.5 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY
Proposed Berm	1.90
East Existing/Proposed Slope	2.08
West Existing/Proposed Slope	2.43

The rapid draw down-slope stability analyses for the proposed berms and west existing / proposed slopes met the minimum requirement of 1.5 Factor of Safety. The east existing / proposed slopes did not meet the minimum requirements. Proposed slope mitigation is described in Section 6.4.3. Details of the slope stability analyses are presented in Appendix D.

Lateral Spreading Susceptibility in Slopes

The potential for lateral spreading was assessed for the east and west slopes. Based on the subsurface investigation and liquefaction analyses, a liquefiable layer interpretation was presented on the slope stability sections. The shear strength parameters used in our analysis were based on the existing fill soils. The estimated factors of safety for static and pseudo-static conditions of 1.5 and 1.1 are considered adequate and meet the Code requirement. Details of the analyses are presented in Appendix D.

Table 4a Factor of Safety for Static and Pseudostatic Analysis
Design Capacity Water Level (El. 5.0 feet MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
East Existing/Proposed Slope	2.02	1.21
West Existing/Proposed Slope	2.43	1.18

Table 4b Factor of Safety for Static and Pseudostatic Analysis
Proposed Operational Water Level (El. -0.5 ft MSL)

SLOPE LOCATIONS	FACTOR OF SAFETY	
	Static	Pseudostatic
East Existing/Proposed Slope	1.98	1.28
West Existing/Proposed Slope	2.01	1.15

The existing / proposed slopes meet the minimum static and pseudo-static factors of safety. Based on the analyses, the east and west slopes do not exhibit any soil layers susceptible to liquefaction. Therefore, we do not expect the slopes to be susceptible to lateral spreading.

6.4.3 Proposed Slope Mitigation

Slopes consisting of undocumented fill would require a minimum 8-foot wide (measured horizontally from face of proposed slope) buttress of engineered fill consisting of suitable material similar to that recommended for the proposed berm construction. Within the flood zone, a minimum of 5 feet surface protection would be required on the surface of fill slopes to protect the slope during a rapid draw down event after flooding. If additional adverse conditions were encountered, the adverse slope conditions could be mitigated by overexcavation and buttressing as fill slopes.

6.4.4 Slope Erosion Control

Generally, slope gradients of 2:1 or flatter do not require erosion protection of the surface. However, the erosion control methods in Table 5 are provided for consideration and special case uses.

Table 5 - EROSION CONTROL ALTERNATIVES

METHOD	ADVANTAGES	DISADVANTAGES
Hydro-seeding	• Widely used • Least expensive • Quickly applied • Not subject to graffiti • Can be used with geotechnical fabrics	• Requires careful irrigation • May require multiple applications • Rills and gullies still possible • Takes significant amount of time to grow • Subject to pests
Landscaping	• Widely used • Inexpensive • Not subject to graffiti • Can be used with geotechnical fabrics • Native plants can be used to minimize irrigation requirements	• May require irrigation • May require periodic replanting and maintenance • Requires full coverage • Rills and gullies still possible • Subject to pests • Takes time for plants to grow
Flattening (4H:1V of terrace slope and 2H:1V of buttress fill)	• Effective immediately • No maintenance required • Not subject to graffiti	• Not feasible due to ROW restriction
Degradable erosion control product with landscaping and/or hydro-seeding	• Widely used • Effective immediately • Not subject to graffiti	• May require irrigation • May require periodic replanting and maintenance • Rills and gullies possible in several years after degradation • Subject to pests
Non-degrading erosion control product with landscaping and/or hydro-seeding	• Widely used • Effective immediately • Not subject to graffiti	• May require irrigation • May require periodic replanting and maintenance • Unsightly • Subject to pests
Geocells with landscaping and/or hydro-seeding	• Effective immediately • Not subject to graffiti • Effective without planting	• May require irrigation • May require periodic replanting and maintenance • Subject to pests
Geogrid reinforcement	• Stabilizes upper 3 feet (if needed) • Not subject to graffiti	• Does not reduce surface erosion • Expensive

Table 5 - EROSION CONTROL ALTERNATIVES

METHOD	ADVANTAGES	DISADVANTAGES
Shotcrete/Concrete facing	• Widely used • Irrigation not needed • Not subject to pests	• Planting not possible • Subject to cracking • Reinforcement needed for crack reduction • Can be undermined at crown • Costly • Subject to graffiti

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 GENERAL

Based on the results of our geotechnical investigation, the proposed Project is feasible, provided our design recommendations and the construction monitoring program discussed in this report are incorporated into the project design and implemented during construction of the Project. Recommendations for design and construction including specific recommendations for site earthwork, foundation design, and construction monitoring are provided below.

The Project is located within the liquefaction hazard zone assigned by the CGS (CDMG, 1999). Results of liquefaction analysis indicate the proposed structures will experience no more than ½ inch of potential liquefaction-induced settlement. If the settlements are within the design tolerable limits, the structures may be supported on shallow spread footings.

Approximately 5 to 10 feet of fill soils were encountered in borings located on the outside edge of the basin, where most of the new structures are proposed (including new retaining walls and five new observations decks/platforms). From a geotechnical standpoint, it is feasible to remove the fill soils and backfill with engineered fill. Due to the proximity of flood control basin and shallow groundwater depth, dewatering will be required during excavation to remove fill soils and backfill with engineered fill. Due to previous usage of the site, reusability of the existing soils, from an environmental standpoint, should be evaluated.

Alternatively, proposed retaining walls and observations decks/platforms may be supported on Cast-In-Drilled-Hole (CIDH) piles. The tip of CIDH piles should be established at Elevation -20 feet MSL or deeper.

7.2 SPREAD FOOTINGS

The proposed retaining walls and observation decks/platforms can be supported on shallow spread footings established on at least 3 feet of engineered fill compacted to at least 95 percent per ASTM D-1557. In addition all fill soils within the foundation footprint should be removed and replaced with engineered fill. Footings should be a minimum of 2 feet wide and established at a minimum

depth of 2 feet below the lowest adjacent final level grade. An allowable bearing pressure of 1,500 pounds per square foot (psf) may be used for footings with the above minimum dimensions.

The allowable bearing pressure is a net value. Therefore, the weight of the foundation and the backfill over the foundation may be neglected when computing dead loads. The bearing pressure applies to dead plus live loads and includes a calculated factor of safety of at least 3. The allowable bearing pressure value may be increased by one-third for short-term loading due to wind or seismic forces.

Total static settlements of individual spread footings will vary depending on the width of the footing and the actual load supported. Total static settlements of footings, designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 1 inch or less.

Differential settlement between similarly loaded continuous footings may be assumed to be about half of the total settlement. Footing settlements have been estimated based on anticipated loading conditions. Due to underlying 8 to 12 feet thick clayey/silty soils, settlements of all footings are expected to occur rapidly as a result of elastic compression of the supporting soils and should be essentially complete following initial application of the loads.

7.3 CAST-IN-DRILLED-HOLE PILES (CIDH)

Alternatively, the proposed structures may be supported on CIDH piles. CIDH piles are expected to derive support in friction from the surrounding soils. A driven pile option was considered and discounted due to potential high cost and the adverse effects of vibrations of sandy soils.

The tip of CIDH piles should be established at Elevation -20 feet MSL or deeper. The allowable downward and upward capacities for 18-, 24-, and 30-inch diameter piles are provided below:

Table 6 Allowable Drilled Pile Capacities

Pile Diameter (inches)	Fill Thickness (feet)	Allowable Downward Capacity (kips)	Allowable Upward Capacity (kips)
18	5	40	25
18	10	20	12
24	5	50	35
24	10	25	15
30	5	65	45
30	10	30	20

Allowable downward values are net capacities and the weight of the pile and the embedded portion of the pile cap and any down drag resulting from seismic settlement is accounted for. The allowable

axial capacities include a calculated factor of safety of at least 3. These capacities may be increased by 33 percent when considering seismic or short term, temporary loads.

Piles should have a minimum center-to-center spacing of 3 pile diameters. With this spacing there is no reduction in axial capacity for group action. For piles with center-to-center spacing of 2 diameters, the axial capacity should be reduced by 33 percent. The estimated total vertical static settlement of the pile foundation should be less than ½-inch under the allowable loads. Differential settlements between similarly loaded pile foundations should be about half of the total settlement.

Lateral loads will be supported by the resistance of the soil against the pile, pile caps, and by the bending strength of the pile itself. Lateral capacities and maximum induced bending moments for CIDH piles (up to 30 inches in diameter) under free-head and fixed-head conditions are presented below:

Table 7 CIDH Lateral Pile Capacities

Pile Diameter (inches)	Fill Thickness (feet)	Lateral Load (kips)		Maximum Induced Bending Moment (feet-kips)		Depth below Pile Cap to Maximum Moment (feet)	
		Free	Fixed	Free	Fixed	Free	Fixed
18	5	9	20	24	88	4.0	0
18	10	10	30	29	135	4.5	0
24	5	10	28	29	149	4.5	0
24	10	11	47	35	269	5.0	0
30	5	11	32	31	178	4.5	0
30	10	12	64	38	420	5.0	0

The above lateral pile capacities and maximum induced bending moments correspond to a pile head deflection of ½-inch. At full fixity, the maximum induced bending moment occurs at the pile cap connection. Under free head conditions, the maximum induced bending moment occurs at about 8 to 11 feet below the pile cap connection. Pile analysis is presented in Appendix E.

There is no reduction in lateral capacity provided that there is a center-to-center spacing of at least 3 pile widths in an orientation normal to the loading and center-to-center spacing of at least 8 pile widths in an orientation parallel to the loading direction. At a center-to-center spacing of three pile widths parallel to the direction of loading, the lateral capacity should be reduced by 50 percent. Interpolation may be used for center-to-center spacing between 3 and 8 pile widths.

Groundwater was encountered at a depth of about 9 to 17 feet below existing grade during the current investigation and design water level may be assumed at +0 feet MSL. Therefore the use of special techniques for preventing possible caving of the drilled shaft due to the predominantly granular nature of the soils and shallow groundwater depth should be anticipated and planned for.

We recommend that steel reinforcement and concrete be placed immediately after completion of drilling each hole. Under no circumstances should drilled shafts be left open overnight. A minimum of 8 hours should be allowed between concrete placements in one shaft before drilling an adjacent shaft within 5 diameters center-to-center. The installation of all CIDH piles shall be performed in accordance with the "Standard Specifications for the Construction of Drilled Piers", ACI 336.1-89

(Revised 1994) or its most recent version. Care shall be exercised in the last few feet of drilling in order not to loosen the surrounding soil. Loose soils at the bottom of the drilled holes should be removed to the extent possible. Proposed installation techniques should be reviewed and approved by the geotechnical engineer prior to mobilization of the contractor to the site.

7.4 LATERAL EARTH PRESSURES

Retaining walls should be designed to resist the earth pressure exerted by the retained soils, plus any additional lateral forces that will be applied to the walls due to surface loads placed at, or near the top, those due to potential ground water build-up and seismic loads.

The at-rest earth pressure against walls with a level-backfill that are restrained at the top can be taken as equivalent to the pressure exerted by a fluid weighing 60 pounds per cubic foot (pcf). Fifty percent of any uniform areal surcharge placed at the top of a restrained wall will act as a uniform horizontal pressure over the entire height of the wall. For sloping backfill conditions of 3(h):1(v) or flatter, the wall should be designed for a triangular load distribution, equivalent to the pressure exerted by a fluid weighing 75 pcf.

Walls with level-backfill that are not restrained at the top may be designed for an active earth pressure. The active earth pressure against walls with a level-backfill can be taken as equivalent to the pressure exerted by a fluid weighing 35 pounds per cubic foot (pcf). Thirty percent of any uniform areal surcharge placed at the top of a restrained wall will act as a uniform horizontal pressure over the entire height of the wall. For sloping backfill conditions of 3(h):1(v) or flatter, the wall should be designed for a triangular load distribution equivalent to the pressure exerted by a fluid weighing 45 pcf. The active earth pressure shall be applied as parallel to the sloping backfill condition.

The above pressures do not include any hydrostatic pressures. For retaining walls without drainage provisions, water pressure of 62.4 psf must be added, but the equivalent fluid earth pressures for materials below the water may be reduced by 50 percent for the portion of the wall below the groundwater table. Light equipment should be used during backfill compaction to avoid possible overstressing of walls.

Retaining walls greater than 12 feet in height, as measured from the top of the foundation, should be designed to resist the additional earth pressure caused by seismic ground shaking. Seismic lateral pressure was estimated based on Seed and Whitman (1970) and Mononabe-Okabe methods using 50% (LAC Manual, 2010, Section 3.5.14) of Peak Ground Acceleration (PGA =SDS/2.5) of 0.40g.

For vertical retaining walls with a level backfill, the corresponding seismic lateral pressure based on the design earthquake may be taken as an inverted triangular pressure distribution with a maximum pressure at the top equal to 17H (with H being the height of the wall in feet). The seismic lateral force may be assumed to act at 2/3H above the wall base. The seismic pressure should be superimposed on the static design load.

7.5 RESISTANCE TO LATERAL LOADS

For spread footings, resistance to lateral loads may be provided by frictional resistance between concrete footings, the underlying soils and by passive soil pressure against the sides of foundations. The coefficient of friction between the concrete foundations and the underlying soils may be taken as

0.35. For pile foundations, lateral resistance is provided by the piles (see section 7.3) and passive earth pressure of the embedded portions of the pile caps.

Allowable passive pressures should be taken as equivalent to the pressure exerted by a fluid weighing 200 pcf. The passive earth pressure shall be limited to 2,000 psf. For foundation and retaining walls located within the basins, due to very soft soil deposits encountered in the upper 3 feet below the bottom of basins no passive resistance is available in the upper three feet. A one-third increase in the passive values may be used for temporary wind or seismic loads. The above-recommended values include a factor of safety of at least 1.5; therefore, frictional and passive resistances may be used in combination without reduction.

For submerged conditions, the allowable passive pressure should be reduced to a fluid weighing 100 pcf. The passive earth pressure shall be limited to 1,000 psf.

For a descending slope of 3(h):1(v) or flatter in front of the retaining wall, the available passive fluid weight should be reduced to 100 pcf (50 pcf below groundwater table).

7.6 SITE PREPARATION AND EARTHWORK

7.6.1 Site Stripping

Prior to construction, any debris, organic materials, and deleterious materials should be removed and disposed of outside the construction limits. All existing foundation elements should be removed. All active or inactive utilities within construction areas should be identified and relocated as appropriate.

7.6.2 Dewatering

Groundwater was measured in our borings 9 to 17 feet bgs in land-based borings and other borings were drilled from a barge floating in about 2 to 4 feet of water. Prior to construction, a dewatering program should be designed and initiated to establish a constant groundwater level at least 5 feet below the lowest excavation grade in the area of the proposed site improvements. The dewatering program should be based on a site-specific dewatering investigation conducted by a hydrologist, which includes field permeability and aquifer pump tests, at a minimum.

7.6.3 Overexcavation

In order to provide uniform support for shallow foundations, a minimum 3 feet of the underlying materials beneath the foundations should be overexcavated and replaced as compacted structural fill. The excavation should extend laterally outside the proposed foundation footprint, a distance equal to the depth of the excavation below the foundation or at least 3 feet, whichever is greater. Following site stripping and overexcavation, the subgrade should be observed, probed and tested by the geotechnical engineer's representative. All loose or soft zones should be compacted in-place or excavated and replaced with properly compacted backfill. In addition all fills soils within the foundation footprint should be removed and replaced with engineered fill.

7.6.4 Fills and Backfills

Engineered fills, trench backfills, wall backfill, and below footing fill may be placed during construction of this project. All fills and backfills, imported or otherwise, should be placed in loose lifts not exceeding 8 inches in thickness, brought to near-optimum moisture content in-place, and compacted to at least 95 percent of the maximum dry density per ASTM D-1557 using mechanical compaction equipment.

Unless noted otherwise, all imported fill and backfill materials should be predominately granular in nature, less than 3 inches in maximum size, free of organic and inorganic debris, and should contain less than about 35 percent non-expansive fines (i.e. material passing the No. 200 sieve). From a geotechnical stand point, the onsite fill soils can be used as engineered fills for the project.

7.7 TEMPORARY EXCAVATIONS

7.7.1 Sloped Excavations

Due to proximity to public roads and available space along the Admiralty Way, over-excavation to remove the fill soils may be shored. All excavations should comply with the current California or Federal OSHA requirements, as applicable. All cuts greater than 5 feet in depth should be sloped and/or shored. For planning purposes, temporary excavations in native soils, new compacted fill areas and existing fill areas that do not remain open more than a few days may be sloped at 1.75(h): 1(v) or flatter, up to a maximum depth of 10 feet below surrounding grade. Flatter slopes may be required if clean and/or loose sandy soils are encountered and the contractor should be prepared to flatten the slope at the direction of the competent person or geotechnical engineer. Steeper or vertical cuts could be utilized for cuts less than 5 feet deep depending on the strength and homogeneity of the soils as observed in the field.

No excavation is allowed within the influence zone of existing structures unless the structures are properly underpinned or supported. The influence zone of the existing structures may be assumed to be below a 45-degree line projected down and away from the bottom edge of the structure.

The geotechnical engineer should review all proposed excavations for the project. If removal of unsuitable soils within the influence zone described above becomes necessary, existing structures will need to be underpinned or supported. Specific recommendation for underpinning can be provided on a case-by-case basis, if needed.

Runoff water should be prevented from entering the excavation, and collected and disposed of outside the construction limits. To prevent runoff from adjacent areas from entering the excavation, a perimeter berm may be constructed at the top of the slope. Heavy construction equipment, building materials, excavated soil stockpiles and vehicle traffic should not be allowed near the top of the slope within a horizontal distance equal to the depth of the excavation.

7.7.2 Shored Excavations

Shoring systems may consist of soldier piles and lagging retention systems. Typical soldier piles consist of steel H-sections installed in pre-drilled holes and backfilled below the planned bottom of the excavation with structural concrete and with sand/cement slurry above. Center to center

horizontal spacing between soldier piles should be limited to a maximum of 8 feet. Treated-timber lagging or steel plates should be installed between soldier piles as the excavation descends, to prevent running-sand conditions where dry and granular soils may be present.

The shoring system should be designed to resist lateral earth pressures plus any additional horizontal pressures imposed by foundations of adjacent structures or other live loads such as vehicular load.

Cantilevered shoring can be designed for a triangular load distribution, which is equivalent to the pressure exerted by a fluid weighing 35 pounds per cubic foot (pcf). Cantilevered shoring should be limited to excavation depths of 15 feet or less. For an areal surcharge placed adjacent to the shoring, an equivalent, horizontal (rectangular) pressure equivalent to thirty (30) percent of the surcharge may be assumed to act along the entire length of the shoring. A traffic surcharge equivalent to about 300 pounds per square foot may be assumed for normal street traffic behind the shoring. For sloping backfill conditions of 3(h):1(v) or flatter, the shoring should be designed for a triangular load distribution equivalent to the pressure exerted by a fluid weighing 45 pcf. The active earth pressure shall be applied as parallel to the sloping backfill condition.

The above pressures do not include any hydrostatic pressures; it is assumed that drainage will be provided by weep-holes or cracks in the lagging. The above values assume a uniform and level grade behind the shoring system.

Soldier piles must extend below the excavation bottom to provide lateral resistance by passive soil pressure. Allowable passive pressures shall be taken as equivalent to the pressure exerted by a fluid weighing 250 pcf. The passive earth pressure shall be limited to 2,500 psf. To account for three-dimensional effects, the passive earth pressure may be assumed to act on 2.5 times the pile width. For submerged conditions, the allowable passive pressure should be reduced to a fluid weighing 125 pcf. The passive earth pressure shall be limited to 1,500 psf. For a descending slope of 3(h):1(v) or flatter in front of the shoring, the available passive fluid weight should be reduced to 100 pcf (60 pcf below groundwater table).

7.8 SEISMIC DESIGN PARAMETERS

Seismic design parameters per 2010 California Building Code (2010 CBC) were estimated for the upper 100 feet of soils along the alignment vary from medium dense to very dense sands, to stiff cohesive soils with undrained shear strength of 1,000 to 2,000 psf. This range of soil properties generally corresponds to a Site Class **D** in accordance with Table No. 1613A.5.2 of the 2010 CBC. Seismic design parameters according to the 2010 CBC are summarized in the table below.

Table 8 Seismic Design Parameters

Site Coordinates (datum NAD83/WGS84)	N33.9852° W118.4554°
Site Class Definition	*D*
Spectral Acceleration For Short Period, S_s	1.5
Spectral Acceleration For 1 Second, S_1	0.6
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.5
Design Spectrum, $S_{DS} = 2/3\ S_{MS}$	1.0
Design Spectrum, $S_{D1} = 2/3\ S_{M1}$	0.6
Maximum Considered S_{MS} = Fa x Ss	1.5
Maximum Considered S_{M1} = Fv x S_1	0.9
Peak Ground Acceleration (PGA) = S_{DS} /2.5	0.4

7.9 CORROSION POTENTIAL

Selected representative soils were tested in order to assess corrosivity parameters including resistivity, sulfate and chloride content. The test results are summarized in the following table:

Table 9 Summary of Corrosivity Test Results

SAMPLE LOCATION	MINIMUM RESISTIVITY (OHM-CM)	pH	SULFATE CONTENT (BY WEIGHT)	CHLORIDE CONTENT (PPM)
G-1@0-5'	930	6.3	7.43	45
GE-1@0-5'	1,700	6.4	0.38	45

Results of the resistivity test indicate that the soils are corrosive to severely corrosive to ferrous metals. Testing for soluble sulfate from the site indicates a sulfate content of up to 7.43% by weight for the onsite soil. Based on the American Concrete Institute (ACI) 318, Section 4.3, sulfate exposure is severe to very severe. We recommend that a licensed corrosion engineer be consulted to determine the most appropriate corrosion protection measures at the site.

8.0 DESIGN REVIEW

We recommend that the geotechnical aspects of the project be reviewed by the geotechnical engineer during the design process. The scope of services may include assistance to the design team in providing specific recommendations for special cases, of shoring design, reviewing the geotechnical portions of the project for possible cost savings through alternative approaches, and reviewing the proposed construction techniques to evaluate if they satisfy the intent of the recommendations presented in this report.

9.0 CONSTRUCTION MONITORING

All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a geotechnical engineer, including:

- Site preparation - site stripping, and removal of subsurface structures;
- Drilled caissons installation;
- Foundation subgrade preparation; and
- Placement of structural fills and backfills.

The geotechnical engineer should be present to observe the soil conditions encountered during construction, to evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein.

10.0 SECTION 111 STATEMENT

Based on the findings of this geotechnical investigation, and provided that the recommendations of this report are followed, and the designs and construction are properly and adequately executed, it is our opinion that the proposed construction work within the project site will be safe from landslides, slippage, or settlement. Further, it is our opinion that the proposed construction will not adversely affect the stability of the adjacent properties, with the same provisions listed above.

11.0 LIMITATIONS

Conclusions and recommendations presented in this report are based on subsurface conditions encountered at the locations of explorations performed by URS. Our current recommendations should not be extrapolated to other areas, or used for other facilities without our prior review.

URS Corporation warrants that our services have been performed within the limits prescribed by our clients, with the usual thoroughness and competence of the geotechnical engineering profession in Southern California at this time. No other warranty or representation, either expressed or implied, is included or intended in this report.

-oOo-

It has been a pleasure to assist you with this project. We look forward to being of further assistance as the project develops. Should you have any questions, please contact us.

Respectfully submitted,

URS

S. Nesarajah, PhD, PE, GE
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
SADDANATHAPILLAI NESARAJAH
No. 2717
Exp. 9-30-13
GEOTECHNICAL
STATE OF CALIFORNIA

Casey Lee Jensen, PG, CEG
Project Engineering Geologist

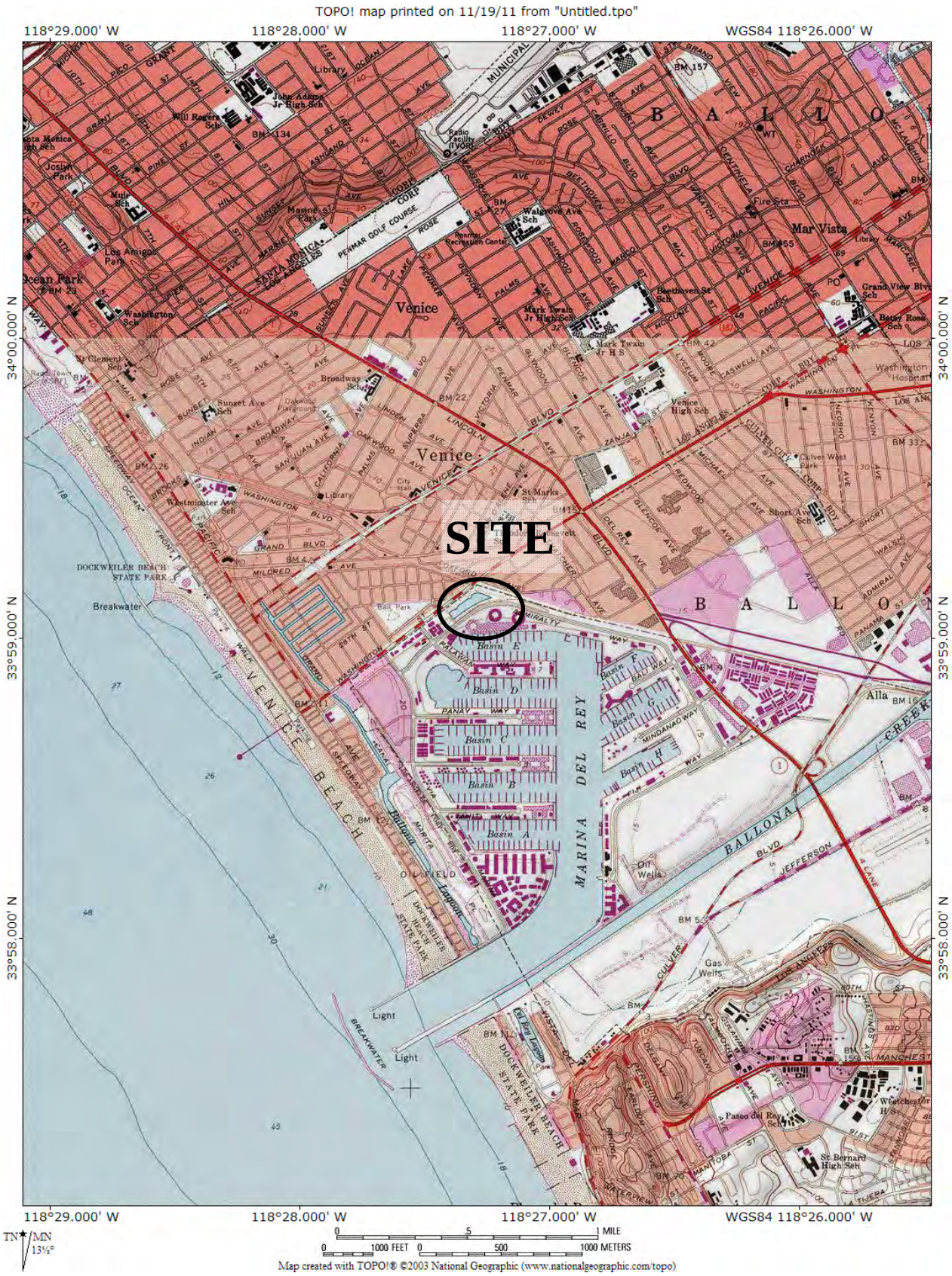
PROFESSIONAL GEOLOGIST
CASEY LEE JENSEN
No. 2320
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

C. Garry Lay, PE, GE
Vice President/Principal Engineer

12.0 REFERENCES

1. Boore, D.M., W. B. Joyner, and T. E. Fumal, 1997, Equations for estimating horizontal response spectra and peak acceleration from western American earthquakes, A summary of recent work, Seism. Res. Letter, 68, 128-153.
2. California Division of Mines and Geology, 1997a, DMG Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California, 1999.
3. California Division of Mines and Geology, 1997b, Special Publication 42, Fault Rupture Hazard Zones in California by Hart and Bryant.
4. California Division of Mines and Geology (1998b) Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada
5. California Division of Mines and Geology, 1999, Seismic Hazard Zones Map, Venice 7.5-minute Quadrangle, Official Map.
6. California Division of Mines and Geology, 1998 Seismic Hazard Zone Report for the Venice 7.5 Minute Quadrangle, Los Angeles and Orange Counties, California, Seismic Hazard Zone Report 037.
7. California Geological Survey, 2003, The Revised 2002 California Probabilistic Seismic Hazard Maps, by Cao, Bryant, et al, posted as pdf on CGS website, June 2003.
8. City of Los Angeles, 2002. "Methane and Methane Buffer Zones," Bureau of Engineering, Department of Public Works, 2002.
9. Greenbook (2006), Standard Specifications for Public Works Construction, BNI Building News, Los Angeles, California.
10. Hitchcock, C.S., and Wills, C.J., 2000, Quaternary Geology of the San Fernando Valley, Los Angeles County, California, CDMG Map Sheet 50, Scale 1:48,000
11. Los Angeles County Department of Regional Planning (1990), Liquefaction Susceptibility, dated December.
12. Naval Facilities Engineering Command (NAVFAC)(1986), Foundation and Earth Structures, Design Manual 7.02.
13. Jennings, 1994, Fault Activity Map of California and Adjacent Areas, Scale = 1:750,000
14. State Water Rights Board Referee, 1962, "Report of Referee, in the Superior Court of the State of California in and for the County of Los Angeles", July, 1962.
15. Southern California Earthquake Data Center, 2006, Southern California Earthquake Center, Website: http://www.data.scec.org/index.html.
16. Yerkes, R.F., McCulloch, T.H., Schoellhamer, J.E., and J.G. Vedder, Geology of the Los Angeles Basin, California – An Introduction, United States Geological Survey Professional Paper 420-A, dated 1965.
17. Youd, T.L, and I. M. Idriss, 2001. "Liquefaction Resistance of Soils: Summary Report From The 1998 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils", ASCE J. of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 4, pp 297 –313.
18. 2010 California Building Code (2010 CBC).

FIGURES

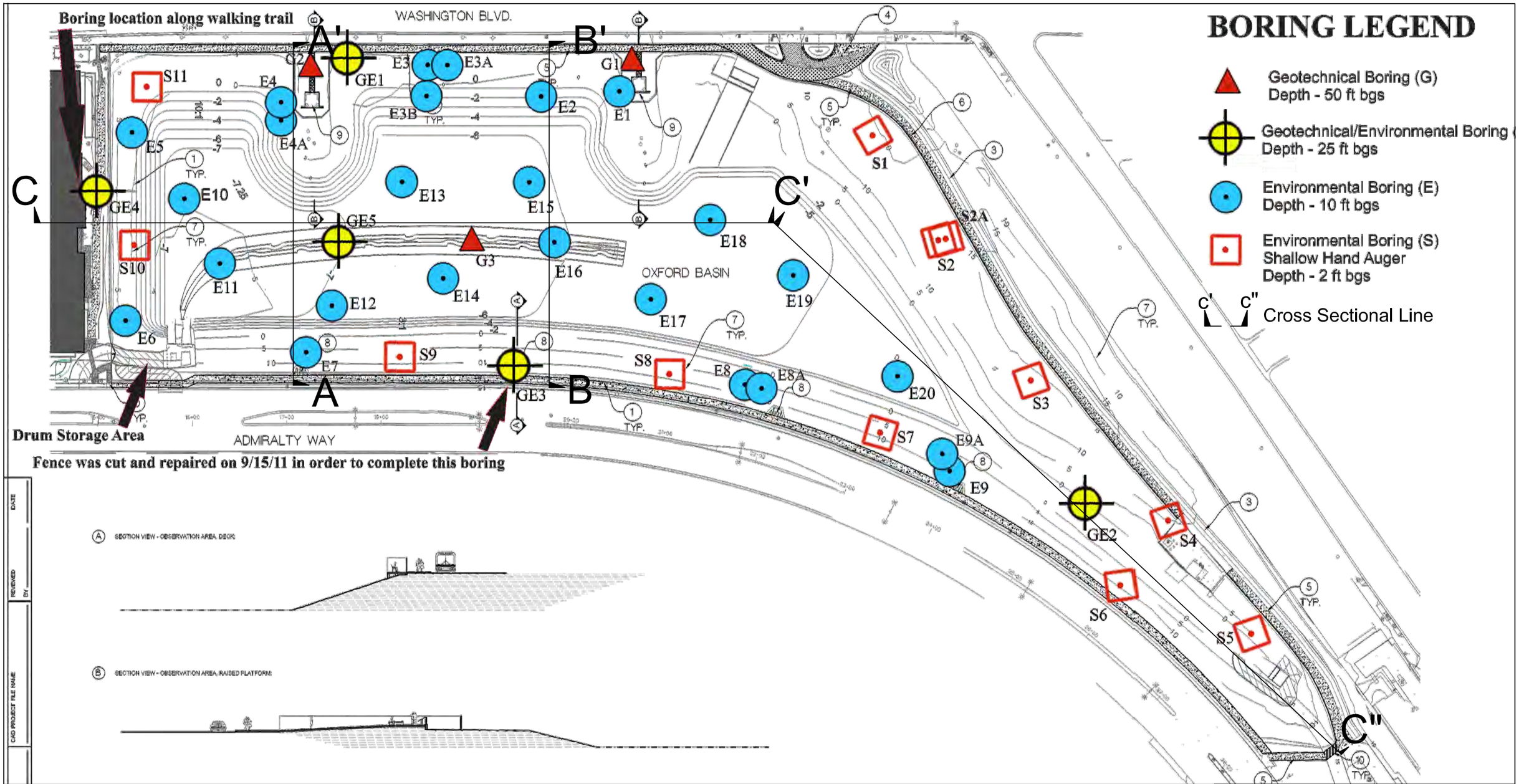


VICINITY MAP

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW/GMED

URS

FIGURE 1

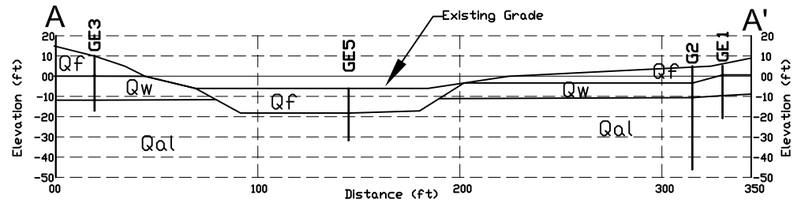


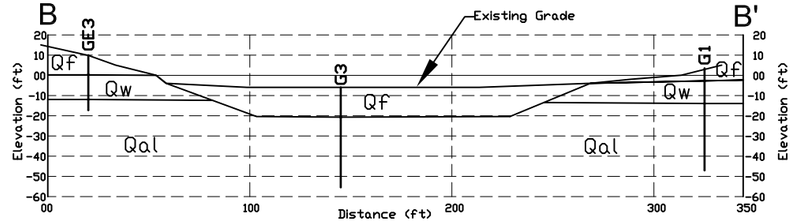
URS

PLOT PLAN

Proj. No.:	29405347	Date:	NOV 2011
Project:	OXFORD RETENTION BASIN MARINA DEL REY, CA	Figure:	2

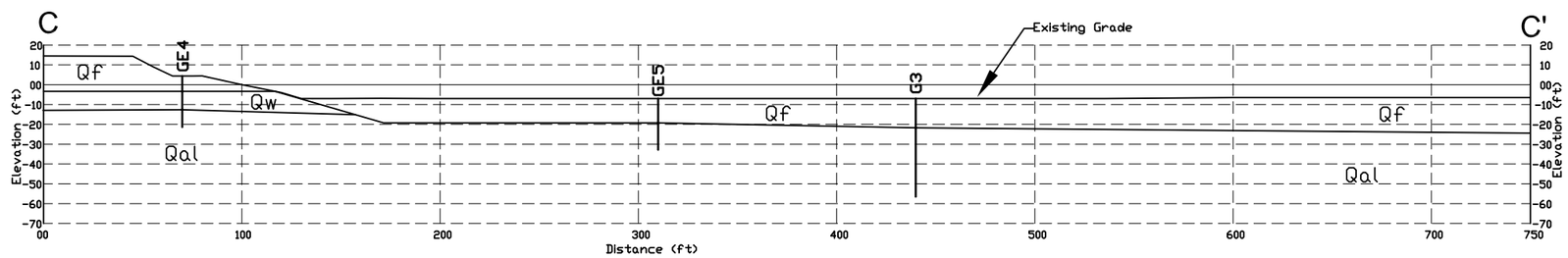
L:\NESA\Projects\Miscellaneous\Oxford basin\ACAD\OXFORD CROSS SECTION.dwg Plot Plan 11/20/2011

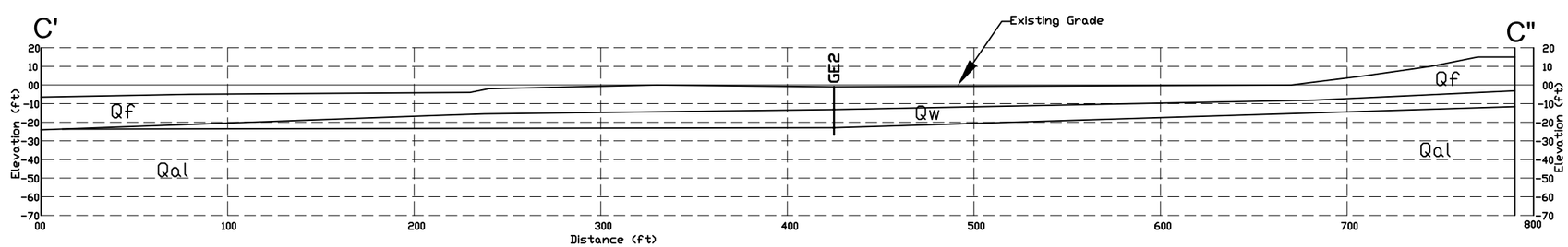




LEGEND

Qf	- Fill
Qw	- Wetland Deposits
Qal	- Alluvium



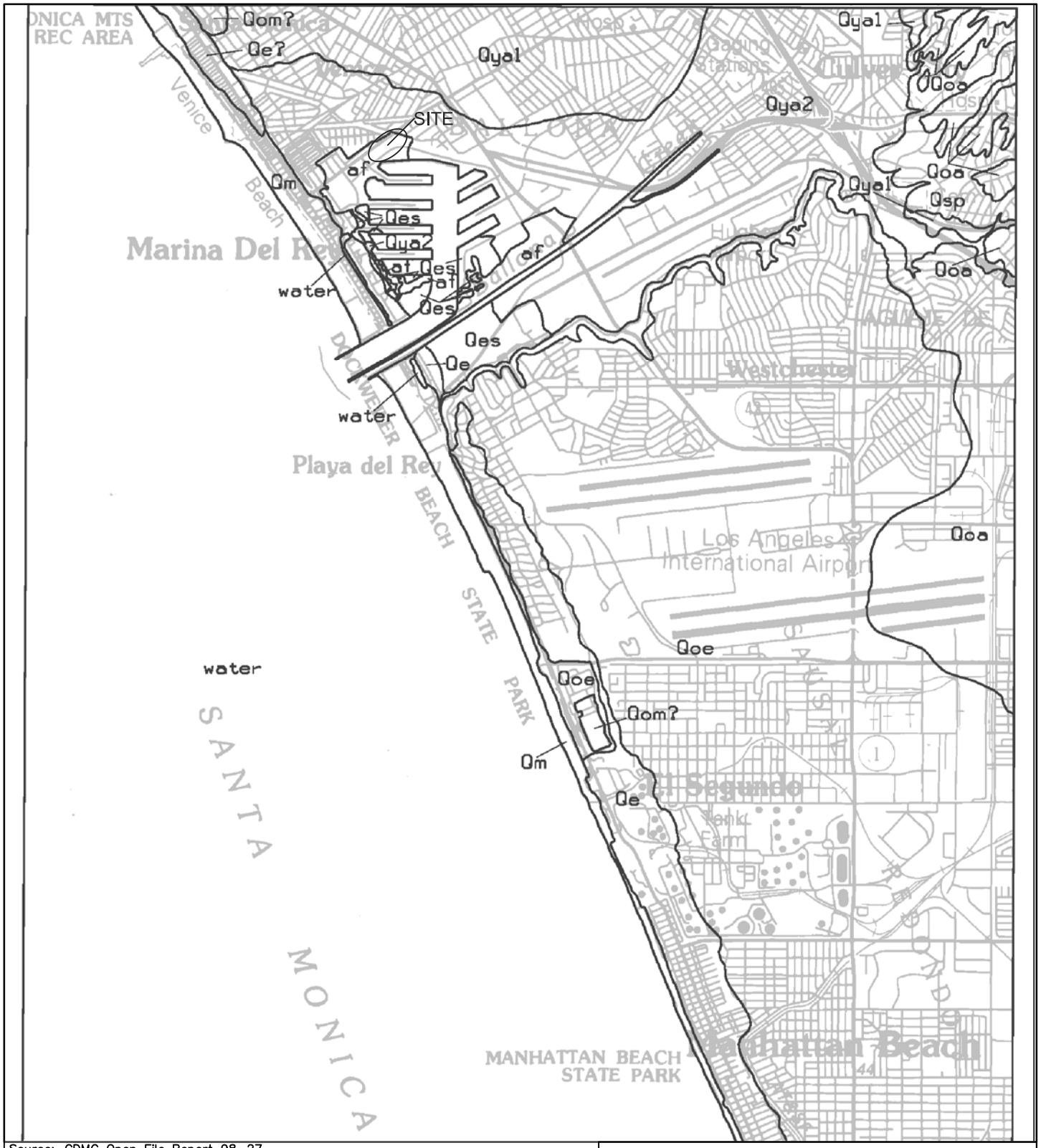


URS

CROSS SECTION

Proj. No.:	29405347	Date:	NOV 2011
Project:	OXFORD RETENTION BASIN MARINA DEL REY, CA	Figure:	3

L:\NESA\Projects\Miscellaneous\Oxford basin\2012-03-23 Final Geotechnical Report\Drafting\OXFORD CROSS SECTION.dwg Cross Section 03/23/2012



Source: CDMG Open File Report 98-27

0 1 2 3

SCALE, miles

LEGEND

af = Artificial Fill

URS

REGIONAL GEOLOGIC MAP

Proj. No.:	29405347	Date:	NOV 2011
Project:	OXFORD RETENTION BASIN MARINA DEL REY, CA	Figure:	4

L:\NESA\Projects\Miscellaneous\Oxford basin\ACAD\Figures.dwg Reg Geo Map 8.5x11 11/20/2011

MAP EXPLANATION

Zones of Required Investigation:

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

Earthquake-Induced Landslides
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Source: CDMG Seismic Hazard Zones Venice Quadrangle 1999

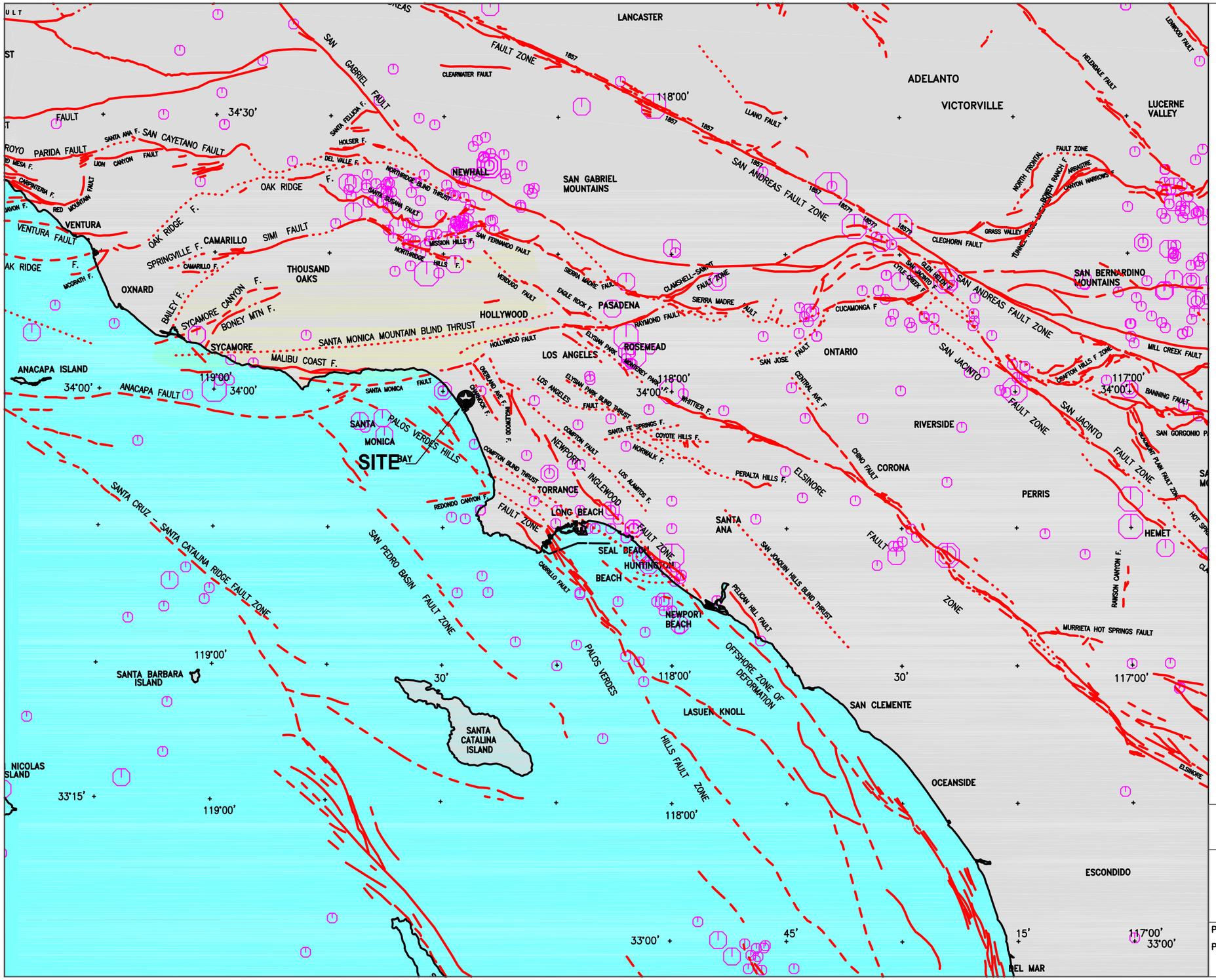
0 1 2 3
SCALE, miles

URS

SEISMIC HAZARDS MAP

Proj. No.: 29405347	Date: NOV 2011
Project: OXFORD RETENTION BASIN MARINA DEL REY, CA	Figure: 5

L:\NESA\Projects\Miscellaneous\Oxford basin\ACAD\Figures.dwg Seis Haz Map 8.5x11 11/20/2011



0 20 40

SCALE,kilometers

LEGEND

REPORTED EARTHQUAKE MAGNITUDES.

- 4.0 TO 4.9
- 5.0 TO 5.9
- 6.0 TO 6.9
- 7.0 AND GREATER

SOUTH OF LATITUDE 35°N, EPICENTER AND MAGNITUDE DATA ARE FROM THE CALIFORNIA GEOLOGICAL SURVEY (2001) EARTHQUAKE CATALOG FOR THE PERIOD FROM 1769 TO 2000. ONLY EARTHQUAKES OF MAGNITUDE 4.0 AND LARGER ARE SHOWN. AFTERSHOCKS ARE NOT INCLUDED.

APPROXIMATE LOCATION OF HOLOCENE AND PLEISTOCENE FAULTS, DOTTED WHERE CONCEALED, QUERIED WHERE CONJECTURAL. FAULT LOCATIONS BASED ON: ZIONY AND JONES, 1989; CDMG GEOLOGIC MAP SERIES OF CALIFORNIA, 1977–1986 (1:250,000 SCALE); CDMG GEOLOGIC MAP SERIES, CALIFORNIA CONTINENTAL MARGIN, 1987 (1:250,000 SCALE); HAUKSSON, 1990; SHAW AND SHEARER, 1999; WRIGHT, 1991; GRANT ET AL. 1999.

URS

REGIONAL FAULT AND EPICENTER MAP

Proj. No.: 29405347	Date: NOV 2011
Project: OXFORD RETENTION BASIN MARINA DEL REY, CA	Figure: 6

L:\NESA\Projects\Miscellaneous\Oxford basin\ACAD\Regional Fault and Epicenter Map.dwg Nov 20, 2011 – 7:20pm

APPENDIX A

APPENDIX A

EXPLORATORY BORINGS

APPENDIX A EXPLORATION BORINGS

This appendix describes the exploration program conducted by URS for the proposed Oxford Retention Basin Multiuse Project, in Marina Del Rey, California. The exploratory locations for soil borings were first marked in the field, and then checked through Dig Alert for clearance of potential conflicts with underground utilities. When necessary, the marked locations were adjusted in order to avoid encountering underground utilities.

Subsurface exploration included drilling and sampling 8 borings to approximate depths of 25 to 50 feet below the existing ground surface using a truck-mounted drilling rig equipped with 8-inch diameter hollow stem augers and a mud-rotary drilling rig attached to a barge. The approximate locations of the borings are shown in Figure 2.

URS representatives from our Los Angeles office maintained a log for each boring in the field, recording sampler blow counts, soil characteristics, observations, sample locations, and other pertinent drilling and sampling information. The subsurface materials were characterized by visual inspection of the samples and soil cuttings returned to the surface during the drilling operation. The behavior of the drill rig, such as variations penetration rate, was also considered in material characterization. Soils were classified according to the Unified Soil Classification System (ASTM D 2488). The boring logs were modified to reflect the results of laboratory observations and testing of the samples. A key to notations on the boring logs is presented in Figure A-1. Boring logs are presented in Figures A-2 through A-9.

Relatively undisturbed samples were obtained using a California sampler (2.42-inches I.D.) driven 18-inches using a 140-pound auto-trip hammer with a 30-inch drop. The number of blows required to drive the sampler was recorded for each 6-inch interval of penetration.

Relatively undisturbed and disturbed samples from the sampling activities were placed in plastic bags to preserve the water content of the soil and transported to our geotechnical laboratory in Los Angeles for testing.

Standard penetration tests (SPT) were also performed at selected depths per ASTM D-1586. The blow count for the final 12 inches of sampler penetration is commonly referred to as the "N-value". (To convert the California sampler blow counts to approximate N-value, a factor of 0.5 may be used). This value generally reflects the resistance to penetration of the soil at the sample depth. The degree of relative density of granular soils and the degree of consistency of cohesive soils are generally described on the boring logs according to the conventional correlation presented below:

Granular Soils			Cohesive Soils	
SPT Blow Count	Description		SPT Blow Count	Description
< 4	Very Loose		< 2	Very Soft
4 – 10	Loose		2 – 4	Soft
10 – 30	Medium Dense		4 – 8	Medium Stiff
30 – 50	Dense		8 – 15	Stiff
> 50	Very Dense		15 – 30	Very Stiff
			> 30	Hard

The relative density and consistency descriptions on the attached boring logs are based on adjusted blow counts recorded in the field. These numbers are considered to be useful in providing an estimate of the soils relative density or consistency. The relative density and consistency descriptions on the logs may deviate from the correlation for a number of reasons, including reliance on other test results or the engineer's judgment based on manual manipulation of the sample.

It is widely accepted that the above-listed SPT blow count correlation is overly simplistic. For most applications in non-gravelly soils, the blow count is usually adjusted for the effective vertical pressure at the sampling depth and for other sampling system parameters such the efficiency of the sampling system or and sampling techniques used. In gravelly soil, it is recognized that the blow counts are higher than would be expected in non-gravelly soil of similar density or consistency. This occurs because the sampler tends to push larger gravel clasts ahead of it. The area of the gravel clast may be significantly greater than that of the sampler, causing increased resistance and higher blow counts.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	*GRAVEL AND GRAVELLY SOILS* MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	*CLEAN GRAVELS* (LITTLE OR NO FINES)	**GW**	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	**GM**	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	*CLEAN SANDS* (LITTLE OR NO FINES)	**SW**	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	**SM**	SILTY SANDS, SAND - SILT MIXTURES
			SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	*SILTS AND CLAYS*	LIQUID LIMIT LESS THAN 50	**ML**	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			**PT**	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

Other Material Symbols (examples)

Asphalt

Sampler and Symbol Descriptions

- Modified California sample
- Standard Penetration Test
- No Recovery
- Bk Bulk sample
- Disturbed Type-U Sample
- Pitcher Tube Sample
- Bk Shelby Tube Sample
- Rock Core Sample
- Approximate depth of perched water or groundwater

Note: Number of blows required to advance driven sample 12" (or length noted) is recorded; blow count recorded for seating interval (initial 6" of drive) is indicated by an asterisk.

Laboratory and Field Test Abbreviations

CBR	California Bearing Ratio (result in parentheses)
COMP	Compaction test
CORR	Corrosivity test
CON	Consolidation test
DSCD	Consolidated drained direct shear test
ECP	Effective Confined Pressure (result in parentheses)
EI	Expansion Index)result in parentheses)
LL=29	Liquid limit (Atterberg limits test)
PERM	Saturated Hydrualic Conductivity (result in parentheses [cm/sec])
PP	Pocket Penetrometer (result in parentheses [tsf])
PI=11	Plasticity Index (Atterberg limits test)
R-value	R-Value Test (result in parentheses)
SA	Sieve Analysis (-200 result in parentheses)
SA/HA	Sieve and Hydrometer Analysis (-200 result in parentheses)
SC	Sand Cone Test (moisture in %, dry density in pcf)
UC	Unconfined Compressive Strength test
-200	Percent passing #200 sieve (test result in parentheses)

KEY TO LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-1

Date(s) Drilled	9/13/2011	Logged By	Joe G.
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8.25-inch
Drill Rig Type	Marl M5T	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	9.3 feet bgs		
Comments			

Boring G1

Sheet 1 of 2

Job Number	29404462
Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	5.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0		BK1	-		SM	FILL (Qf) Silty SAND grayish brown, moist, fine to medium, fragments of brick asphalt, and concrete			Hand Auger to 5 feet CORR, EI
0	5		1	24						
						CL	WETLAND DEPOSIT (Qw) CLAY			
			2	6		CL	light olive brown, stiff, moist, trace roots, bioturbated			
							▼ Sandy CLAY dark greenish gray, medium stiff, moist, fine, 1" thick silty sand interbed			
	10		3	11		CL				DSCD, CON, LL=38 PI=16
							CLAY very dark greenish gray, medium stiff, moist, trace roots, pinhole structure, medium plasticity			
			4	8		SC				
							Clayey SAND dark yellowish brown, loose, moist, fine to medium, trace coarse sand and roots			
-10	15		5	41		SP-SM		7.8	135.2	-200(8)
							ALLUVIUM (Qal) SAND with Silt dark yellowish brown, medium dense, wet, fine to medium, trace gravel to 2½"			
			6	23						
	20		7	61			grades dense, medium, trace gravel to 1½"	8.2	138.7	
			8	36		SP	SAND grayish brown, dense, wet, fine to medium, trace gravel to ½"			
-20	25		9	62				10.7	134.1	
			10	52			grades very dense, ¼" clay seam			
	30		11	56			grades dense, with trace iron oxide stains	13.0	130.4	
			12	34			grades yellowish brown, increasingly medium, ½" thick coarse sand layer			
-30	35		13	59			grades medium grained, with gravel to 1", trace iron oxide stains, some coarse sand	11.5	128.0	
			14	47		CL	CLAY with Sand olive brown, hard, wet, fine to medium, clay bed thickness varies from ¼" to 3"			
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-2

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	40		15	39		SP	SAND grayish brown, dense, wet, fine to medium	15.2	110.6	
			16	54			grades very dense, medium, 1" thick fine sand layer, trace gravel to ¾"			
-40	45		17	58		SM	Silty SAND grayish brown, dense, wet, fine to medium			
						SP	SAND yellowish brown, very dense, wet, fine to medium			
	50		18	59						
							Total Depth = 51.5 ft below ground surface Groundwater encountered at 9.3 ft below ground surface Backfilled with bentonite grout			
-50	55						Debris fill thickness: 6 feet			
	60									
-60	65									
	70									
-70	75									
	80									
-80	85									
	90									

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Date(s) Drilled	9/13/2011	Logged By	Joe G.
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8.25-inch
Drill Rig Type	Marl M5T	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	9.7 feet bgs		
Comments			

Boring G2

Sheet 1 of 2

Job Number	29404462
Total Depth Drilled (ft)	51.3
Approximate Ground Surface Elevation (ft)	5.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0		BK1	-		SM	FILL (Qf) Silty SAND grayish brown, moist, fine to medium, fragments of asphalt and concrete			Hand Auger to 5 feet
0	5		1	21			grades dark brown, medium dense			
			2	4		CL	WETLAND DEPOSIT (Qw) Sandy CLAY dark greenish gray, soft to medium stiff, moist, fine, trace roots			
	10		3	11				22.6	111.1	DSCD
			4	11		CL	CLAY very dark greenish gray, stiff, moist, trace iron oxide stains and roots			
-10	15		5	45		SP	ALLUVIUM (Qal) SAND dark grayish brown, medium dense, wet, fine to medium, trace coarse sand and gravel to 1" grades grayish brown, dense, medium to coarse, trace gravel to 1½", subrounded			
			6	30						
	20		7	59			grades with gravel to 1½"	7.7	145.1	
			8	22		CH	High-Plastic CLAY olive brown, very stiff, moist, traces fine sand, micaceous grades trace iron oxide stains	26.6		LL=54 PI=24, -200(90)
-20	25		9	35				26.3	96.4	
			10	42						
	30		11	21		MH	SILT dark olive brown, stiff, moist, micaceous, trace iron oxide stains, ¼" thick clay seam grades with lenses of silty fine sand grades olive brown, hard	28.7	104.3	SA/HA(90), LL=51 PI=25
			12	36						
-30	35		13	74		SM	Silty SAND olive brown, dense, moist, fine, trace iron oxide stains, 1" thick clay interbed			
			14	54		SP	SAND light olive brown, very dense, wet, fine, trace gravel to ¾", angular			
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-3

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

MARINA DEL REY, CALIFORNIA

FOR: LACDPW

Boring G2

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	40		15	50/3"						
			16	71			grades fine to coarse, grades fine upward, trace gravel to 1"			
-40	45		17	50/4"						
			18	50/5"			grades yellowish brown, medium to coarse			
	50		19	50/3"			grades gray			
							Total Depth = 51.25 ft below ground surface Groundwater encountered at 9.7 ft below ground surface Backfilled with bentonite grout			
-50	55						Debris fill thickness: 7 feet			
	60									
-60	65									
	70									
-70	75									
	80									
-80	85									
	90									

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

URS

FIGURE A-3

Date(s) Drilled	9./19/2011	Logged By	Joe G.
Drilling Method	Mud Rotary	Drill Bit Size/Type	8.25-inch
Drill Rig Type	CME 45	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	-3.5 feet bgs		
Comments			

Boring G3

Sheet 1 of 2

Job Number	29404462
Total Depth Drilled (ft)	50.8
Approximate Ground Surface Elevation (ft)	-6.5 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	FILL (Qf) Silty SAND olive brown, medium dense, moist, fine to medium			
-10			1	19						
	5		2	51		SP	SAND olive brown, medium dense, slightly moist, fine 3" thick layer of medium to coarse sand, trace gravel to ½", angular	3.0		
			3	37			grades dense, fine to medium, trace coarse sand, subangular gravel to 1½"			
	10		4	50/5.5"		GP	GRAVEL grayish brown, very dense, wet, fine to coarse, with medium sand,			
			5	25		SM	gravel to 2", subangular			
-20							Silty SAND olive brown, medium dense, wet, fine to medium, trace gravel to 1½", subangular			
	15		6	46		ML	ALLUVIUM (Qal) Sandy SILT dark yellowish brown, very stiff, wet, fine, trace iron oxide stains, micaceous, 1" thick clay interbed, few gravel to 2½", subangular	24.1	109.0	
			7	31						
	20		8	55		SP	grades with 1" silty sand interbed	20.9	114.4	
							SAND yellowish brown, dense, wet, fine to medium, ½" thick silty clay interbed			
-30			9	31		ML	Sandy SILT olive brown, very stiff, wet, fine, micaceous, trace iron oxide stains, 1" thick clay interbed			
	25		10	50/5"		SM	Silty SAND light olive brown, very dense, wet, fine, micaceous, trace iron oxide stains	22.9	107.3	
			11	37		SP-SM	SAND with Silt light olive brown, dense, wet, fine, some clay, ¼" thick clay interbed grades grayish brown, medium dense, micaceous, trace iron oxide stains			
	30		12	24				23.8	107.2	LL=NP PI=NP, -200(11.9)
-40			13	73		ML	Sandy SILT strong brown, hard, moist, fine to medium, trace gravel to 1"			
	35		14	46		SP	SAND yellowish brown, dense, wet, medium to coarse, trace gravel to ½" grades grayish brown, very dense, fine	2.9	137.6	-200(1)
			15	97						
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-4

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

MARINA DEL REY, CALIFORNIA

FOR: LACDPW

Boring G3

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	40		16	50/5"			fine to medium, trace gravel to ½"			
-50			17	70						
	45		18	59			grades medium to coarse			
			19	50/5"		CL	CLAY olive brown, hard, wet, trace iron oxide stains			
	50		20	50/4"						
							Total Depth = 50.8 ft below ground surface Surface water 3½' Backfilled with bentonite grout			
-60	55									
	60									
-70	65									
	70									
-80	75									
	80									
-90	85									
	90									

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

URS

FIGURE A-4

Date(s) Drilled	8/12/2011	Logged By	Joe G.
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8.25-inch
Drill Rig Type	Marl M5T	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	9.5 feet bgs		
Comments			

Boring GE1

Sheet 1 of 1

Job Number	29404462
Total Depth Drilled (ft)	26.5
Approximate Ground Surface Elevation (ft)	4.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0		BK1	-		SM	FILL (Qf) Silty SAND olive brown, moist, fine to medium, some concrete and asphalt debris			Hand Auger to 5 feet CORR
0	5		1	19		CL	WETLAND DEPOSIT (Qw) CLAY dark olive brown, stiff, moist, medium plastic			
			2	4		CL	CLAY with Sand dark greenish gray, soft, moist, fine, trace roots and iron oxide stains, increasing plasticity			
	10		3	13			grades medium stiff, trace coarse sand	21.6		LL=35 PI=17, -200(73), CON
			4	18			grades very stiff			
-10	15		5	24		SM	ALLUVIUM (Qal) Silty SAND dark olive gray, medium dense, moist, fine to medium	16.9	121.7	-200(43)
			6	49		SP	SAND grayish brown, dense, wet, fine to medium, trace gravel to 1½", 1½" rock in shoe			
	20		7	38		ML	Sandy SILT olive brown, very stiff, wet, fine to medium	23.0	110.5	
			8	22		CL	Silty CLAY olive brown, very stiff, moist			
-20	25		9	28				27.3	100.3	-200(91)
							Total Depth = 26.5 ft below ground surface Groundwater encountered at 9.5 ft below ground surface Backfilled with bentonite grout			
	30									
-30	35									
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-5

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Date(s) Drilled	9/20/2011	Logged By	Joe G.
Drilling Method	Mud Rotary	Drill Bit Size/Type	4.5-inch
Drill Rig Type	CME45	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	-3.5 feet bgs		
Comments			

Boring GE2

Sheet 1 of 1

Job Number	29404462
Total Depth Drilled (ft)	26.5
Approximate Ground Surface Elevation (ft)	0.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
0	0					OL	ORGANIC DEBRIS			
						SM	FILL (Qf) Silty SAND greenish gray, medium dense, wet, fine to medium grained, trace gravel to 2" subrounded			
			1	45						
	5		2	57		SP	SAND gray, dense, wet, fine to coarse, with gravel to 2", subangular			
			3	60		SM	Silty SAND light greenish gray, very dense, wet, fine to coarse, trace gravel			
-10	10		4	35		SP	SAND gray, medium dense, wet, fine to coarse, trace gravel to 2½", subangular			
			5	26		CL	WETLAND DEPOSIT (Qw) CLAY olive brown, stiff, moist, grades Sandy SILT downward, micaceous, grades trace iron oxide stains and organic deposits grades dark olive gray, slightly plastic			
	15		6	12						
			7	30			grades very stiff, trace iron oxide stains, trace gravel to 1½", subangular	25.9	98.2	
-20	20		8	25			grades olive brown			
			9	41		ML	ALLUVIUM (Qal) Sandy SILT dark grayish brown, very stiff, moist, fine, micaceous, trace iron oxide stains			
	25		10	55		SM	Silty SAND olive brown, very dense, wet, fine, trace iron oxide stains			
							Total Depth = 26.5 ft below ground surface 3½' surface water Backfilled with bentonite grout			
-30	30									
	35									
-40	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-6

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Date(s) Drilled	9/15/2011	Logged By	Joe G.
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8.25-inch
Drill Rig Type	Marl M5T	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	17 feet bgs		
Comments			

Boring GE3

Sheet 1 of 1

Job Number	29404462
Total Depth Drilled (ft)	28.0
Approximate Ground Surface Elevation (ft)	10.0 MSL

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
10	0					SM	FILL (Qf) Silty SAND grayish brown, medium dense, moist, fine to medium, concrete and wood debris			
	5		1	33			grades very dark brown, loose, asphalt and glass debris			
			2	6						
0	10		3	25		ML	WETLAND DEPOSITS (Qw) SILT very dark grayish brown, stiff, moist, abundant calcium carbonate deposits, trace gravel fragments	38.8	68.9	
			4	10						
	15		5	18		CL	CLAY dark greenish gray, stiff, moist, ¼" thick sandy silt seam	39.2	86.0	
			6	11		CL	Sandy CLAY very dark greenish gray, stiff, moist, fine, trace roots and iron oxide stains			
-10	20		7	26		ML	Sandy SILT olive brown, very stiff, wet, fine, fine to medium sand interbeds	16.2	124.8	
			8	34		SM	ALLUVIUM (Qal) Silty SAND dark olive brown, dense, wet, fine to medium, trace coarse sand, 1" thick silty clay interbed			
	25		9	32		SP	SAND very dark grayish brown, medium dense, wet, fine to medium	18.3	96.2	
			10	38				10.1	126.5	
-20	30						Total Depth = 28 ft below ground surface Groundwater encountered at 17 ft below ground surface Backfilled with bentonite grout			
	35									
-30	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-7

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Date(s) Drilled	9/14/2011	Logged By	Joe G.
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8.25-inch
Drill Rig Type	Marl M5T	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	9.2 feet bgs		
Comments			

Boring GE4

Sheet 1 of 1

Job Number	29404462
Total Depth Drilled (ft)	26.5
Approximate Ground Surface Elevation (ft)	5.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	FILL (Qf) Silty SAND brownish gray, moist, fine to medium, abundant fragments of PVC, concrete, brick and cable			
0	5		1	13			grades very dark grayish brown, medium dense			DSCD
			2	9		CH	WETLAND DEPOSITS (Qw) Fat CLAY	50.5	77.3	DSCD
	10		3	4		CL	very dark greenish gray, soft, wet, trace roots, ¼" thick fine sandy silt seam, trace hydrocarbon odor, plastic			
			4	10			CLAY very dark greenish gray, medium stiff, moist, trace roots and pinhole structure, iron oxide stains, 1" thick sandy silt interbed grades mottled very dark greenish gray and olive brown, trace pinhole structure, trace roots	23.5	107.1	
-10	15		5	8		ML	Sandy SILT very dark greenish gray, medium stiff, moist, fine, micaceous			
			6	36		SP-SM	ALLUVIUM (Qal) SAND with SILT dark grayish brown, medium dense, wet, medium with some coarse sand, trace gravel, iron oxide stains	9.3	125.8	
	20		7	18			grades grayish brown, fine to coarse, 1½" rock in the shoe			
			8	52			grades yellowish brown, trace gravel to 1½"	11.3	131.1	
-20	25		9	56			grades grayish brown, very dense, fine to medium			
						SM	Silty SAND light olive brown, very dense, wet, fine to medium, trace coarse sand, gravel to 2", subangular			
							Total Depth = 26.5 ft below ground surface Groundwater encountered at 9.2 ft below ground surface Backfilled with bentonite grout			
	30									
-30	35									
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-8

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

Date(s) Drilled	9/20/2011	Logged By	Joe G.
Drilling Method	Mud Rotary	Drill Bit Size/Type	4.5-inch
Drill Rig Type	CME 45	Hammer Data	140 lb at 30-inch drop
Sampling Method(s)	SPT, Modified California Sampler		
Approximate Groundwater Depth and Date Measured	-4.5 feet bgs		
Comments			

Boring GE5

Sheet 1 of 1

Job Number	29404462
Total Depth Drilled (ft)	25.8
Approximate Ground Surface Elevation (ft)	-7.0 MSL

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					OL	ORGANIC DEBRIS			
						CL	FILL (Qf) CLAY greenish black, medium stiff, moist, plastic			
-10			1	12						
	5		2	28		SP-SM	SAND with SILT olive brown, medium dense, wet, fine to medium, trace gravel and coarse sand			
			3	25		GP	GRAVEL light olive brown, medium dense, wet, fine to coarse, with fine to medium sand, subangular, granite	6.2	125.4	
	10		4	12		SP	SAND light olive brown, loose, wet, fine to medium, subangular gravel			
-20			5	44		SM	ALLUVIUM (Qal) Silty SAND olive gray, dense, wet, fine to medium, 1" thick clay interbed, trace gravel, subangular			
	15		6	50/5"			grades dark grayish brown, very dense, medium to coarse, with gravel, to 1½", subangular	26.5	112.5	
			7	50			grades olive brown, fine to medium, 1" thick sandy silt interbed			
						SP-SM	SAND with Silt olive brown, very dense, wet, fine to medium, trace coarse sand			
	20		8	50/5"		SM	Silty SAND light olive brown, very dense, wet, fine to medium, trace gravel to 2"	12.6	121.2	
-30			9	41			grades olive gray, micaceous, 1" thick medium sand interbed			
	25		10	50/5"		SP	SAND light olive brown, very dense, wet, fine			
							Total Depth = 25.8 ft below ground surface 4½' surface water Backfilled with bentonite grout			
	30									
-40										
	35									
	40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

LOG OF BORING

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE A-9

Report: URS; Project File: L:\NESA\PROJECTS\MISCELLANEOUS\OXFORD BASIN\BORINGS\ORB.GPJ; Data Template:URS4444 Printed: 3/23/12

APPENDIX B

APPENDIX B

GEOTECHNICAL LABORATORY TESTING

APEENDIX B GEOTECHNICAL LABORATORY TESTING

B1. GENERAL

Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting design and construction procedures. Tests performed are indicated on the Logs of Borings. A description of the laboratory testing program is presented below.

B2. MOISTURE AND DENSITY TESTS

Moisture content and density tests were performed on a number of samples recovered from the borings. The results of these tests were used to compute existing soil overburden pressures, to correlate strength and compressibility data from tested samples with those not tested, and to aid in evaluating soil properties. The tests were performed in accordance with ASTM Test Methods D-2937 and D-2216, respectively. The results of these tests are presented on the Logs of Borings.

B3. SIEVE ANALYSIS -PERCENT PASSING THROUGH THE NO. 200

Sieve analyses (percent passing through the No. 200 sieve) were performed on selected samples of soils encountered at the site. These tests were performed to evaluate the gradation characteristics of the soils and to aid in their classification. The tests were performed in accordance with ASTM Test Method D-1140. The results are presented on the Logs of Borings.

B4. SIEVE ANALYSIS AND HYDROMETER ANALYSIS

Sieve and hydrometer analyses were performed on a selected soil sample obtained from the borings in accordance with ASTM Test Method D-422. The test was performed to aid in classification of the soils. The results of the test are presented on the Logs of Borings and in Figure B-1.

B5. ATTERBERG LIMITS

Atterberg Limits tests were performed on representative samples to aid in classification and to evaluate the plasticity characteristics of fine-grained materials encountered in the borings. The test was performed in accordance with ASTM Test Method D-4318. The results of the tests are presented on the summary plot in Figure B-2.

B6. EXPANSION INDEX TESTS

Expansion Index (EI) tests were performed on a selected representative sample to evaluate the expansion potential of the near-surface soils. The tests were performed in accordance with ASTM Test Method D-4829. The results of the test are presented on the Logs of Borings and in Figures B-3.

B7. DIRECT SHEAR TESTS

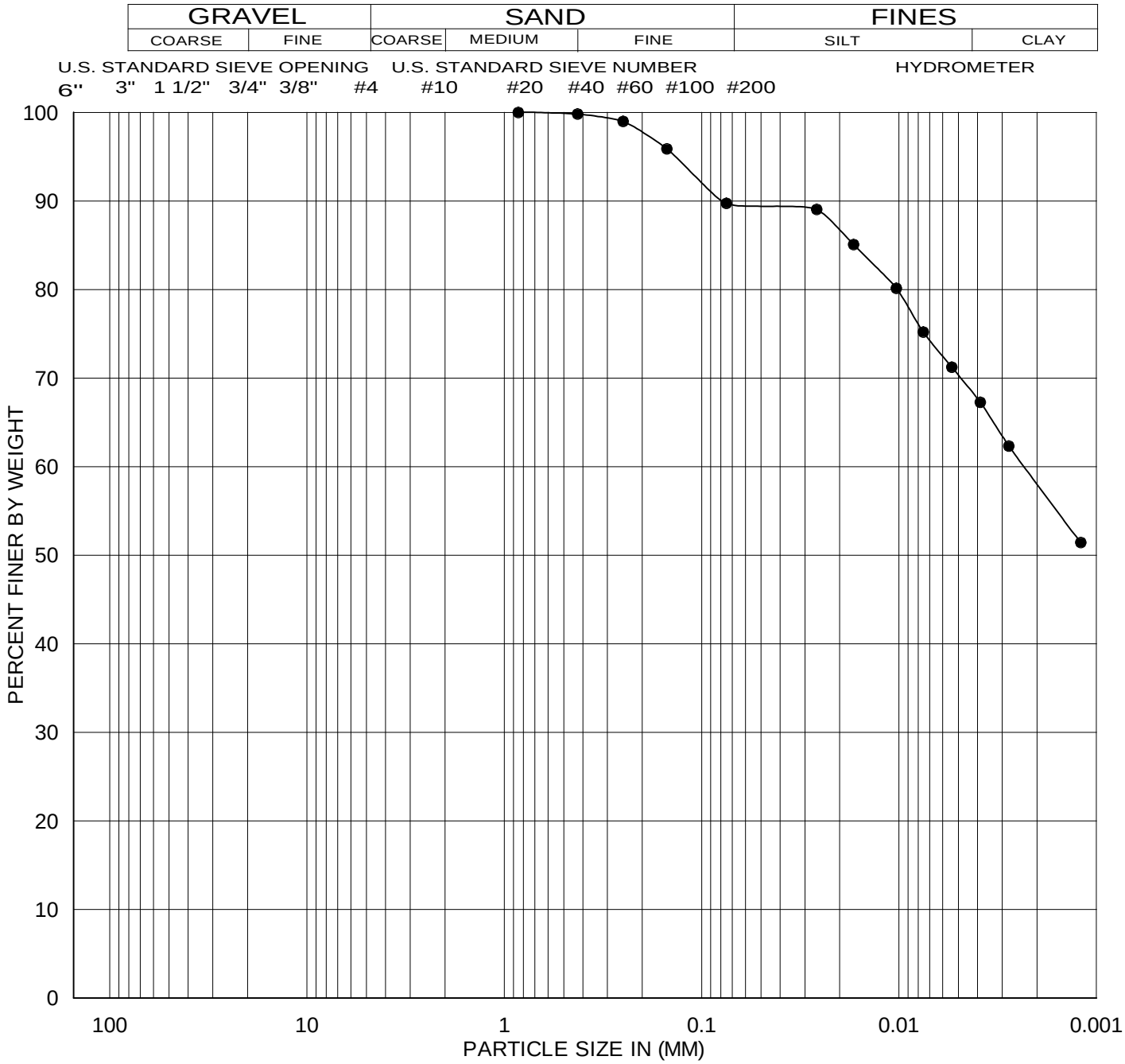
Consolidated-drained direct shear tests were performed on selected undisturbed samples to evaluate shear strength parameters of the site soils. The tests were performed in accordance with ASTM Test Method D-3080. The results of these tests are presented in Figures B-4 through B-7.

B8. CONSOLIDATION TEST

One-dimensional consolidation test was performed on selected undisturbed samples to evaluate compressibility characteristics of the on-site soils. The tests were performed in accordance with ASTM Test Method D-2435. The consolidation test plots are presented in Figures B-8 and B-9.

B9. CORROSIVITY TESTING

Representative soil samples were selected and tested by URS. Samples were tested to determine the sulfate content (CTM 417), chloride content (CTM 422), minimum resistivity (CTM 532) and pH values (CTM 643) of the on-site soils. Test results are presented in Table B-1.



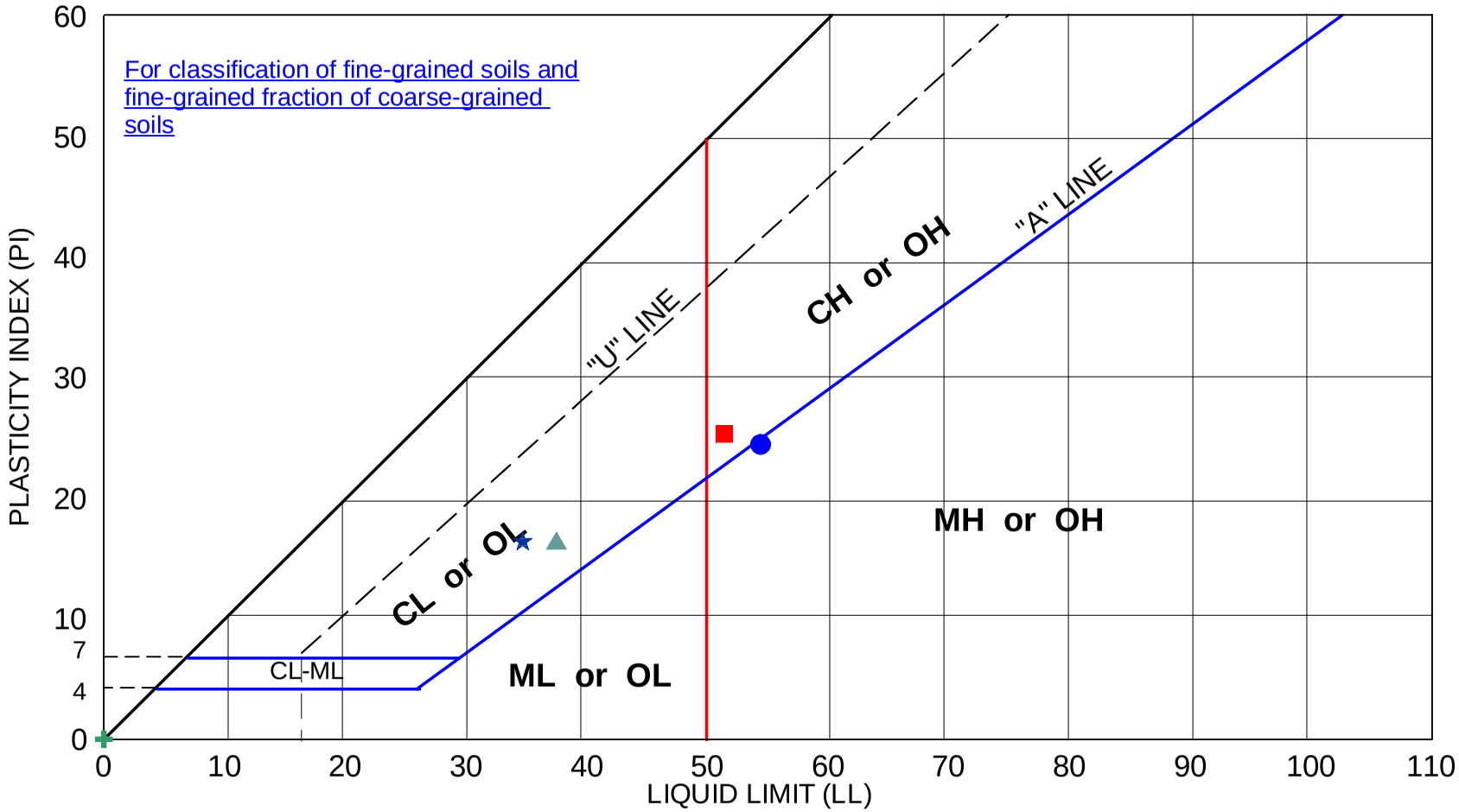
Symbol	Boring No.	Sample No.	Depth (ft.)	GR:SA:SI:CL (%)	Sample Description (USCS Symbol)
●	G-2	11	30	0:10:23:67	Dark Olive Brown SILT (MH)

PARTICLE-SIZE DISTRIBUTION CURVE
(ASTM D-422)

OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE B-1



SYMBOL	SAMPLE	DEPTH (ft.)	USCS
▲	G-1	10	CL
●	G-2	22.5	CH
■	G-2	30	CH
✚	G-3	30	NP
★	GE-1	10	CL

ATTERBERG LIMITS
(ASTM D4318)

OXFORD RETENTION BASIN MULTIUSE PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE B-2

URS

EXPANSION INDEX OF SOILS

ASTM D4829-07

Project Name :	OXFORD RETENTION BASIN	Tested By :	ADC	Date:	10/10/11
Project No. :	29405347	Data Input By:	VO	Date:	10/13/11
Source:	OXFORD RETENTION BASIN	Checked By:		Date:	
Sample No. :	BK-1	Depth (ft.) :	0-5		

Visual Sample Description: Olive Brown Lean CLAY with Sand, Fine Sand Few Gravel

MOLDED SPECIMEN	BEFORE TEST		AFTER TEST
	Conventional Oven	Microwave Oven	Conventional Oven
Specimen Diameter (in.)	4.01		4.01
Specimen Height (in.)	1.0000		
Wt. Comp. Soil + Mold (gm.)	588.18		
Wt. of Mold (gm.)	207.01		
Specific Gravity	2.70		
Container No.	A96	M1	A60
Wet Wt. of Soil + Cont. (gm.)	319.11	211.55	299.49
Dry Wt. of Soil + Cont. (gm.)	290.20	197.61	251.30
Wt. of Container (gm.)	49.71	80.49	50.81
Moisture Content (%)	12.0%	11.9%	24.0%
Wet Density (pcf)	114.9		
Dry Density (pcf)	102.5		
Void Ratio			
Total Porosity			
Pore Volume (cc)			
Degree of Saturation (%) [S meas] **[50% ± 2%]**	**50%**		

SPECIMEN INUNDATION in distilled water for period of 24 h or expansion rate < 0.0002 in./h.

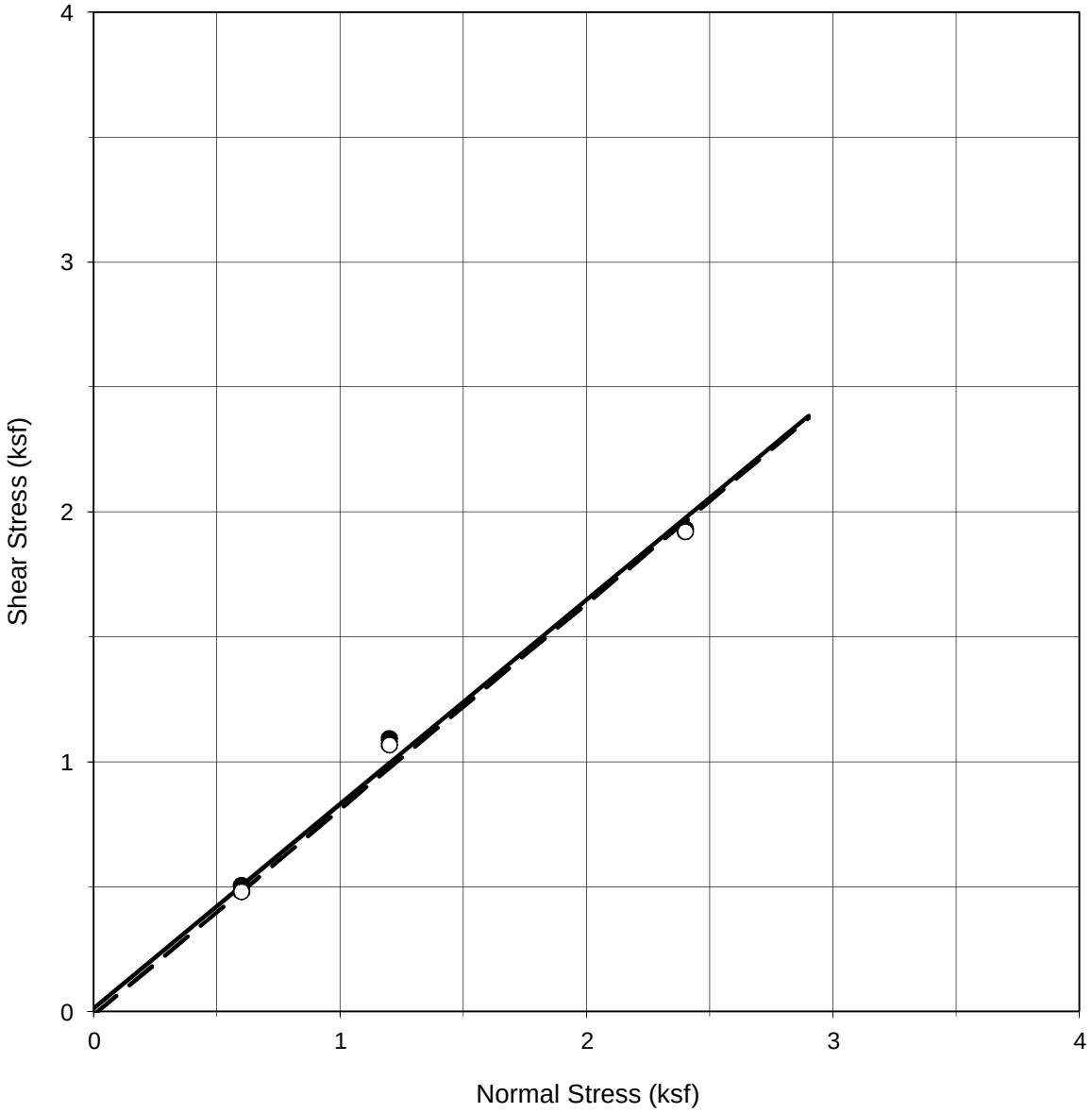
DATE	TIME	PRESSURE (PSI)	ELAPSED TIME	DIAL READING
10/10/11	15:32	1.0	0	-----
			10	-----
	15:43		10	0.1416
ADD DISTILLED WATER TO THE SPECIMEN				
10/10/11	15:47			0.1485
	16:25			0.1904
10/12/11	10:47			0.2056

Expansion Index [EI meas]= $\frac{\text{(Final Rdg-Initial Rdg) x 1000}}{\text{Initial Thickness}}$ **64.0**

CLASSIFICATION OF A POTENTIALLY EXPANSIVE SOIL

Expansion Index, EI	Potential Index
0-20	Very Low
21-51	Low
51-90	Medium
91-130	High
> 130	Very High

FIGURE B-3



BORING NO.	SAMPLE NO.	DEPTH (ft)	STRAIN RATE (in/min)	NORMAL STRESS (ksf)	PEAK STRESS (ksf)	ULTIMATE STRESS (ksf)
G-1	3	10	0.002	0.600	0.504	0.480
				1.200	1.092	1.068
				2.400	1.932	1.920

Sample Description: Very Dark Greenish Gray CLAY (CL) Sample Type: Undisturbed

Test Condition: Saturated Initial Dry Density: 105 pcf

Moisture Content: (before) 23% (after) 18 %

INTERPRETED STRENGTH DATA	PEAK	ULTIMATE
COHESION (psf)	0	0
FRICTION ANGLE (deg)	39 °	39 °

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED

ASTM D 3080

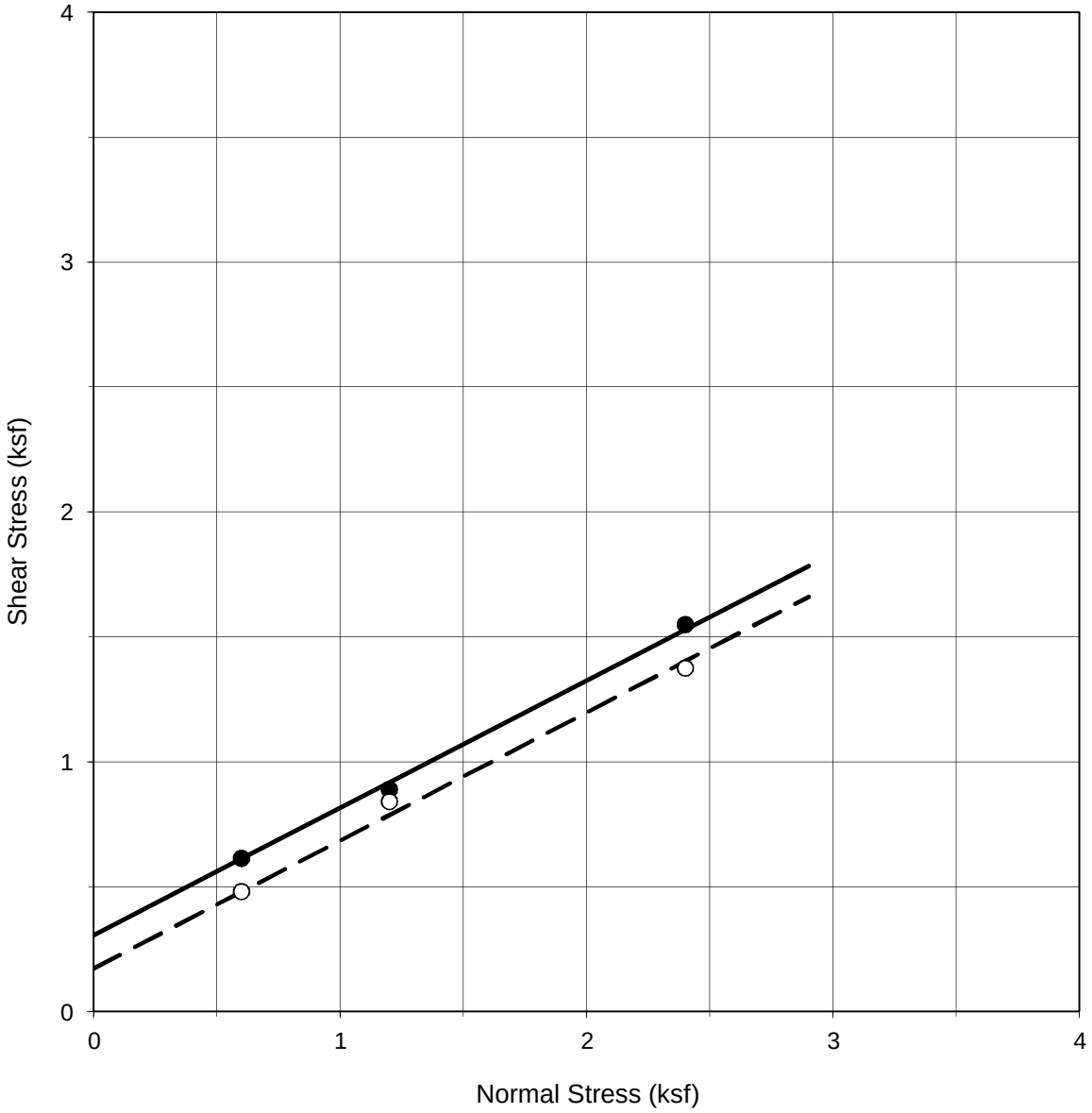
OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT

MARINA DEL REY, CALIFORNIA

FOR: LACDPW

URS

FIGURE B-4



BORING NO.	SAMPLE NO.	DEPTH (ft)	STRAIN RATE (in/min)	NORMAL STRESS (ksf)	PEAK STRESS (ksf)	ULTIMATE STRESS (ksf)
G-2	3	10	0.002	0.600	0.612	0.480
				1.200	0.888	0.840
				2.400	1.548	1.375

Sample Description: Dark Greenish Gray Sandy CLAY (CL) Sample Type: Undisturbed

Test Condition: Saturated Initial Dry Density: 105 pcf

Moisture Content: (before) 23% (after) 25 %

INTERPRETED STRENGTH DATA	PEAK	ULTIMATE
COHESION (psf)	300	150
FRICTION ANGLE (deg)	27 °	27 °

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED

ASTM D 3080

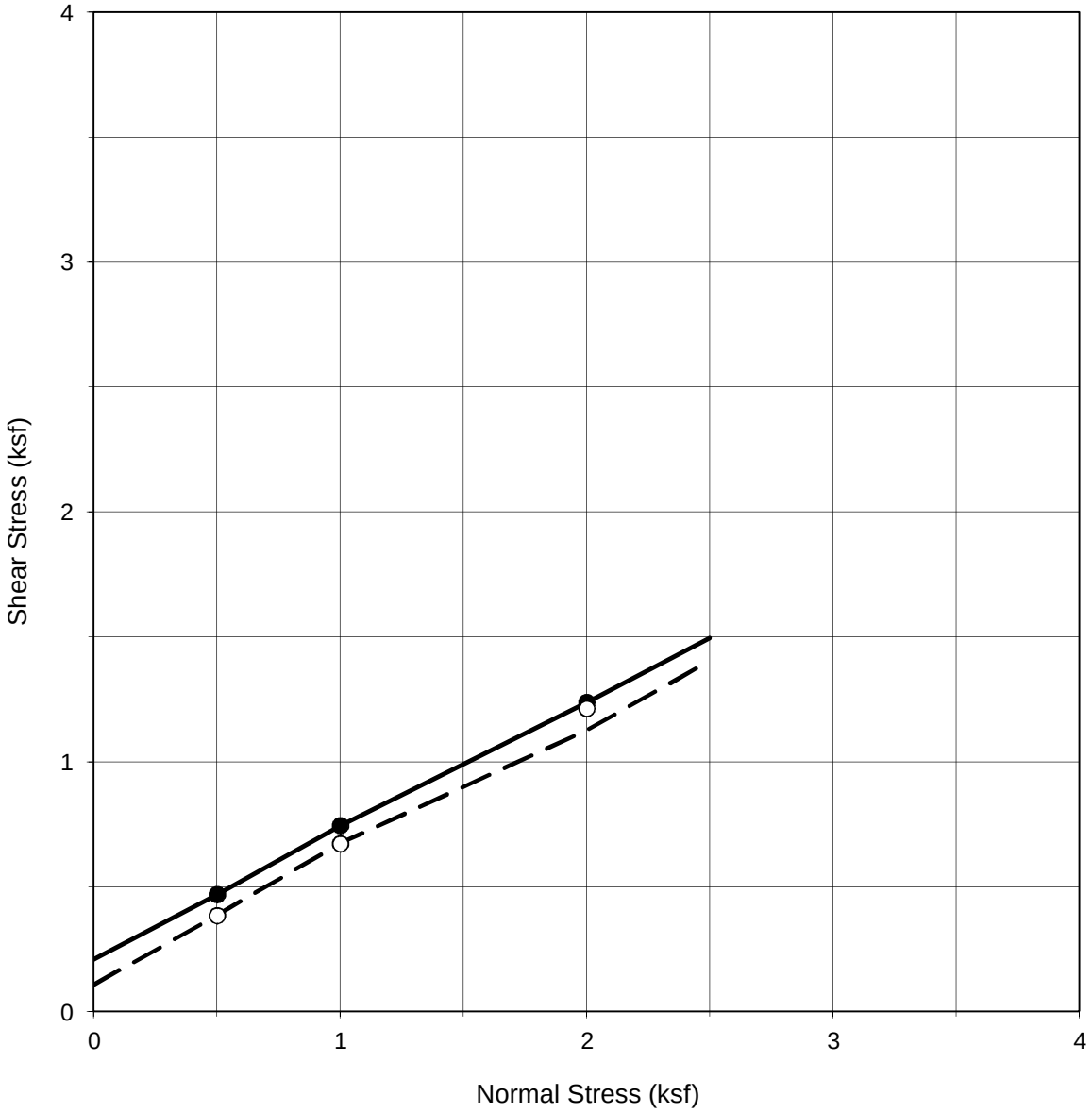
OXFORD RETENTION BASIN MULTIUSE ENHANCEMENT PROJECT

MARINA DEL REY, CALIFORNIA

FOR: LAC DPW

URS

FIGURE B-5



BORING NO.	SAMPLE NO.	DEPTH (ft)	STRAIN RATE (in/min)	NORMAL STRESS (ksf)	PEAK STRESS (ksf)	ULTIMATE STRESS (ksf)
G-4	2	7.5	0.002	0.500	0.468	0.384
				1.000	0.744	0.672
				2.000	1.236	1.125

Sample Description: Very Dark Greenish Gray Fat CLAY (CH) Sample Type: Undisturbed

Test Condition: Saturated Initial Dry Density: 72 pcf

Moisture Content: (before) 50% (after) 48 %

INTERPRETED STRENGTH DATA	PEAK	ULTIMATE
COHESION (psf)	200	100
FRICTION ANGLE (deg)	27 °	29 °

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED

ASTM D 3080

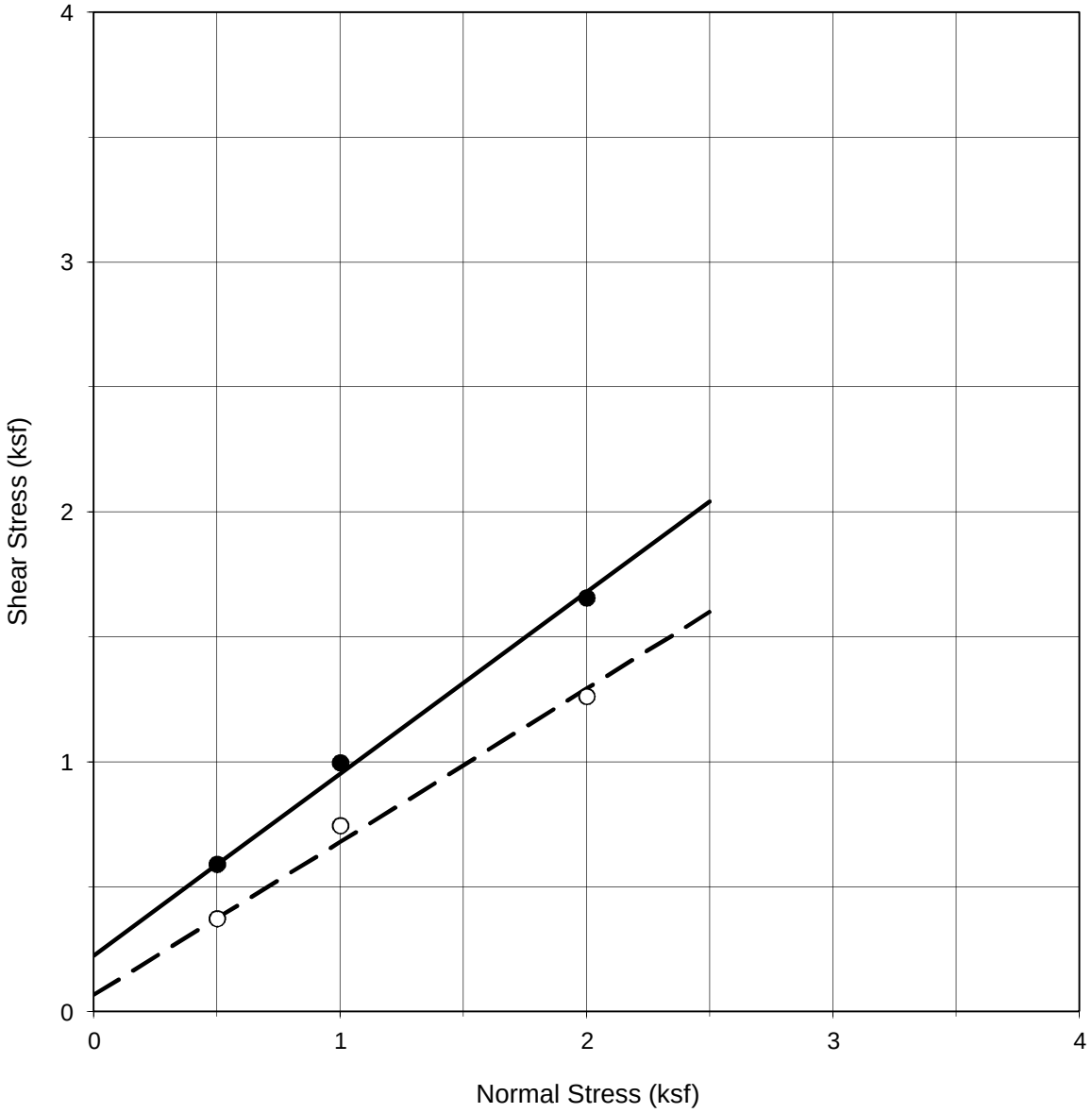
OXFORD RETENTION BASIN MULTIUSE PROJECT

MARINA DEL REY, CALIFORNIA

FOR: LACDPW

URS

FIGURE B-6



BORING NO.	SAMPLE NO.	DEPTH (ft)	STRAIN RATE (in/min)	NORMAL STRESS (ksf)	PEAK STRESS (ksf)	ULTIMATE STRESS (ksf)
GE-5	2	5	0.005	0.500	0.588	0.372
				1.000	0.996	0.744
				2.000	1.656	1.260

Sample Description: Olive Brown SAND with SILT (SP-SM) Sample Type: Undisturbed

Test Condition: Saturated Initial Dry Density: 116 pcf

Moisture Content: (before) 9% (after) 19 %

INTERPRETED STRENGTH DATA	PEAK	ULTIMATE
COHESION (psf)	200	50
FRICTION ANGLE (deg)	36 °	32 °

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED

ASTM D 3080

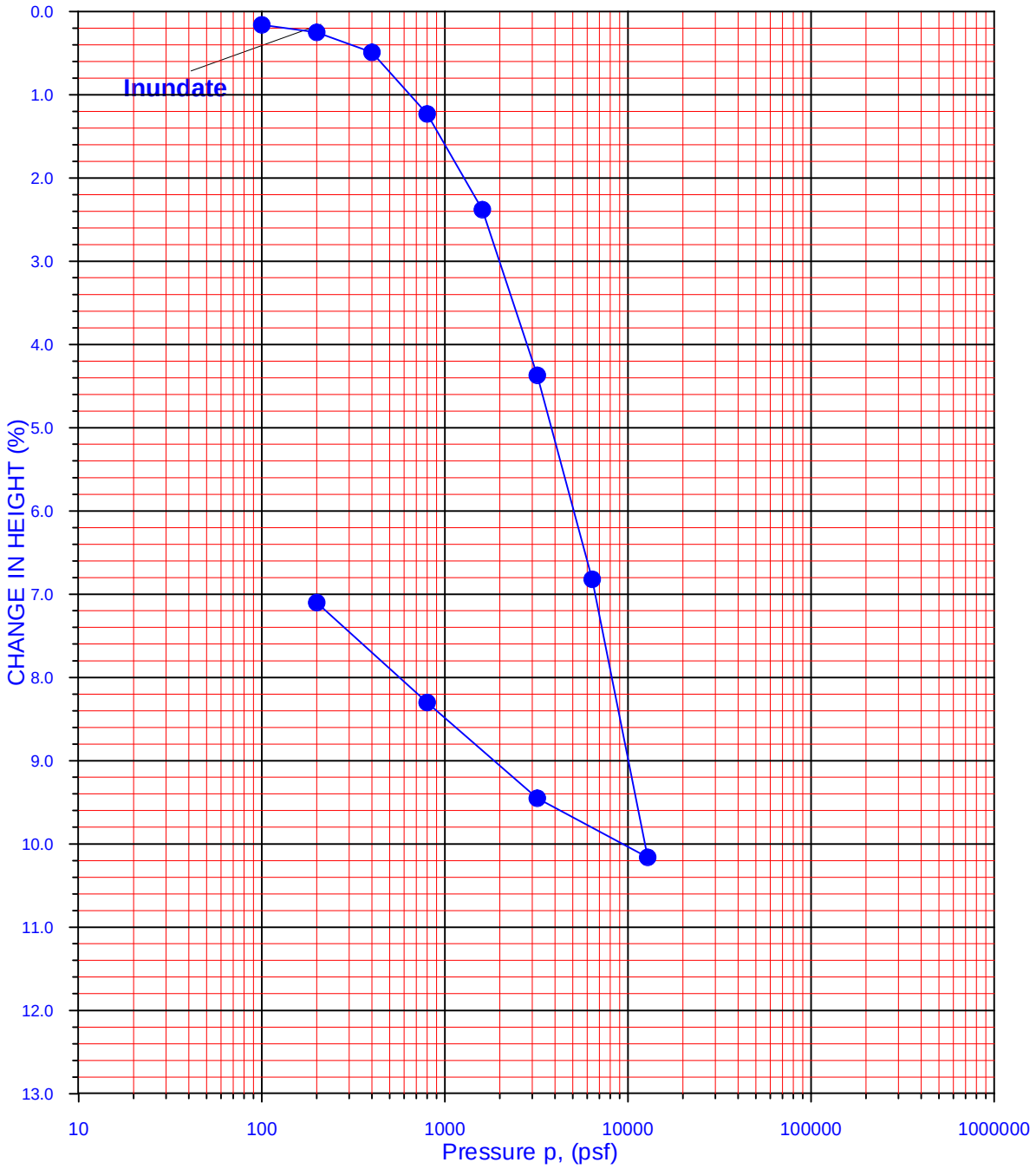
OXFORD RETENTION BASIN MULTIUSE PROJECT

MARINA DEL REY, CALIFORNIA

FOR: LACDPW

URS

FIGURE B-7



BORING NO.	SAMPLE NO.	DEPTH (ft.)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	DEGREE OF SATURATION (%) Initial / Final
G-1	3	10	22 / 25	103 / 110	95 / 100

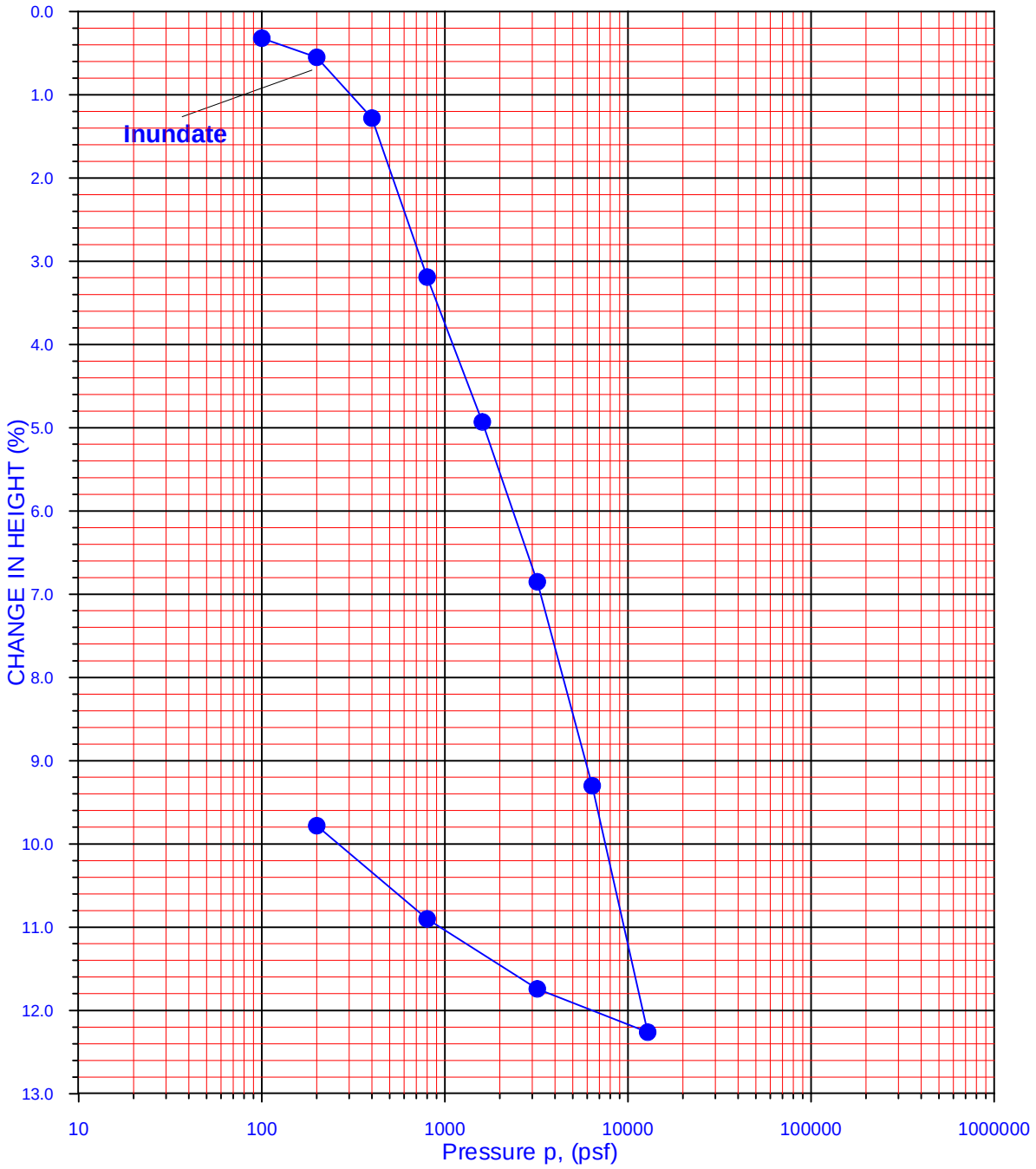
Sample Description: Very Dark Greenish Gray CLAY (CL)

ONE-DIMENSIONAL CONSOLIDATION
(ASTM D2435)

OXFORD RETENTION BASIN, MULTIUSE ENHANCEMENT PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE B-8



BORING NO.	SAMPLE NO.	DEPTH (ft.)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	DEGREE OF SATURATION (%) Initial / Final
GE-1	3	10	9 / 25	102 / 101	36 / 100

Sample Description: Dark Greenish Gray CLAY with Sand (CL)

ONE-DIMENSIONAL CONSOLIDATION
(ASTM D2435)

OXFORD RETENTION BASIN MULTIUSE PROJECT
MARINA DEL REY, CALIFORNIA
FOR: LACDPW

URS

FIGURE B-9

URS

TABLE B-1 CORROSIVITY TEST

Resistivity Test and PH: Califiornia Test Methods 532 and 643

Sulfate Content: California Test Method 417

Chloride Content: California Test Method 422

Project Name : Oxford Retention Basin Multiuse Enhancement Project

Location : Marina Del Rey, Los Angeles,

Project No. 29405347

Tested By : ADC/VO

Date: 10/12/2011

Data Input By: VO

Sample Description:

Boring No.	Sample No.	Depth	Resistivity	pH	Sulfate Content	Chloride Content
		(ft.)	(ohm-cm)		(ppm)	(ppm)
G-1	BK-1	0-5	930	6.30	7.43	45
GE-1	BK-1	0-5	1,700	6.40	0.38	45

APPENDIX C

APPENDIX C

LIQUEFACTION ANALYSIS

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	11/17/2011
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
G1	5	13	SM	25.0	9.3	8	MC	YES	6		500	0.60	0.60	1.70	Above Design	Ground Water Table		2.5		0.0
	7.5	6	CL	73.0	9.3	8	SPT	NO	6	NO	500	0.90	0.90	1.49	0	non-liquefiable		2.5		0.0
	10	6	CL	90.0	9.3	8	MC	YES	6	NO	500	1.20	1.16	1.32	0	non-liquefiable		2.5		0.0
	12.5	8	SC	30.0	9.3	8	SPT	NO	6		500	1.50	1.30	1.24	100	0.64	1.9	2.5	0.57	0.6
	15	22	SM	8.0	9.3	8	MC	YES	6		500	1.80	1.44	1.18	0	>1.3		2.5		0.6
	17.5	23	SP-SM	12.0	9.3	8	SPT	NO	6		500	2.10	1.59	1.12	0	>1.3		2.5		0.6
	20	33	SP-SM	12.0	9.3	8	MC	YES	6		500	2.40	1.73	1.07	0	>1.3		2.5		0.6
	22.5	36	SP	1.0	9.3	8	SPT	NO	6		500	2.70	1.88	1.03	0	>1.3		2.5		0.6
	25	34	SP	1.0	9.3	8	MC	YES	6		500	3.00	2.02	0.99	0	>1.3		2.5		0.6
	27.5	52	SP	1.0	9.3	8	SPT	NO	6		500	3.30	2.16	0.96	0	>1.3		2.5		0.6
	30	31	SP	1.0	9.3	8	MC	YES	6		500	3.60	2.31	0.93	0	>1.3		2.5		0.6
	32.5	34	SP	1.0	9.3	8	SPT	NO	6		500	3.90	2.45	0.90	0	>1.3		2.5		0.6
	35	32	SP	1.0	9.3	8	MC	YES	6		500	4.20	2.60	0.88	0	>1.3		2.5		0.6
	37.5	47	CL	90.0	9.3	8	SPT	NO	6	NO	500	4.50	2.74	0.85	0	non-liquefiable		2.5		0.6
	40	21	SP	1.0	9.3	8	MC	YES	6		500	4.80	2.88	0.83	24	1.02	0.1	2.5	0.03	0.6
	42.5	54	SP	1.0	9.3	8	SPT	NO	6		500	5.10	3.03	0.81	0	>1.3		2.5		0.6
	45	32	SM	8.0	9.3	8	MC	YES	6		500	5.40	3.17	0.79	0	>1.3		5		0.6
	50	59	SP	1.0	9.3	8	SPT	NO	6		500	6.00	3.46	0.76	0	>1.3		5		0.6

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
G2	5	11	SM	25.0	9.7	8	MC	YES	6		500	0.60	0.60	1.70	Above Design	Ground Water Table		2.5		0.0
	7.5	4	CL	73.0	9.7	8	SPT	NO	6	NO	500	0.90	0.90	1.49	0	non-liquefiable		2.5		0.0
	10	6	CL	73.0	9.7	8	MC	YES	6	NO	500	1.20	1.18	1.30	0	non-liquefiable		2.5		0.0
	12.5	11	CL	90.0	9.7	8	SPT	NO	6	NO	500	1.50	1.33	1.23	0	non-liquefiable		2.5		0.0
	15	25	SP	12.0	9.7	8	MC	YES	6		500	1.80	1.47	1.17	0	>1.3		2.5		0.0
	17.5	30	SP	12.0	9.7	8	SPT	NO	6		500	2.10	1.61	1.11	0	>1.3		2.5		0.0
	20	32	SP	12.0	9.7	8	MC	YES	6		500	2.40	1.76	1.07	0	>1.3		2.5		0.0
	22.5	22	CH	90.0	9.7	8	SPT	NO	6	NO	500	2.70	1.90	1.03	0	non-liquefiable		2.5		0.0
	25	19	CH	90.0	9.7	8	MC	YES	6	NO	500	3.00	2.05	0.99	0	non-liquefiable		2.5		0.0
	27.5	42	CH	90.0	9.7	8	SPT	NO	6	NO	500	3.30	2.19	0.96	0	non-liquefiable		2.5		0.0
	30	11	ML	90.0	9.7	8	MC	YES	6	NO	500	3.60	2.33	0.93	0	non-liquefiable		2.5		0.0
	32.5	36	ML	43.0	9.7	8	SPT	NO	6	NO	500	3.90	2.48	0.90	0	non-liquefiable		2.5		0.0
	35	41	SM	8.0	9.7	8	MC	YES	6		500	4.20	2.62	0.87	0	>1.3		2.5		0.0
	37.5	54	SP	1.0	9.7	8	SPT	NO	6		500	4.50	2.77	0.85	0	>1.3		2.5		0.0
	40	50	SP	1.0	9.7	8	MC	YES	6		500	4.80	2.91	0.83	0	>1.3		2.5		0.0
	42.5	71	SP	1.0	9.7	8	SPT	NO	6		500	5.10	3.05	0.81	0	>1.3		2.5		0.0
	45	50	SP	1.0	9.7	8	MC	YES	6		500	5.40	3.20	0.79	0	>1.3		2.5		0.0
	47.5	50	SP	1.0	9.7	8	SPT	NO	6		500	5.70	3.34	0.77	0	>1.3		2.5		0.0
	50	50	SP	1.0	9.7	8	MC	YES	6		500	6.00	3.49	0.76	0	>1.3		2.5		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
G3	2.5	19	SM	25.0	0	8	SPT	YES	0		500	0.30	0.29	1.70	0	>1.3		2.5		0.0
	5	28	SP	12.0	0	8	MC	NO	0		500	0.60	0.43	1.70	0	>1.3		2.5		0.0
	7.5	37	SP	12.0	0	8	SPT	YES	0		500	0.90	0.58	1.70	0	>1.3		2.5		0.0
	10	50	GP	0.0	0	8	MC	NO	0		500	1.20	0.72	1.67	0	>1.3		2.5		0.0
	12.5	25	SM	25.0	0	8	SPT	YES	0		500	1.50	0.86	1.52	0	>1.3		2.5		0.0
	15	25	ML	43.0	0	8	MC	NO	0	NO	500	1.80	1.01	1.41	0	non-liquefiable		2.5		0.0
	17.5	31	ML	43.0	0	8	SPT	YES	0	NO	500	2.10	1.15	1.32	0	non-liquefiable		2.5		0.0
	20	30	SP	12.0	0	8	MC	NO	0		500	2.40	1.30	1.24	0	>1.3		2.5		0.0
	22.5	31	ML	43.0	0	8	SPT	YES	0	NO	500	2.70	1.44	1.18	0	non-liquefiable		2.5		0.0
	25	50	SM	25.0	0	8	MC	NO	0		500	3.00	1.58	1.12	0	>1.3		2.5		0.0
	27.5	37	SP	12.0	0	8	SPT	YES	0		500	3.30	1.73	1.08	0	>1.3		2.5		0.0
	30	13	SP	12.0	0	8	MC	NO	0	NO	500	3.60	1.87	1.03	0	non-liquefiable		2.5		0.0
	32.5	73	ML	43.0	0	8	SPT	YES	0	NO	500	3.90	2.02	1.00	0	non-liquefiable		2.5		0.0
	35	25	SP	1.0	0	8	MC	NO	0		500	4.20	2.16	0.96	0	>1.3		2.5		0.0
	37.5	97	SP	1.0	0	8	SPT	YES	0		500	4.50	2.30	0.93	0	>1.3		2.5		0.0
	40	50	SP	1.0	0	8	MC	NO	0		500	4.80	2.45	0.90	0	>1.3		2.5		0.0
	42.5	70	SP	1.0	0	8	SPT	YES	0		500	5.10	2.59	0.88	0	>1.3		2.5		0.0
	45	32	SP	1.0	0	8	MC	NO	0		500	5.40	2.74	0.85	0	>1.3		2.5		0.0
	47.5	50	CL	90.0	0	8	SPT	YES	0	NO	500	5.70	2.88	0.83	0	non-liquefiable		2.5		0.0
	50	50	CL	90.0	0	8	MC	NO	0	NO	500	6.00	6.00	0.58	0	non-liquefiable		1		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
GE1	5	10	CL	90.0	9.5	8	MC	YES	5	NO	500	0.60	0.60	1.70	0	non-liquefiable		2.5		0.0
	7.5	4	CL	73.0	9.5	8	SPT	NO	5	NO	500	0.90	0.90	1.49	0	non-liquefiable		2.5		0.0
	10	7	CL	73.0	9.5	8	MC	YES	5	NO	500	1.20	1.17	1.31	0	non-liquefiable		2.5		0.0
	12.5	18	CL	73.0	9.5	8	SPT	NO	5	NO	500	1.50	1.31	1.23	0	non-liquefiable		2.5		0.0
	15	13	ML	43.0	9.5	8	MC	YES	5	NO	500	1.80	1.46	1.17	0	non-liquefiable		2.5		0.0
	17.5	49	SP	12.0	9.5	8	SPT	NO	5		500	2.10	1.60	1.12	0	>1.3		2.5		0.0
	20	21	ML	43.0	9.5	8	MC	YES	5	NO	500	2.40	1.74	1.07	0	non-liquefiable		2.5		0.0
	22.5	22	CL	90.0	9.5	8	SPT	NO	5	NO	500	2.70	1.89	1.03	0	non-liquefiable		2.5		0.0
	25	15	CL	90.0	9.5	8	MC	YES	5	NO	500	3.00	2.03	0.99	0	non-liquefiable		2.5		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
GE2	2.5	25	SM	25.0	0	8	MC	YES	0		500	0.30	0.14	1.70	0	>1.3		2.5		0.0
	5	31	SP	12.0	0	8	MC	YES	0		500	0.60	0.29	1.70	0	>1.3		2.5		0.0
	7.5	60	SM	25.0	0	8	SPT	NO	0		500	0.90	0.43	1.70	0	>1.3		2.5		0.0
	10	19	SP	12.0	0	8	MC	YES	0		500	1.20	0.58	1.70	0	>1.3		2.5		0.0
	12.5	14	CL	73.0	0	8	MC	YES	0	NO	500	1.50	0.72	1.67	0	non-liquefiable		2.5		0.0
	15	12	CL	73.0	0	8	SPT	NO	0	NO	500	1.80	0.86	1.52	0	non-liquefiable		2.5		0.0
	17.5	16	CL	73.0	0	8	MC	YES	0	NO	500	2.10	1.01	1.41	0	non-liquefiable		2.5		0.0
	20	25	CL	73.0	0	8	SPT	NO	0	NO	500	2.40	1.15	1.32	0	non-liquefiable		2.5		0.0
	22.5	22	ML	43.0	0	8	MC	YES	0	NO	500	2.70	1.30	1.24	0	non-liquefiable		2.5		0.0
	25	55	SM	25.0	0	8	SPT	NO	0		500	3.00	1.44	1.18	0	>1.3		2.5		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
GE3	5	18	SM	25.0	17	8	MC	YES	11		500	0.60	0.60	1.70	Above Design	Ground Water Table		2.5		0.0
	7.5	6	SM	25.0	17	8	SPT	NO	11		500	0.90	0.90	1.49	Above Design	Ground Water Table		2.5		0.0
	10	14	ML	90.0	17	8	MC	YES	11		500	1.20	1.20	1.29	Above Design	Ground Water Table		2.5		0.0
	12.5	10	ML	90.0	17	8	SPT	NO	11		500	1.50	1.50	1.15	1	>1.3		2.5		0.0
	15	10	CL	90.0	17	8	MC	YES	11	NO	500	1.80	1.80	1.05	0	non-liquefiable		2.5		0.0
	17.5	11	CL	73.0	17	8	SPT	NO	11	NO	500	2.10	2.07	0.98	0	non-liquefiable		2.5		0.0
	20	14	ML	43.0	17	8	MC	YES	11	NO	500	2.40	2.21	0.95	0	non-liquefiable		2.5		0.0
	22.5	34	SM	25.0	17	8	SPT	NO	11	NO	500	2.70	2.36	0.92	0	non-liquefiable		2.5		0.0
	25	18	SP	12.0	17	8	MC	YES	11	NO	500	3.00	2.50	0.89	0	non-liquefiable		2.5		0.0
	26.5	21	SM	12.0	17	8	MC	YES	11		500	3.18	2.59	0.88	86	0.67		1.5		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
GE4	5	13	SM	25.0	9.2	8	MC	YES	6		500	0.60	0.60	1.70	Above Design	Ground Water Table		2.5		0.0
	7.5	5	CH	90.0	9.2	8	SPT	NO	6	NO	500	0.90	0.90	1.49	0	non-liquefiable		2.5		0.0
	10	4	CL	90.0	9.2	8	MC	YES	6	NO	500	1.20	1.15	1.32	0	non-liquefiable		2.5		0.0
	12.5	5	CL	90.0	9.2	8	SPT	NO	6	NO	500	1.50	1.29	1.24	0	non-liquefiable		2.5		0.0
	15	8	ML	43.0	9.2	8	MC	YES	6	NO	500	1.80	1.44	1.18	0	non-liquefiable		2.5		0.0
	17.5	20	SP-SM	12.0	9.2	8	SPT	NO	6		500	2.10	1.58	1.12	0	>1.3		2.5		0.0
	20	18	SP-SM	12.0	9.2	8	MC	YES	6		500	2.40	1.73	1.08	3	>1.3		2.5		0.0
	22.5	29	SP-SM	12.0	9.2	8	SPT	NO	6		500	2.70	1.87	1.03	0	>1.3		2.5		0.0
	25	31	SP	12.0	9.2	8	SPT	NO	6		500	3.00	2.01	1.00	0	>1.3		1.5		0.0

URS

SHEET	1 OF 1
PROJECT	29404462
DATE	2/2/2012
COMPUTED BY	JNR
CHECKED BY	SN

PROJECT: Oxford Retention Basin - Multiuse Enhancement Project

SUBJECT: LIQUEFACTION POTENTIAL EVALUATION

Reference: Seed, et.al., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework
FAT CLAYS (CH) and ELASTIC SILTS (MH) not considered in analyses

Soil Unit Weight (pcf)	=	120
Energy Ratio (%)	=	75
Design Probability in decimals	=	0.15
Peak Ground Acceleration (g)	=	0.4
Earthquake Magnitude	=	7

BORING (No.)	DEPTH (feet)	SPT-N (bpf)	SOIL CLASSIF.	PERCENT FINES P200	DEPTH TO WATER DURING DRILLING (feet)	BOREHOLE DIAMETER (inches)	SAMPLE TYPE	LINER USED	DESIGN WATER LEVEL IN DEPTH (feet)	LIQUE-FIABLE FINE-GRAINED SOILS	AVERAGE SHEAR WAVE VELOCITY AT UPPER 40 FEET (feet/sec)	TOTAL PRESSURE (ksf)	EFFECTIVE PRESSURE (ksf)	DEPTH FACTOR Cn	PROBABILITY OF LIQUEFACTION (%)	FACTOR OF SAFETY	VOLUM. STRAIN (%)	LAYER THICKNESS (feet)	SETTLE LAYER (in)	SETTLE TOTAL (in)
GE5	2.5	7	SM	90.0	0	8	MC	YES	0		500	0.30	0.14	1.70	1	>1.3		2.5		0.0
	5	15	SP-SM	12.0	0	8	MC	YES	0		500	0.60	0.29	1.70	0	>1.3		2.5		0.0
	7.5	14	GP	0.0	0	8	MC	YES	0		500	0.90	0.43	1.70	5	>1.3		2.5		0.0
	10	7	SP	12.0	0	8	MC	YES	0		500	1.20	0.58	1.70	100	0.65	2.1	2.5	0.63	0.6
	12.5	44	SM	25.0	0	8	SPT	NO	0		500	1.50	0.72	1.67	0	>1.3		2.5		0.6
	15	50	SP	12.0	0	8	MC	YES	0		500	1.80	0.86	1.52	0	>1.3		2.5		0.6
	17.5	50	SM	25.0	0	8	SPT	NO	0		500	2.10	1.01	1.41	0	>1.3		2.5		0.6
	20	50	SM	25.0	0	8	MC	YES	0		500	2.40	1.15	1.32	0	>1.3		2.5		0.6
	22.5	41	SM	25.0	0	8	SPT	NO	0		500	2.70	1.30	1.24	0	>1.3		2.5		0.6
	25	50	SP	12.0	0	9	MC	YES	0		500	3.00	1.44	1.18	0	>1.3		1		0.6

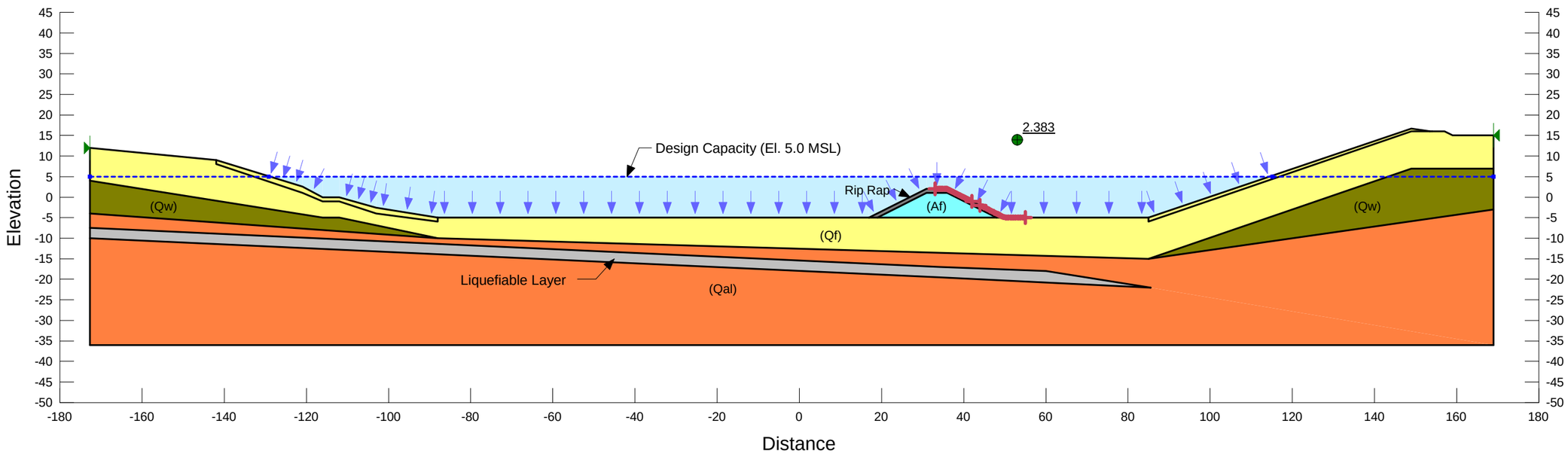
APPENDIX D

APPENDIX D

SLOPE STABILITY ANALYSIS

Cross Section at STA 7+00

Name: 1a - Berm Static
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

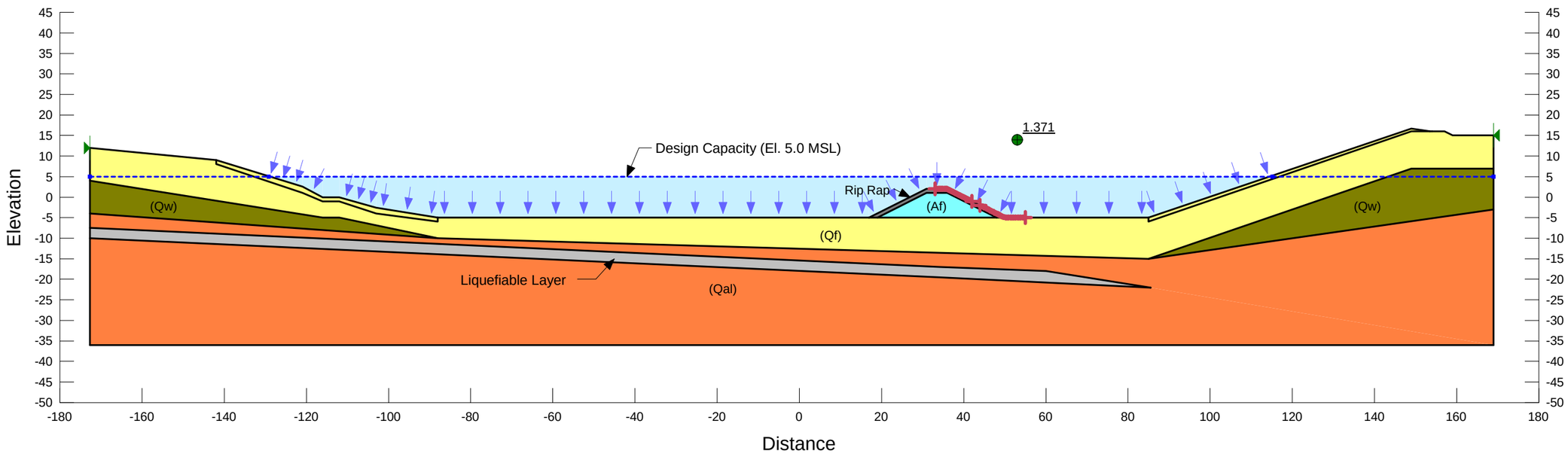
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 1b - Pseudo-Static
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

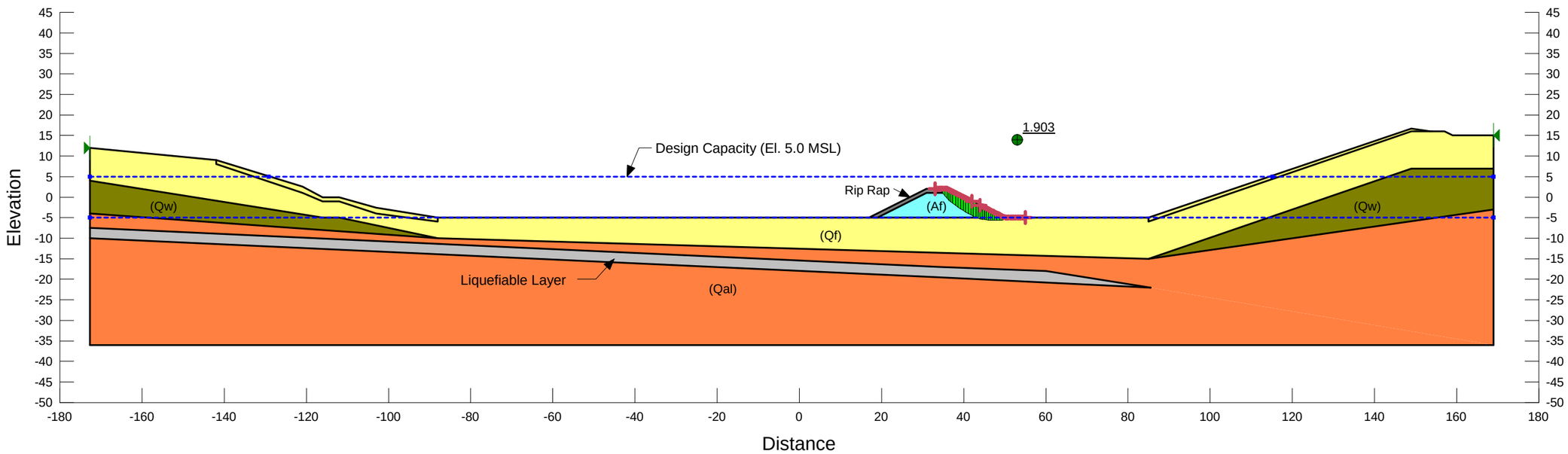
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 1c - Rapid Drawdown
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

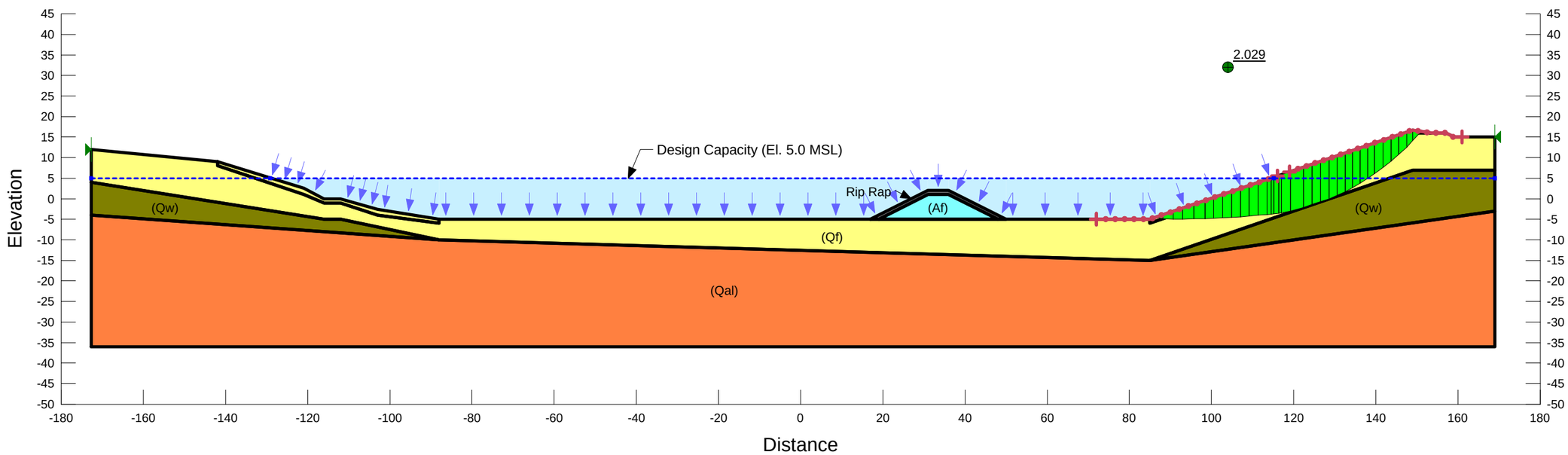
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 2a - East Slope Static
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

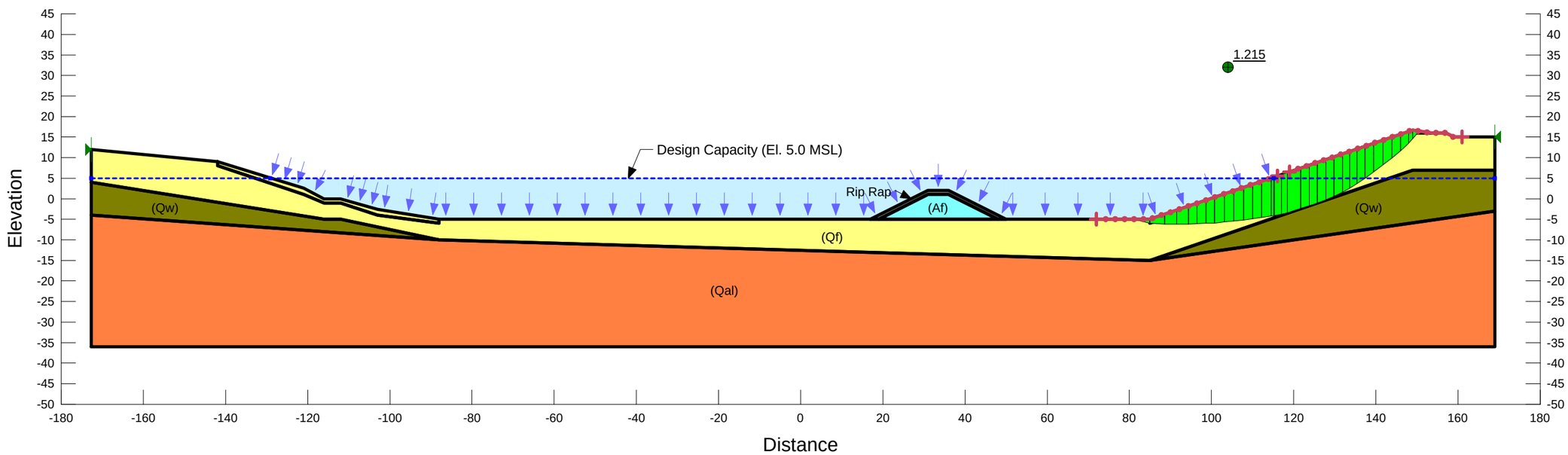
Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Cross Section at STA 7+00

Name: 2b - East Slope Pseudo-Static
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

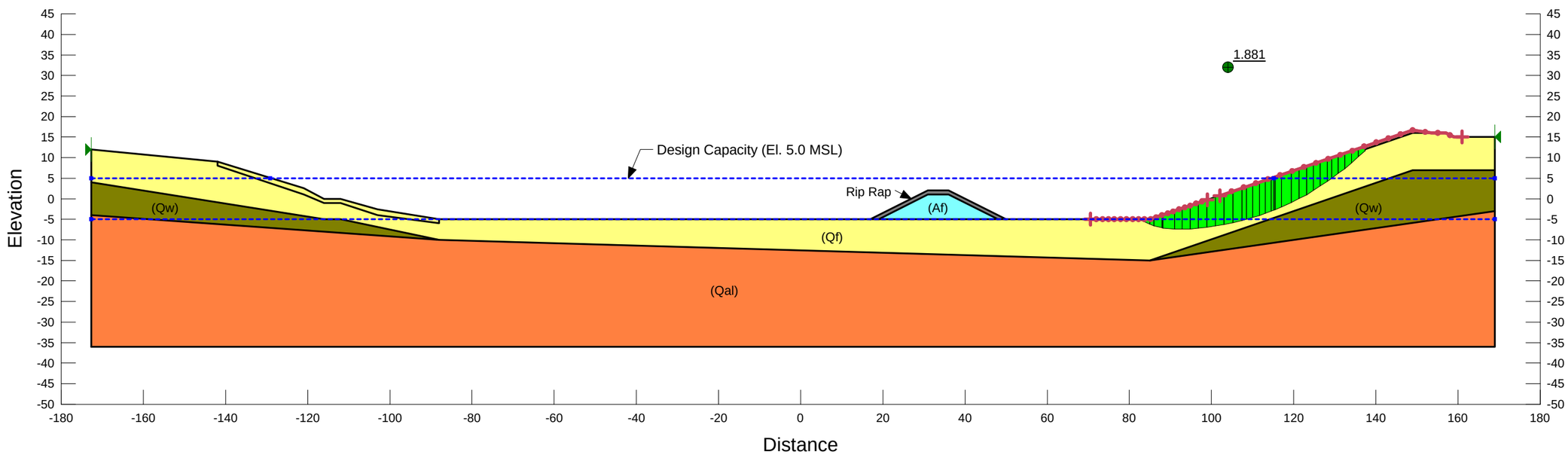
Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Cross Section at STA 7+00

Name: 2c - East Slope Rapid Drawdown
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

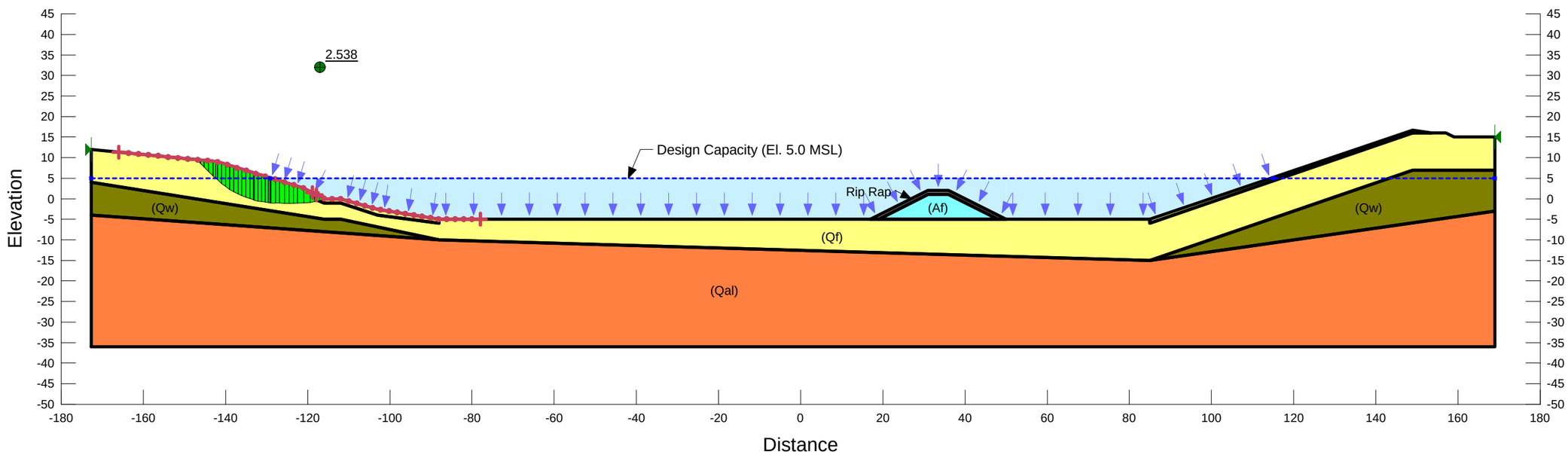
Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Cross Section at STA 7+00

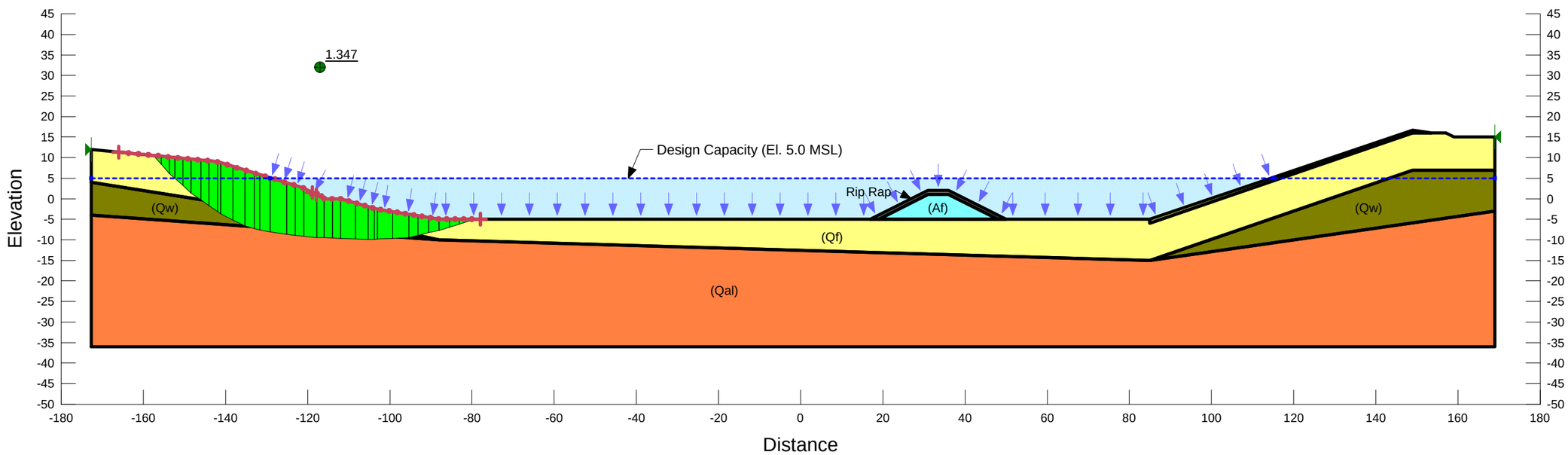
Name: 3a - West Slope Static
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)	Name: (Qf)	Name: (Qw)	Name: (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

Name: 3b - West Slope Pseudo-Static
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

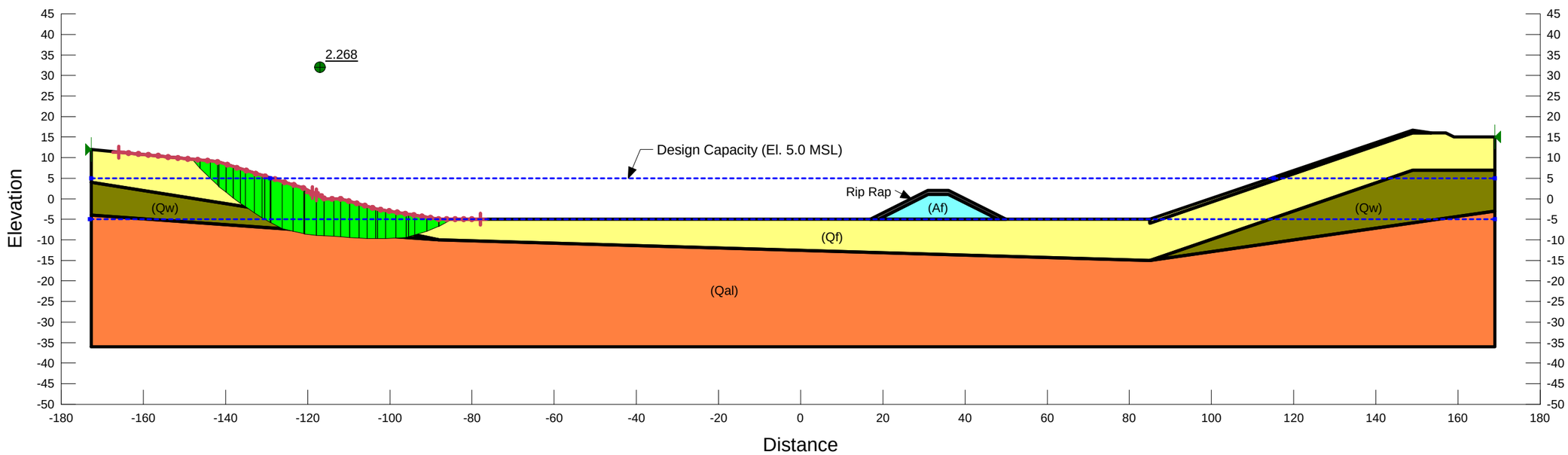
Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Cross Section at STA 7+00

Name: 3c - West Slope Rapid Drawdown
File Name: Cross Section at STA 7+00 design.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

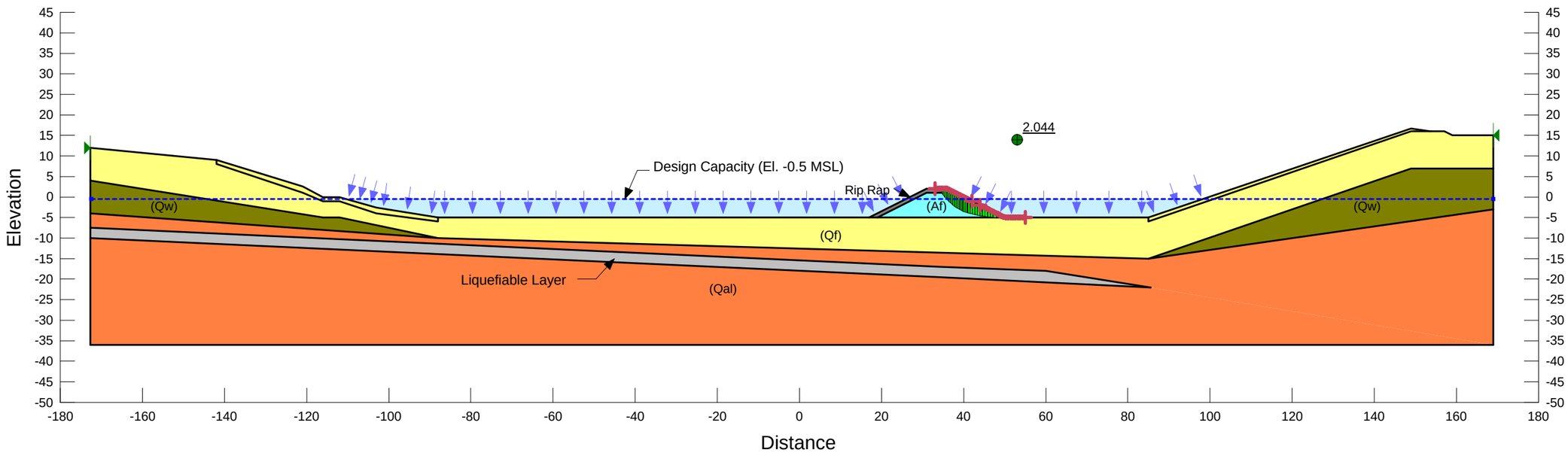
Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Cross Section at STA 7+00

Name: 1a - Berm Static
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

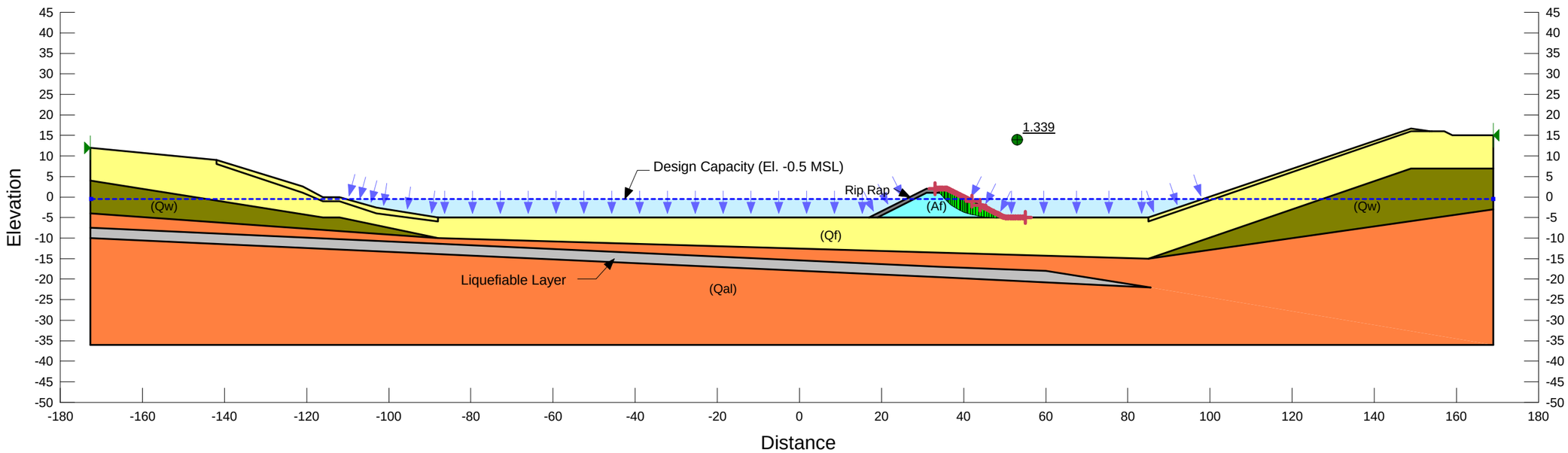
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 1b - Pseudo-Static
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

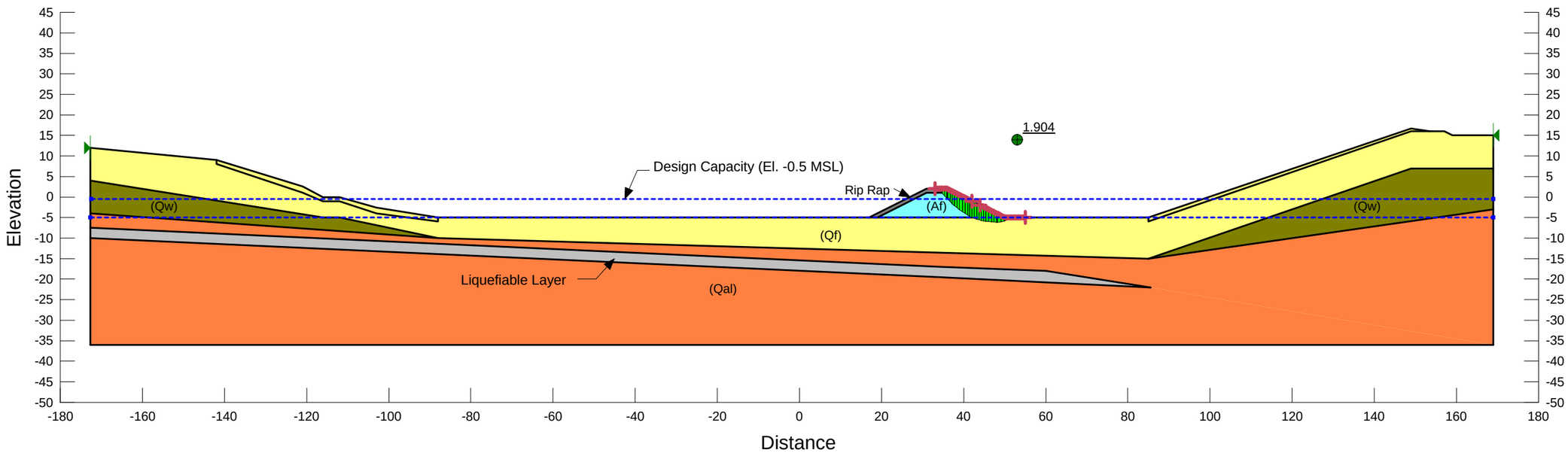
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 1c - Rapid Drawdown
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

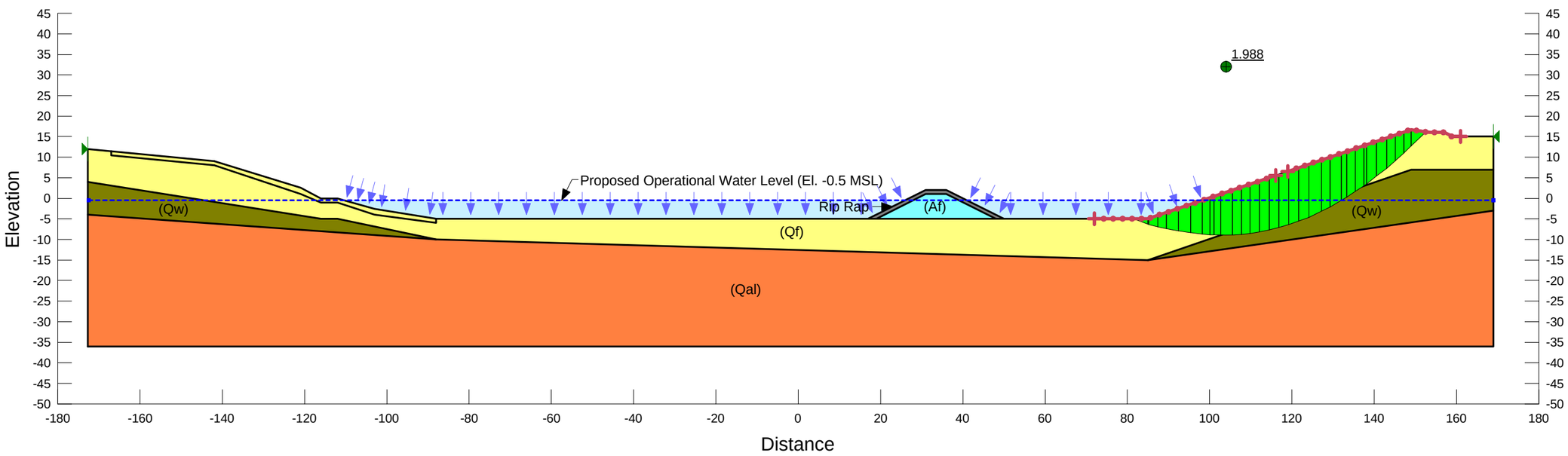
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

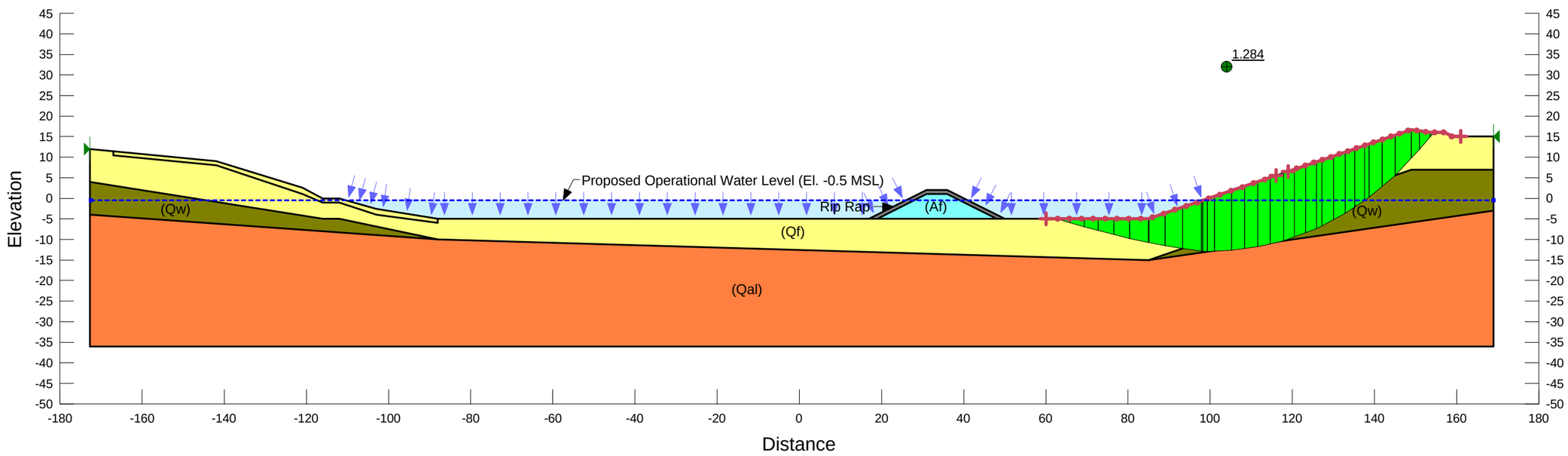
Name: 2a - East Slope Static
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

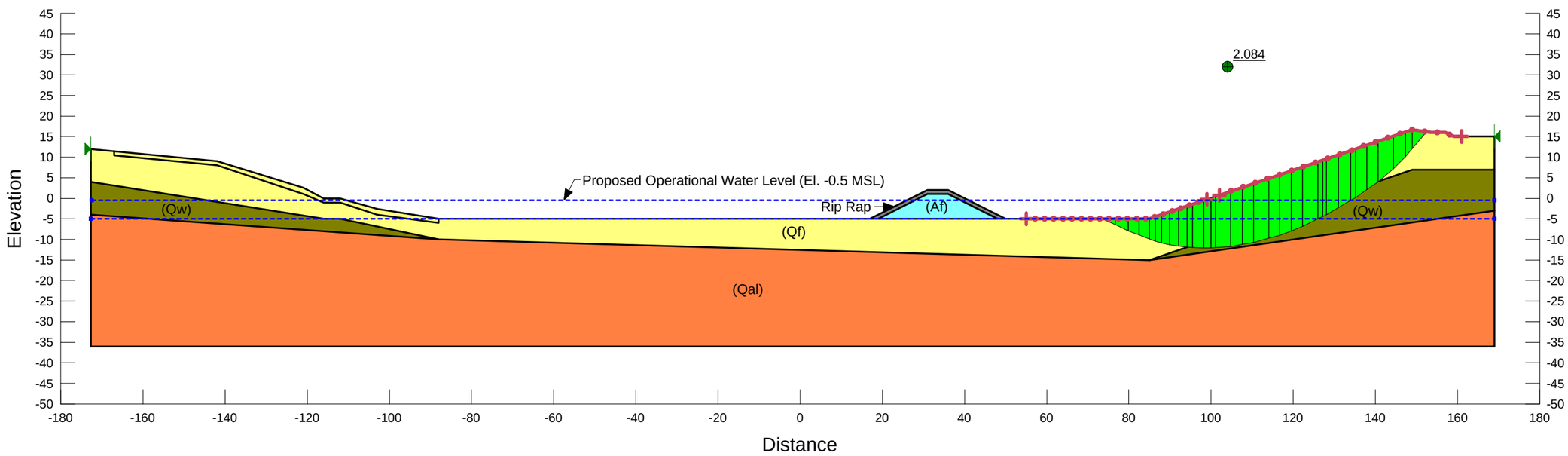
Name: 2b - East Slope Pseudo-Static
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

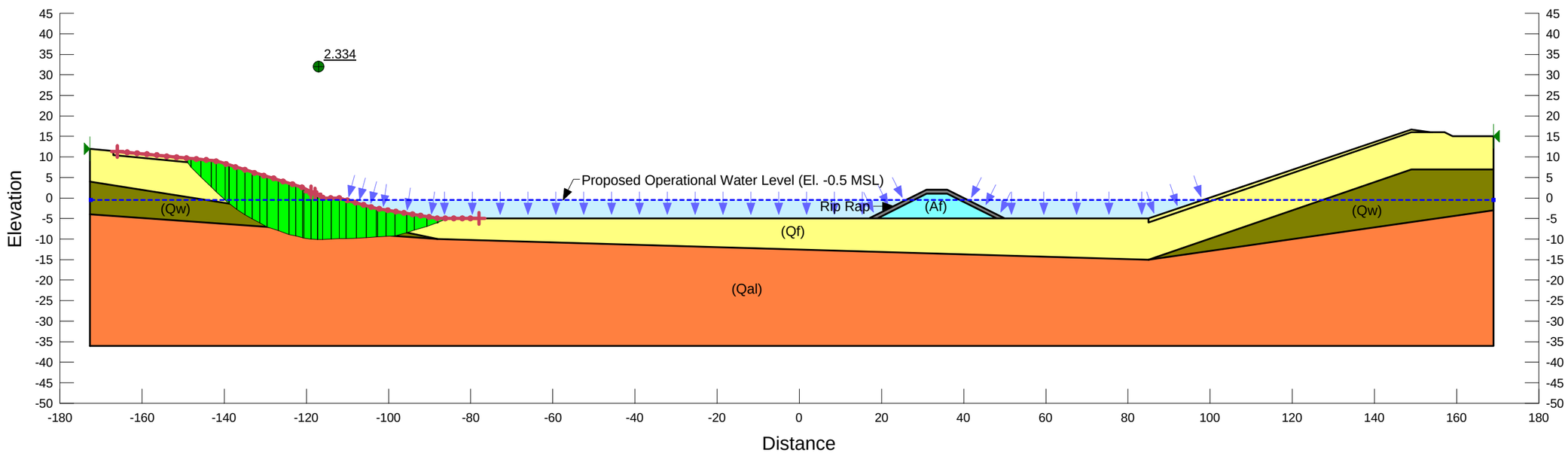
Name: 2c - East Slope Rapid Drawdown
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

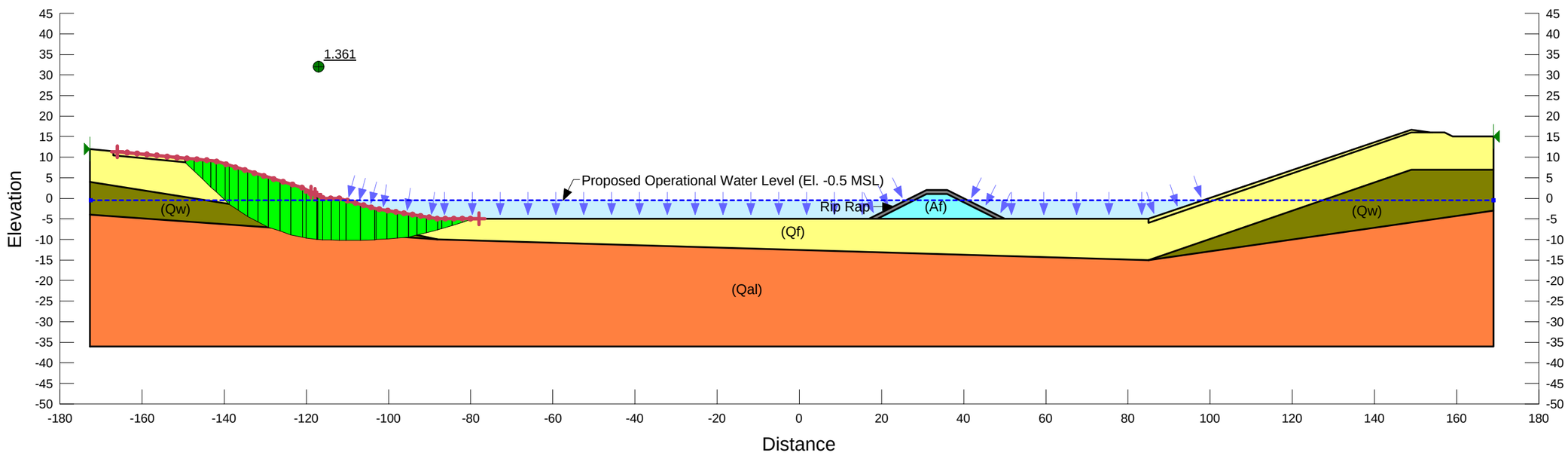
Name: 3a - West Slope Static
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

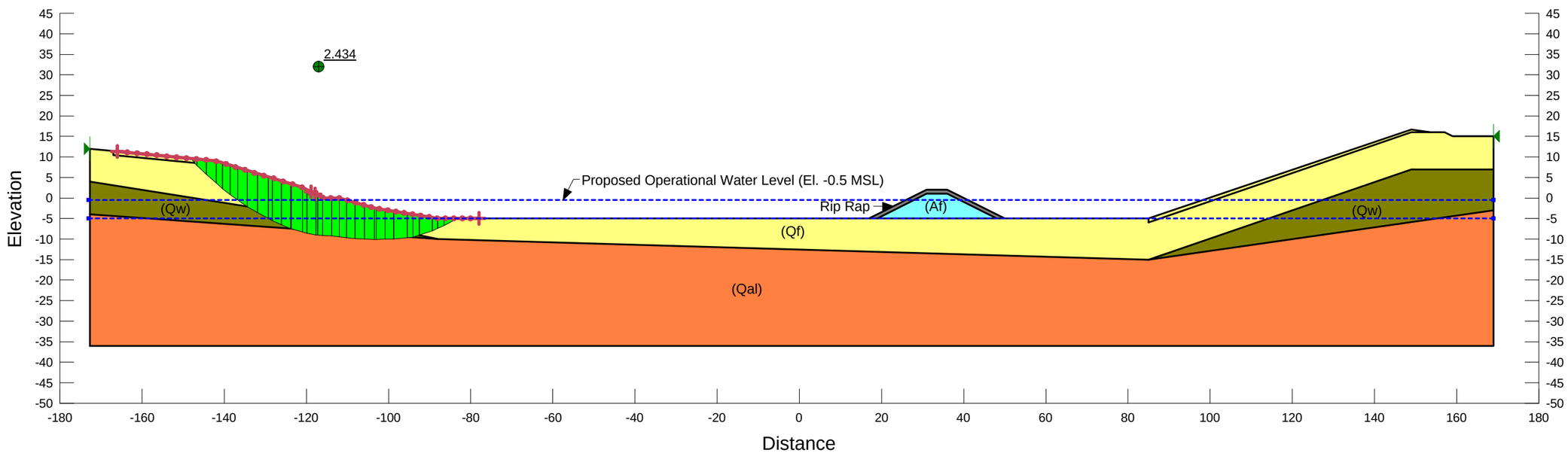
Name: 3b - West Slope Pseudo-Static
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

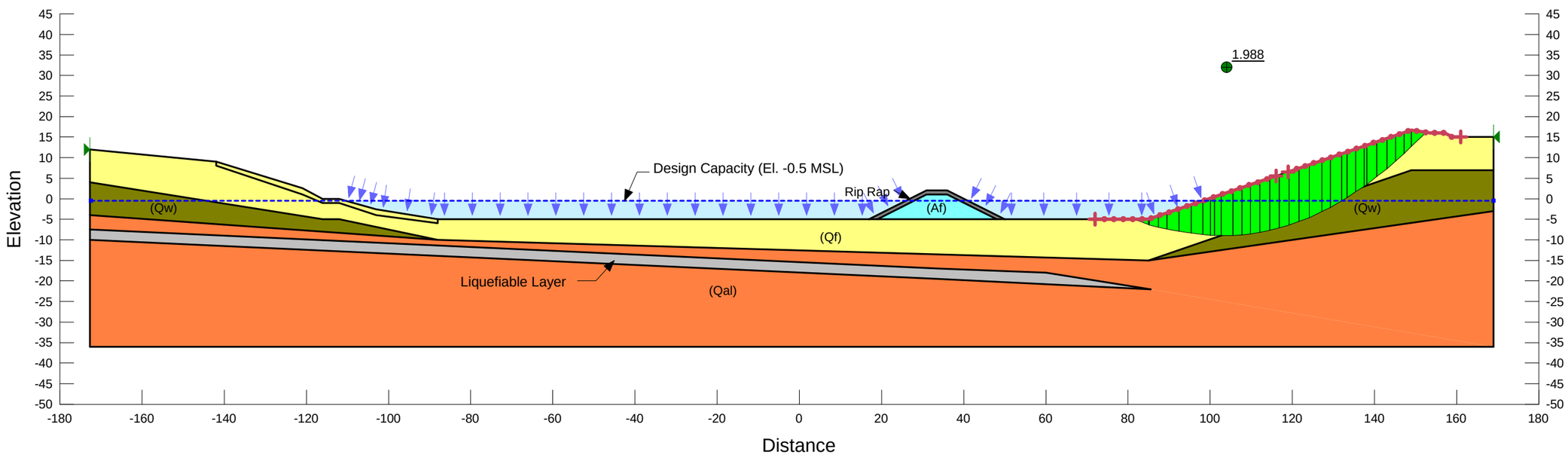
Name: 3c - West Slope Rapid Drawdown
File Name: Cross Section at STA 7+00 operational.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: Engineered Fill (Af)	Name: Fill (Qf)	Name: Wetland Deposit (Qw)	Name: Alluvium (Qal)	Name: Rip Rap
Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 120 pcf	Unit Weight: 130 pcf	Unit Weight: 150 pcf
Cohesion: 200 psf	Cohesion: 50 psf	Cohesion: 150 psf	Cohesion: 0 psf	Cohesion: 0 psf
Phi: 30 °	Phi: 32 °	Phi: 27 °	Phi: 32 °	Phi: 50 °

Cross Section at STA 7+00

Name: 2a - East Slope Static
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

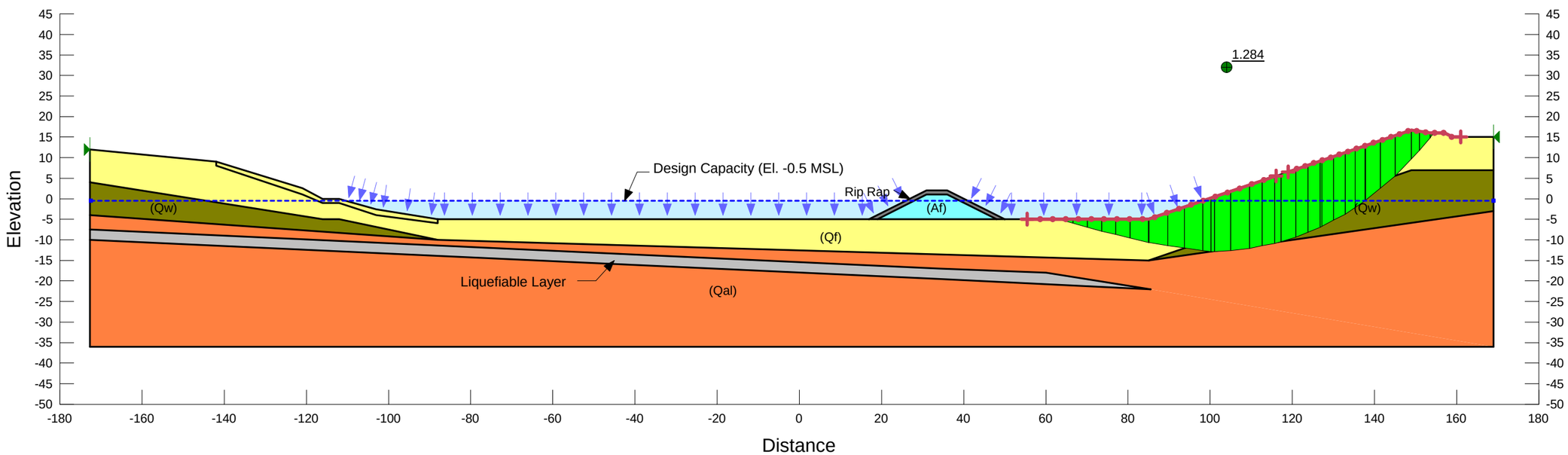
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 2b - East Slope Pseudo-Static
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

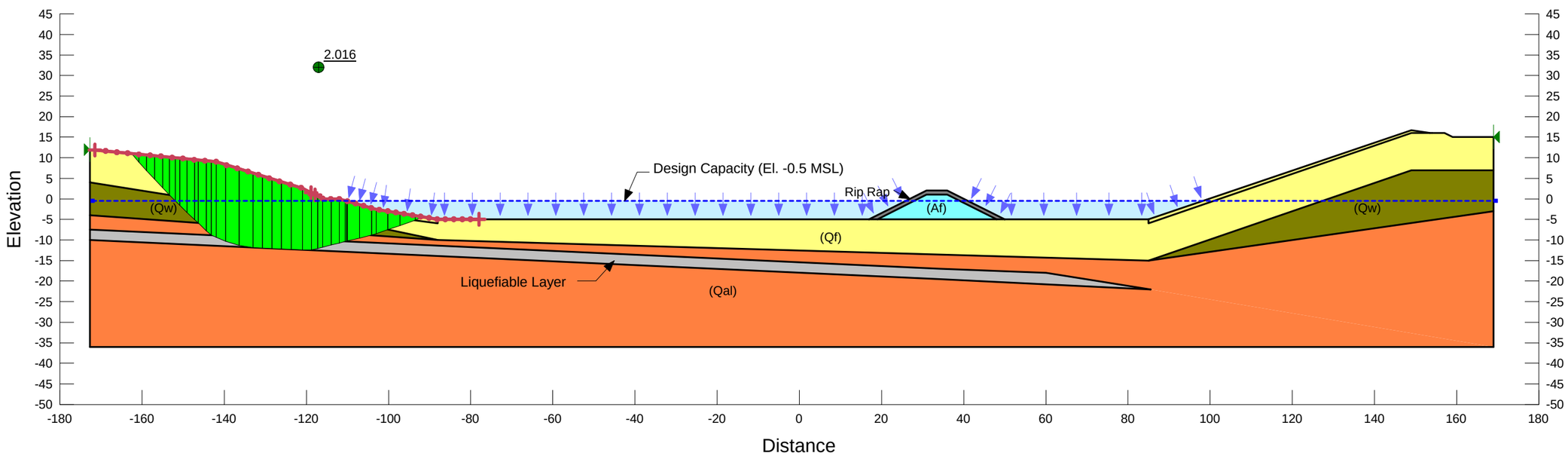
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 3a - West Slope Static
File Name: Cross Section at STA 7+00 operational v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

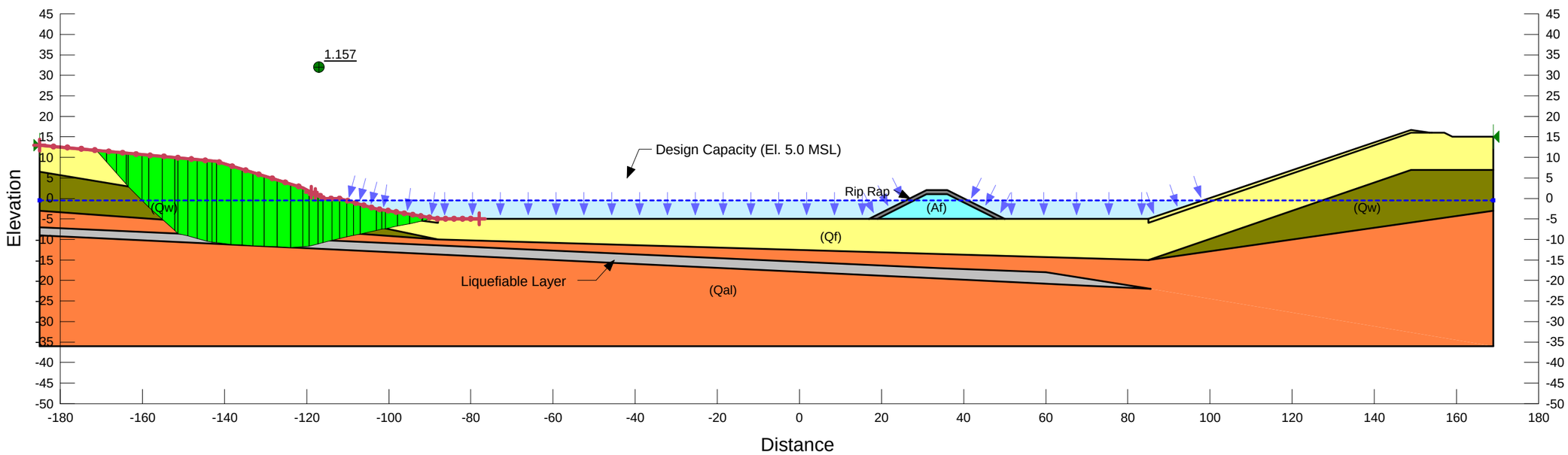
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 3b - West Slope Pseudo-Static
File Name: Cross Section at STA 7+00 operational - w liq layer v2 3b only.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

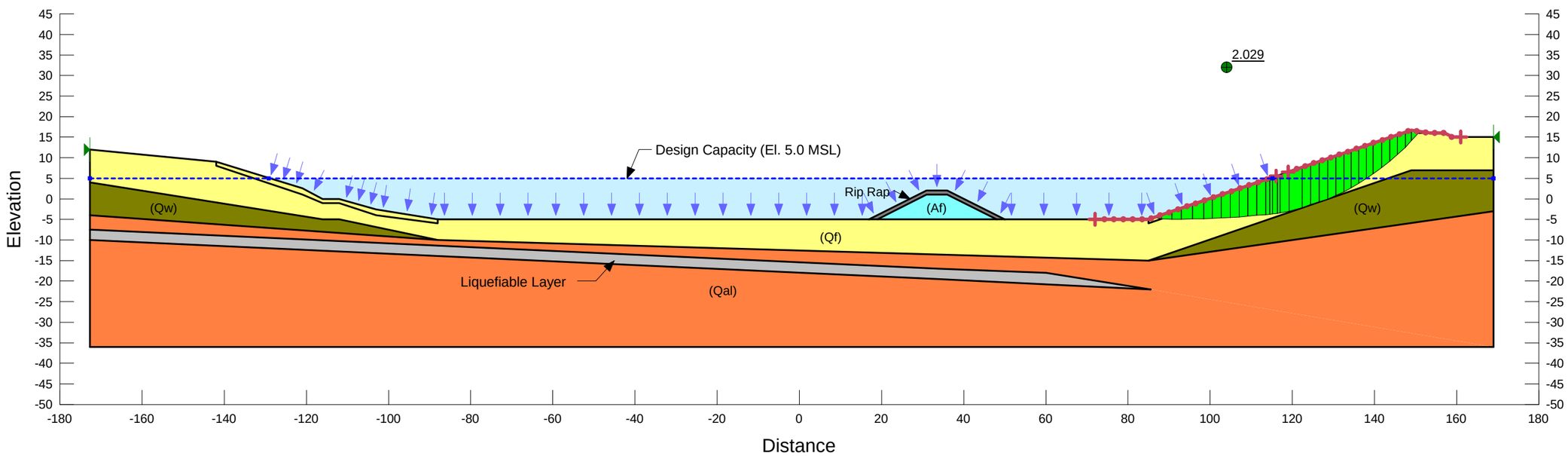
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 2a - East Slope Static
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

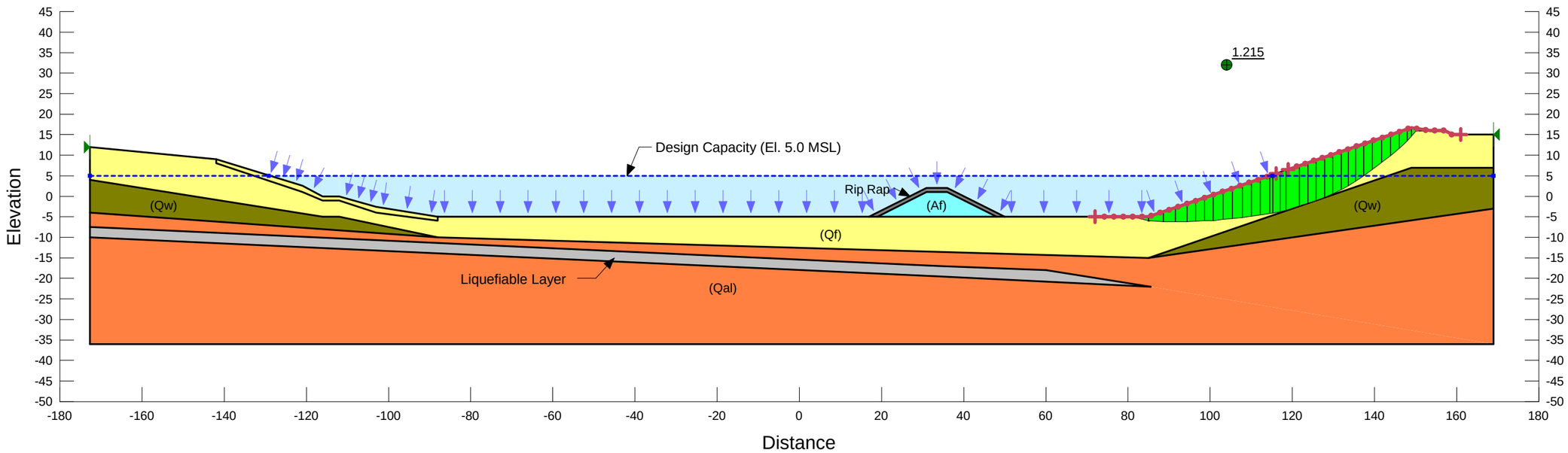
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 2b - East Slope Pseudo-Static
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

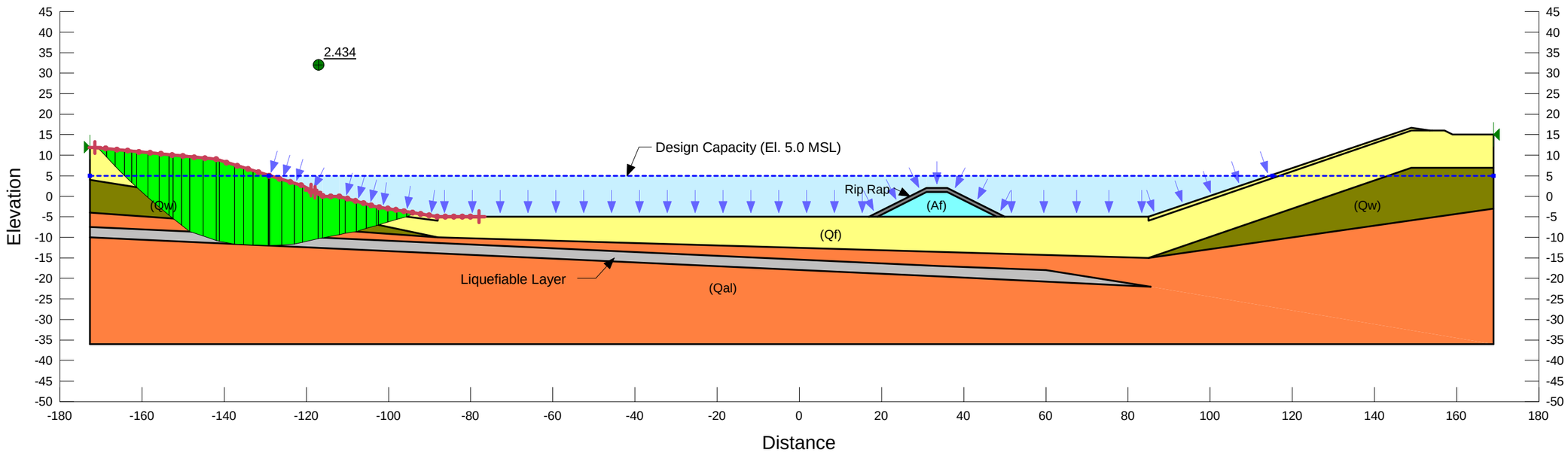
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 3a - West Slope Static
File Name: Cross Section at STA 7+00 design v2.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

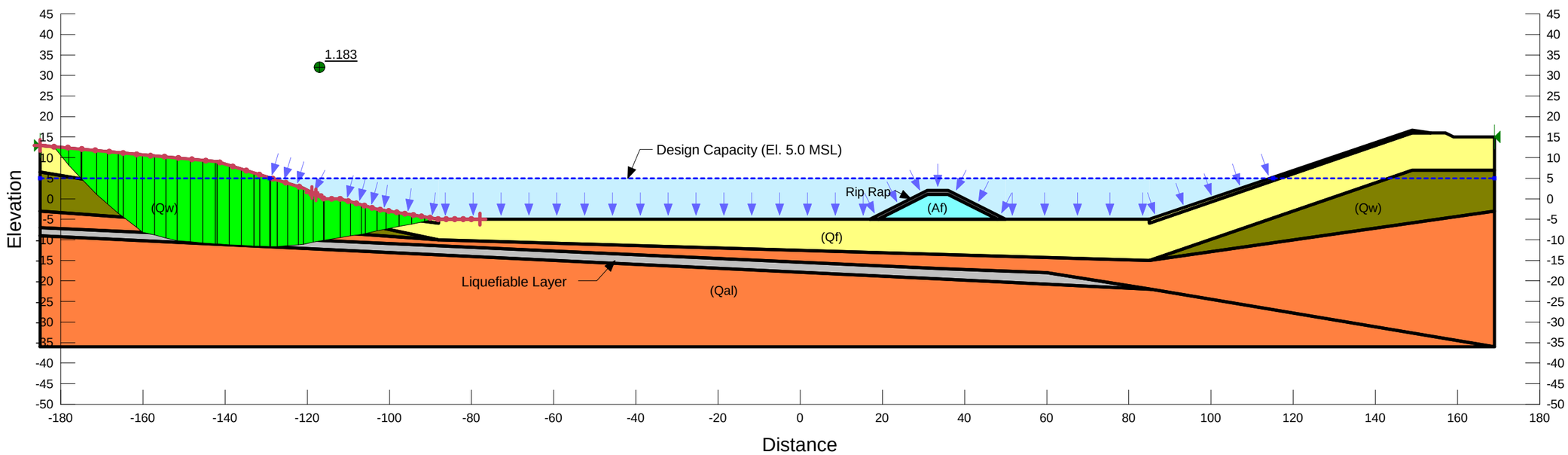
Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

Cross Section at STA 7+00

Name: 3b - West Slope Pseudo-Static
File Name: Cross Section at STA 7+00 design - w liq layer v2 3b only.gsz
Method: Spencer
PWP Conditions Source: Piezometric Line
Use Staged Rapid Drawdown: No
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.15



Name: (Af)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 30 °

Name: (Qf)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 50 psf
Phi: 32 °

Name: (Qw)
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 150 psf
Phi: 27 °

Name: (Qal)
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion: 0 psf
Phi: 32 °

Name: Rip Rap
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 0 psf
Phi: 50 °

Name: Liquefiable Layer
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 450 psf
Phi: 0 °

APPENDIX E

APPENDIX E

PILE ANALYSIS

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

OXFORD BASIN Cutoff at 10, L=30' Compression

PROPOSED DEPTH = 30.0 FT

NUMBER OF LAYERS = 3

WATER TABLE DEPTH = 10.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 2.50

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.500E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.500E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.150E+02

LAYER NO 3----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.977E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.150E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.646E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.400E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	1.500 FT.
DIAMETER OF BASE	=	1.500 FT.
END OF STEM TO BASE	=	0.000 FT.
ANGLE OF BELL	=	0.000 DEG.
IGNORED TOP PORTION	=	5.000 FT.
IGNORED BOTTOM PORTION	=	0.000 FT.
AREA OF ONE PERCENT STEEL	=	2.545 SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM	=	0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	0.39	0.19	1.19	1.39	0.59	0.48	3.51
7.0	0.46	0.39	1.19	1.58	0.79	0.55	3.45
8.0	0.52	0.58	1.19	1.78	0.98	0.63	3.39
9.0	0.59	0.78	1.19	1.97	1.18	0.71	3.35
10.0	0.65	0.97	1.19	2.17	1.37	0.79	3.31
11.0	0.72	1.17	1.19	2.36	1.56	0.86	3.28
12.0	0.79	1.36	1.19	2.55	1.76	0.94	3.25
13.0	0.85	1.56	0.51	2.07	1.73	0.79	2.43
14.0	0.92	1.75	0.00	1.75	1.75	0.70	1.91
15.0	0.98	1.94	0.00	1.94	1.94	0.78	1.98
16.0	1.05	5.44	0.00	5.44	5.44	2.18	5.19
17.0	1.11	9.00	0.00	9.00	9.00	3.60	8.09
18.0	1.18	12.63	0.00	12.63	12.63	5.05	10.72
19.0	1.24	16.32	0.00	16.32	16.32	6.53	13.13
20.0	1.31	20.08	0.00	20.08	20.08	8.03	15.33
21.0	1.37	23.88	0.00	23.88	23.88	9.55	17.38
22.0	1.44	27.75	0.00	27.75	27.75	11.10	19.27
23.0	1.51	31.66	0.00	31.66	31.66	12.66	21.03
24.0	1.57	35.63	0.00	35.63	35.63	14.25	22.68
25.0	1.64	39.64	0.00	39.64	39.64	15.86	24.22
26.0	1.70	43.70	0.00	43.70	43.70	17.48	25.68
27.0	1.77	47.80	0.00	47.80	47.80	19.12	27.04
28.0	1.83	51.94	0.00	51.94	51.94	20.78	28.34
29.0	1.90	56.12	0.00	56.12	56.12	22.45	29.56
30.0	1.96	60.33	0.00	60.33	60.33	24.13	30.72

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1182E-01	0.1640E-04	0.1718E-08	0.1000E-04
0.5910E-01	0.8201E-04	0.8591E-08	0.5000E-04
0.1182E+00	0.1640E-03	0.1718E-07	0.1000E-03
0.5910E+01	0.8201E-02	0.8591E-06	0.5000E-02
0.8890E+01	0.1231E-01	0.1289E-05	0.7500E-02
0.1187E+02	0.1642E-01	0.1718E-05	0.1000E-01
0.2671E+02	0.3960E-01	0.4296E-05	0.2500E-01
0.4149E+02	0.7290E-01	0.8591E-05	0.5000E-01
0.4753E+02	0.1013E+00	0.1289E-04	0.7500E-01
0.5227E+02	0.1290E+00	0.1713E-04	0.1000E+00
0.5593E+02	0.2812E+00	0.4011E-04	0.2500E+00
0.5557E+02	0.5310E+00	0.6097E-04	0.5000E+00
0.5552E+02	0.6560E+00	0.7077E-04	0.6250E+00
0.5546E+02	0.8122E+00	0.8182E-04	0.7813E+00
0.5542E+02	0.9309E+00	0.8969E-04	0.9000E+00

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1634E-01	0.1877E-04	0.2455E-08	0.1000E-04
0.8170E-01	0.9386E-04	0.1227E-07	0.5000E-04
0.1634E+00	0.1877E-03	0.2455E-07	0.1000E-03
0.8192E+01	0.9393E-02	0.1227E-05	0.5000E-02
0.1234E+02	0.1412E-01	0.1841E-05	0.7500E-02
0.1647E+02	0.1883E-01	0.2455E-05	0.1000E-01
0.3582E+02	0.4455E-01	0.6137E-05	0.2500E-01
0.5187E+02	0.7874E-01	0.1227E-04	0.5000E-01
0.5565E+02	0.1059E+00	0.1841E-04	0.7500E-01
0.5796E+02	0.1322E+00	0.2435E-04	0.1000E+00
0.5817E+02	0.2824E+00	0.5548E-04	0.2500E+00
0.5807E+02	0.5324E+00	0.7109E-04	0.5000E+00
0.5807E+02	0.6574E+00	0.7924E-04	0.6250E+00
0.5807E+02	0.8136E+00	0.8844E-04	0.7813E+00
0.5807E+02	0.9324E+00	0.9544E-04	0.9000E+00

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.7522E-02	0.1412E-04	0.9819E-09	0.1000E-04
0.3761E-01	0.7058E-04	0.4909E-08	0.5000E-04
0.7522E-01	0.1412E-03	0.9819E-08	0.1000E-03
0.3761E+01	0.7058E-02	0.4909E-06	0.5000E-02
0.5641E+01	0.1059E-01	0.7364E-06	0.7500E-02
0.7526E+01	0.1412E-01	0.9819E-06	0.1000E-01
0.1776E+02	0.3474E-01	0.2455E-05	0.2500E-01
0.3080E+02	0.6696E-01	0.4909E-05	0.5000E-01
0.3929E+02	0.9671E-01	0.7364E-05	0.7500E-01
0.4652E+02	0.1258E+00	0.9917E-05	0.1000E+00
0.5363E+02	0.2799E+00	0.2474E-04	0.2500E+00
0.5307E+02	0.5297E+00	0.5086E-04	0.5000E+00
0.5298E+02	0.6546E+00	0.6230E-04	0.6250E+00
0.5286E+02	0.8108E+00	0.7521E-04	0.7813E+00
0.5277E+02	0.9295E+00	0.8395E-04	0.9000E+00

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.000 FT.
DIAMETER OF BASE	=	2.000 FT.
END OF STEM TO BASE	=	0.000 FT.
ANGLE OF BELL	=	0.000 DEG.
IGNORED TOP PORTION	=	5.000 FT.
IGNORED BOTTOM PORTION	=	0.000 FT.
AREA OF ONE PERCENT STEEL	=	4.524 SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM	=	0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	0.70	0.26	2.12	2.38	0.97	0.81	3.37
7.0	0.81	0.52	2.12	2.64	1.23	0.91	3.24
8.0	0.93	0.78	2.12	2.90	1.48	1.02	3.11
9.0	1.05	1.04	2.12	3.16	1.74	1.12	3.01
10.0	1.16	1.30	2.12	3.42	2.00	1.23	2.94
11.0	1.28	1.56	2.12	3.68	2.26	1.33	2.87
12.0	1.40	1.81	1.36	3.18	2.27	1.18	2.28
13.0	1.51	2.07	0.45	2.53	2.23	0.98	1.67
14.0	1.63	2.33	0.00	2.33	2.33	0.93	1.43
15.0	1.75	2.59	0.00	2.59	2.59	1.04	1.49
16.0	1.86	7.25	0.00	7.25	7.25	2.90	3.90
17.0	1.98	12.01	0.00	12.01	12.01	4.80	6.07

18.0	2.09	16.84	0.00	16.84	16.84	6.74	8.04
19.0	2.21	21.77	0.00	21.77	21.77	8.71	9.84
20.0	2.33	26.77	0.00	26.77	26.77	10.71	11.50
21.0	2.44	31.85	0.00	31.85	31.85	12.74	13.03
22.0	2.56	37.00	0.00	37.00	37.00	14.80	14.45
23.0	2.68	42.22	0.00	42.22	42.22	16.89	15.77
24.0	2.79	47.50	0.00	47.50	47.50	19.00	17.01
25.0	2.91	52.85	0.00	52.85	52.85	21.14	18.17
26.0	3.03	58.26	0.00	58.26	58.26	23.31	19.26
27.0	3.14	63.73	0.00	63.73	63.73	25.49	20.28
28.0	3.26	69.25	0.00	69.25	69.25	27.70	21.25
29.0	3.37	74.83	0.00	74.83	74.83	29.93	22.17
30.0	3.49	80.45	0.00	80.45	80.45	32.18	23.04

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1147E-01	0.1352E-04	0.2291E-08	0.1000E-04
0.5734E-01	0.6761E-04	0.1146E-07	0.5000E-04
0.1147E+00	0.1352E-03	0.2291E-07	0.1000E-03
0.5734E+01	0.6761E-02	0.1146E-05	0.5000E-02
0.8601E+01	0.1014E-01	0.1718E-05	0.7500E-02
0.1147E+02	0.1352E-01	0.2291E-05	0.1000E-01
0.2804E+02	0.3365E-01	0.5728E-05	0.2500E-01
0.4714E+02	0.6464E-01	0.1146E-04	0.5000E-01
0.5745E+02	0.9290E-01	0.1718E-04	0.7500E-01
0.6300E+02	0.1197E+00	0.2291E-04	0.1000E+00
0.7441E+02	0.2733E+00	0.5603E-04	0.2500E+00
0.7415E+02	0.5233E+00	0.9040E-04	0.5000E+00
0.7411E+02	0.6483E+00	0.1035E-03	0.6250E+00
0.7405E+02	0.8045E+00	0.1207E-03	0.7813E+00
0.7389E+02	0.1223E+01	0.1595E-03	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1569E-01	0.1479E-04	0.3273E-08	0.1000E-04
0.7843E-01	0.7395E-04	0.1636E-07	0.5000E-04
0.1569E+00	0.1479E-03	0.3273E-07	0.1000E-03
0.7843E+01	0.7395E-02	0.1636E-05	0.5000E-02
0.1176E+02	0.1109E-01	0.2455E-05	0.7500E-02
0.1572E+02	0.1480E-01	0.3273E-05	0.1000E-01
0.3798E+02	0.3668E-01	0.8182E-05	0.2500E-01
0.6124E+02	0.6906E-01	0.1636E-04	0.5000E-01
0.7075E+02	0.9711E-01	0.2455E-04	0.7500E-01
0.7395E+02	0.1231E+00	0.3273E-04	0.1000E+00
0.7764E+02	0.2743E+00	0.7790E-04	0.2500E+00
0.7742E+02	0.5243E+00	0.1135E-03	0.5000E+00
0.7742E+02	0.6493E+00	0.1220E-03	0.6250E+00
0.7742E+02	0.8055E+00	0.1368E-03	0.7813E+00
0.7742E+02	0.1224E+01	0.1697E-03	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.7376E-02	0.1228E-04	0.1309E-08	0.1000E-04
0.3688E-01	0.6141E-04	0.6546E-08	0.5000E-04
0.7376E-01	0.1228E-03	0.1309E-07	0.1000E-03
0.3688E+01	0.6141E-02	0.6546E-06	0.5000E-02
0.5532E+01	0.9212E-02	0.9819E-06	0.7500E-02
0.7376E+01	0.1228E-01	0.1309E-05	0.1000E-01
0.1825E+02	0.3065E-01	0.3273E-05	0.2500E-01
0.3285E+02	0.6019E-01	0.6546E-05	0.5000E-01
0.4380E+02	0.8862E-01	0.9819E-05	0.7500E-01
0.5191E+02	0.1162E+00	0.1309E-04	0.1000E+00
0.7118E+02	0.2723E+00	0.3417E-04	0.2500E+00
0.7089E+02	0.5223E+00	0.6729E-04	0.5000E+00
0.7079E+02	0.6473E+00	0.8496E-04	0.6250E+00
0.7068E+02	0.8035E+00	0.1046E-03	0.7813E+00
0.7037E+02	0.1222E+01	0.1492E-03	0.1200E+01

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.500	FT.
DIAMETER OF BASE	=	2.500	FT.
END OF STEM TO BASE	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	5.000	FT.
IGNORED BOTTOM PORTION	=	0.000	FT.
AREA OF ONE PERCENT STEEL	=	7.069	SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07	LB/SQ IN
VOLUME OF UNDERREAM	=	0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	1.09	0.32	3.31	3.64	1.43	1.23	3.28
7.0	1.27	0.65	3.31	3.96	1.75	1.36	3.11
8.0	1.45	0.97	3.31	4.29	2.08	1.49	2.95
9.0	1.64	1.30	3.31	4.61	2.40	1.62	2.82
10.0	1.82	1.62	3.31	4.93	2.72	1.75	2.71
11.0	2.00	1.94	2.41	4.35	2.75	1.58	2.18
12.0	2.18	2.27	1.36	3.62	2.72	1.36	1.66
13.0	2.36	2.59	0.45	3.04	2.74	1.19	1.29
14.0	2.55	2.92	0.00	2.92	2.92	1.17	1.15
15.0	2.73	3.24	0.00	3.24	3.24	1.30	1.19
16.0	2.91	9.07	0.00	9.07	9.07	3.63	3.12
17.0	3.09	15.01	0.00	15.01	15.01	6.00	4.86
18.0	3.27	21.06	0.00	21.06	21.06	8.42	6.43
19.0	3.45	27.21	0.00	27.21	27.21	10.88	7.88
20.0	3.64	33.46	0.00	33.46	33.46	13.38	9.20
21.0	3.82	39.81	0.00	39.81	39.81	15.92	10.43
22.0	4.00	46.24	0.00	46.25	46.25	18.50	11.56
23.0	4.18	52.77	0.00	52.77	52.77	21.11	12.62
24.0	4.36	59.38	0.00	59.38	59.38	23.75	13.61
25.0	4.55	66.07	0.00	66.07	66.07	26.43	14.53
26.0	4.73	72.83	0.00	72.83	72.83	29.13	15.41
27.0	4.91	79.66	0.00	79.66	79.66	31.87	16.23
28.0	5.09	86.57	0.00	86.57	86.57	34.63	17.00
29.0	5.27	93.53	0.00	93.53	93.53	37.41	17.74
30.0	5.45	100.56	0.00	100.56	100.56	40.22	18.43

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1131E-01	0.1223E-04	0.2864E-08	0.1000E-04
0.5654E-01	0.6116E-04	0.1432E-07	0.5000E-04
0.1131E+00	0.1223E-03	0.2864E-07	0.1000E-03
0.5654E+01	0.6116E-02	0.1432E-05	0.5000E-02
0.8481E+01	0.9173E-02	0.2148E-05	0.7500E-02
0.1131E+02	0.1223E-01	0.2864E-05	0.1000E-01
0.2831E+02	0.3058E-01	0.7160E-05	0.2500E-01
0.4976E+02	0.5988E-01	0.1432E-04	0.5000E-01
0.6432E+02	0.8780E-01	0.2148E-04	0.7500E-01
0.7301E+02	0.1146E+00	0.2864E-04	0.1000E+00
0.9233E+02	0.2685E+00	0.7078E-04	0.2500E+00
0.9290E+02	0.5187E+00	0.1254E-03	0.5000E+00
0.9269E+02	0.6436E+00	0.1412E-03	0.6250E+00
0.9265E+02	0.7686E+00	0.1571E-03	0.7500E+00
0.9237E+02	0.1519E+01	0.2492E-03	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1539E-01	0.1302E-04	0.4091E-08	0.1000E-04
0.7695E-01	0.6511E-04	0.2046E-07	0.5000E-04
0.1539E+00	0.1302E-03	0.4091E-07	0.1000E-03
0.7695E+01	0.6511E-02	0.2046E-05	0.5000E-02
0.1154E+02	0.9767E-02	0.3068E-05	0.7500E-02
0.1539E+02	0.1302E-01	0.4091E-05	0.1000E-01
0.3858E+02	0.3257E-01	0.1023E-04	0.2500E-01
0.6585E+02	0.6307E-01	0.2046E-04	0.5000E-01
0.8172E+02	0.9131E-01	0.3068E-04	0.7500E-01
0.8909E+02	0.1178E+00	0.4091E-04	0.1000E+00
0.9709E+02	0.2695E+00	0.9901E-04	0.2500E+00
0.9687E+02	0.5194E+00	0.1681E-03	0.5000E+00
0.9678E+02	0.6444E+00	0.1774E-03	0.6250E+00
0.9678E+02	0.7694E+00	0.1866E-03	0.7500E+00
0.9678E+02	0.1519E+01	0.2651E-03	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.7310E-02	0.1145E-04	0.1636E-08	0.1000E-04
0.3655E-01	0.5726E-04	0.8182E-08	0.5000E-04
0.7310E-01	0.1145E-03	0.1636E-07	0.1000E-03
0.3655E+01	0.5726E-02	0.8182E-06	0.5000E-02
0.5482E+01	0.8588E-02	0.1227E-05	0.7500E-02
0.7310E+01	0.1145E-01	0.1636E-05	0.1000E-01
0.1827E+02	0.2863E-01	0.4091E-05	0.2500E-01
0.3381E+02	0.5672E-01	0.8182E-05	0.5000E-01
0.4659E+02	0.8426E-01	0.1227E-04	0.7500E-01
0.5654E+02	0.1113E+00	0.1636E-04	0.1000E+00
0.8756E+02	0.2676E+00	0.4255E-04	0.2500E+00
0.8883E+02	0.5179E+00	0.8264E-04	0.5000E+00
0.8861E+02	0.6428E+00	0.1051E-03	0.6250E+00
0.8852E+02	0.7678E+00	0.1276E-03	0.7500E+00
0.8796E+02	0.1518E+01	0.2332E-03	0.1500E+01

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

OXFORD BASIN Cutoff at 10, L=30' Uplift

PROPOSED DEPTH = 30.0 FT

REDUCTION FACTOR APPLIED FOR UPLIFT FRICTION = 0.700

NUMBER OF LAYERS = 3

WATER TABLE DEPTH = 10.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 2.50
FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA = 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.400E+04
DEPTH, FT = 0.000E+00

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA = 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.400E+04
DEPTH, FT = 0.500E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.150E+03
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.500E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.150E+03
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.150E+02

LAYER NO 3----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA = 0.977E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.400E+04
DEPTH, FT = 0.150E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA = 0.646E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT = 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.400E+04
DEPTH, FT = 0.400E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 1.500 FT.
DIAMETER OF BASE = 1.500 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 5.000 FT.
IGNORED BOTTOM PORTION = 0.000 FT.
AREA OF ONE PERCENT STEEL = 2.545 SQ.IN.
ELASTIC MODULUS, Ec = 0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	0.39	0.14	0.80	0.93	0.93	0.85	2.43
7.0	0.46	0.27	0.93	1.20	1.20	1.04	2.62
8.0	0.52	0.41	1.06	1.47	1.47	1.22	2.80
9.0	0.59	0.54	1.19	1.74	1.74	1.41	2.95
10.0	0.65	0.68	1.33	2.01	2.01	1.60	3.06
11.0	0.72	0.82	1.46	2.27	2.27	1.78	3.16
12.0	0.79	0.95	1.59	2.54	2.54	1.97	3.24
13.0	0.85	1.09	1.72	2.81	2.81	2.16	3.30
14.0	0.92	1.22	1.86	3.08	3.08	2.35	3.36
15.0	0.98	1.36	1.99	3.35	3.35	2.53	3.41
16.0	1.05	3.81	2.12	5.93	5.93	3.64	5.66
17.0	1.11	6.30	2.25	8.56	8.56	4.77	7.69
18.0	1.18	8.84	2.39	11.23	11.23	5.92	9.53
19.0	1.24	11.43	2.52	13.95	13.95	7.09	11.21
20.0	1.31	14.05	2.65	16.70	16.70	8.27	12.76
21.0	1.37	16.72	2.78	19.50	19.50	9.47	14.19
22.0	1.44	19.42	2.92	22.34	22.34	10.69	15.51
23.0	1.51	22.16	3.05	25.21	25.21	11.91	16.75
24.0	1.57	24.94	3.18	28.12	28.12	13.16	17.90
25.0	1.64	27.75	3.31	31.06	31.06	14.41	18.98
26.0	1.70	30.59	3.45	34.03	34.03	15.68	20.00
27.0	1.77	33.46	3.58	37.04	37.04	16.96	20.96
28.0	1.83	36.36	3.71	40.07	40.07	18.25	21.86
29.0	1.90	39.28	3.84	43.13	43.13	19.56	22.72
30.0	1.96	42.23	3.98	46.21	46.21	20.87	23.53

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.8193E-02	0.1448E-04	0.7732E-04	0.1000E-04
0.4096E-01	0.7238E-04	0.3866E-03	0.5000E-04
0.8193E-01	0.1448E-03	0.7732E-03	0.1000E-03
0.4096E+01	0.7238E-02	0.3866E-01	0.5000E-02
0.6145E+01	0.1086E-01	0.5799E-01	0.7500E-02
0.8204E+01	0.1448E-01	0.7732E-01	0.1000E-01
0.1862E+02	0.3525E-01	0.1933E+00	0.2500E-01
0.2927E+02	0.6624E-01	0.3866E+00	0.5000E-01
0.3373E+02	0.9381E-01	0.5799E+00	0.7500E-01
0.3728E+02	0.1209E+00	0.7710E+00	0.1000E+00
0.4096E+02	0.2732E+00	0.1805E+01	0.2500E+00
0.4164E+02	0.5238E+00	0.2744E+01	0.5000E+00
0.4205E+02	0.6491E+00	0.3185E+01	0.6250E+00
0.4251E+02	0.8057E+00	0.3682E+01	0.7813E+00
0.4283E+02	0.9247E+00	0.4036E+01	0.9000E+00

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1125E-01	0.1611E-04	0.1105E-03	0.1000E-04
0.5627E-01	0.8054E-04	0.5523E-03	0.5000E-04
0.1125E+00	0.1611E-03	0.1105E-02	0.1000E-03
0.5627E+01	0.8054E-02	0.5523E-01	0.5000E-02
0.8457E+01	0.1209E-01	0.8285E-01	0.7500E-02
0.1130E+02	0.1613E-01	0.1105E+00	0.1000E-01
0.2494E+02	0.3871E-01	0.2762E+00	0.2500E-01
0.3672E+02	0.7046E-01	0.5523E+00	0.5000E-01
0.3971E+02	0.9722E-01	0.8285E+00	0.7500E-01
0.4164E+02	0.1234E+00	0.1096E+01	0.1000E+00
0.4322E+02	0.2745E+00	0.2496E+01	0.2500E+00
0.4384E+02	0.5251E+00	0.3199E+01	0.5000E+00
0.4421E+02	0.6503E+00	0.3566E+01	0.6250E+00
0.4463E+02	0.8069E+00	0.3980E+01	0.7813E+00
0.4494E+02	0.9259E+00	0.4295E+01	0.9000E+00

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5243E-02	0.1289E-04	0.4418E-04	0.1000E-04
0.2622E-01	0.6444E-04	0.2209E-03	0.5000E-04
0.5243E-01	0.1289E-03	0.4418E-03	0.1000E-03
0.2622E+01	0.6444E-02	0.2209E-01	0.5000E-02
0.3933E+01	0.9666E-02	0.3314E-01	0.7500E-02
0.5243E+01	0.1289E-01	0.4418E-01	0.1000E-01
0.1239E+02	0.3184E-01	0.1105E+00	0.2500E-01
0.2162E+02	0.6196E-01	0.2209E+00	0.5000E-01
0.2767E+02	0.9037E-01	0.3314E+00	0.7500E-01
0.3288E+02	0.1183E+00	0.4463E+00	0.1000E+00
0.3866E+02	0.2718E+00	0.1113E+01	0.2500E+00
0.3944E+02	0.5225E+00	0.2289E+01	0.5000E+00
0.3989E+02	0.6478E+00	0.2803E+01	0.6250E+00
0.4039E+02	0.8044E+00	0.3384E+01	0.7813E+00
0.4072E+02	0.9235E+00	0.3778E+01	0.9000E+00

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 2.000 FT.
DIAMETER OF BASE = 2.000 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 5.000 FT.
IGNORED BOTTOM PORTION = 0.000 FT.
AREA OF ONE PERCENT STEEL = 4.524 SQ.IN.
ELASTIC MODULUS, Ec = 0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	0.70	0.18	1.41	1.60	1.60	1.49	2.33
7.0	0.81	0.36	1.65	2.01	2.01	1.79	2.47
8.0	0.93	0.54	1.89	2.43	2.43	2.10	2.61
9.0	1.05	0.73	2.12	2.85	2.85	2.41	2.72
10.0	1.16	0.91	2.36	3.26	3.26	2.72	2.80
11.0	1.28	1.09	2.59	3.68	3.68	3.03	2.88
12.0	1.40	1.27	2.83	4.10	4.10	3.34	2.93
13.0	1.51	1.45	3.06	4.52	4.52	3.64	2.98

14.0	1.63	1.63	3.30	4.93	4.93	3.95	3.03
15.0	1.75	1.81	3.53	5.35	5.35	4.26	3.06
16.0	1.86	5.08	3.77	8.85	8.85	5.80	4.75
17.0	1.98	8.40	4.01	12.41	12.41	7.37	6.27
18.0	2.09	11.79	4.24	16.03	16.03	8.96	7.65
19.0	2.21	15.24	4.48	19.71	19.71	10.57	8.92
20.0	2.33	18.74	4.71	23.45	23.45	12.21	10.08
21.0	2.44	22.29	4.95	27.24	27.24	13.87	11.15
22.0	2.56	25.90	5.18	31.08	31.08	15.54	12.14
23.0	2.68	29.55	5.42	34.97	34.97	17.24	13.07
24.0	2.79	33.25	5.66	38.91	38.91	18.96	13.93
25.0	2.91	37.00	5.89	42.89	42.89	20.69	14.74
26.0	3.03	40.78	6.13	46.91	46.91	22.44	15.50
27.0	3.14	44.61	6.36	50.97	50.97	24.21	16.22
28.0	3.26	48.48	6.60	55.08	55.08	25.99	16.90
29.0	3.37	52.38	6.83	59.21	59.21	27.78	17.55
30.0	3.49	56.31	7.07	63.38	63.38	29.59	18.16

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.8045E-02	0.1249E-04	0.1031E-03	0.1000E-04
0.4023E-01	0.6245E-04	0.5155E-03	0.5000E-04
0.8045E-01	0.1249E-03	0.1031E-02	0.1000E-03
0.4023E+01	0.6245E-02	0.5155E-01	0.5000E-02
0.6034E+01	0.9367E-02	0.7732E-01	0.7500E-02
0.8045E+01	0.1249E-01	0.1031E+00	0.1000E-01
0.1972E+02	0.3112E-01	0.2577E+00	0.2500E-01
0.3335E+02	0.6043E-01	0.5155E+00	0.5000E-01
0.4091E+02	0.8783E-01	0.7732E+00	0.7500E-01
0.4505E+02	0.1142E+00	0.1031E+01	0.1000E+00
0.5461E+02	0.2674E+00	0.2521E+01	0.2500E+00
0.5598E+02	0.5180E+00	0.4068E+01	0.5000E+00
0.5653E+02	0.6432E+00	0.4657E+01	0.6250E+00
0.5727E+02	0.7998E+00	0.5431E+01	0.7813E+00
0.5890E+02	0.1219E+01	0.7176E+01	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1097E-01	0.1338E-04	0.1473E-03	0.1000E-04
0.5485E-01	0.6690E-04	0.7364E-03	0.5000E-04
0.1097E+00	0.1338E-03	0.1473E-02	0.1000E-03
0.5485E+01	0.6690E-02	0.7364E-01	0.5000E-02
0.8228E+01	0.1003E-01	0.1105E+00	0.7500E-02
0.1097E+02	0.1338E-01	0.1473E+00	0.1000E-01
0.2669E+02	0.3327E-01	0.3682E+00	0.2500E-01
0.4343E+02	0.6361E-01	0.7364E+00	0.5000E-01
0.5057E+02	0.9093E-01	0.1105E+01	0.7500E-01
0.5318E+02	0.1168E+00	0.1473E+01	0.1000E+00
0.5786E+02	0.2685E+00	0.3505E+01	0.2500E+00
0.5930E+02	0.5191E+00	0.5108E+01	0.5000E+00
0.5968E+02	0.6443E+00	0.5491E+01	0.6250E+00
0.6035E+02	0.8008E+00	0.6155E+01	0.7813E+00
0.6183E+02	0.1220E+01	0.7635E+01	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5186E-02	0.1161E-04	0.5891E-04	0.1000E-04
0.2593E-01	0.5807E-04	0.2946E-03	0.5000E-04
0.5186E-01	0.1161E-03	0.5891E-03	0.1000E-03
0.2593E+01	0.5807E-02	0.2946E-01	0.5000E-02
0.3890E+01	0.8711E-02	0.4418E-01	0.7500E-02
0.5186E+01	0.1161E-01	0.5891E-01	0.1000E-01
0.1283E+02	0.2900E-01	0.1473E+00	0.2500E-01
0.2318E+02	0.5723E-01	0.2946E+00	0.5000E-01
0.3101E+02	0.8469E-01	0.4418E+00	0.7500E-01
0.3681E+02	0.1115E+00	0.5891E+00	0.1000E+00
0.5136E+02	0.2663E+00	0.1538E+01	0.2500E+00
0.5265E+02	0.5169E+00	0.3028E+01	0.5000E+00
0.5338E+02	0.6422E+00	0.3823E+01	0.6250E+00
0.5418E+02	0.7988E+00	0.4708E+01	0.7813E+00
0.5597E+02	0.1218E+01	0.6716E+01	0.1200E+01

DRILLED SHAFT INFORMATION

```
DIAMETER OF STEM          =    2.500  FT.
DIAMETER OF BASE          =    2.500  FT.
END OF STEM TO BASE       =    0.000  FT.
ANGLE OF BELL             =    0.000  DEG.
IGNORED TOP PORTION       =    5.000  FT.
IGNORED BOTTOM PORTION    =    0.000  FT.
AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
ELASTIC MODULUS, Ec       = 0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM       =    0.000  CU.YDS.
```

PREDICTED RESULTS

```
QS     = ULTIMATE SIDE RESISTANCE;
QB     = ULTIMATE BASE RESISTANCE;
WT     = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU     = TOTAL ULTIMATE RESISTANCE;
QBD    = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY
         APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN    = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY
         APPLIED TO THE ULTIMATE SIDE RESISTANCE AND
         THE ULTIMATE BASE RESISTANCE.
```

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
6.0	1.09	0.23	2.21	2.44	2.44	2.30	2.27
7.0	1.27	0.45	2.58	3.03	3.03	2.76	2.38
8.0	1.45	0.68	2.95	3.63	3.63	3.22	2.49
9.0	1.64	0.91	3.31	4.22	4.22	3.68	2.58
10.0	1.82	1.13	3.68	4.82	4.82	4.14	2.65
11.0	2.00	1.36	4.05	5.41	5.41	4.59	2.71
12.0	2.18	1.59	4.42	6.01	6.01	5.05	2.75
13.0	2.36	1.81	4.79	6.60	6.60	5.51	2.79
14.0	2.55	2.04	5.15	7.20	7.20	5.97	2.83
15.0	2.73	2.27	5.52	7.79	7.79	6.43	2.86
16.0	2.91	6.35	5.89	12.24	12.24	8.43	4.21
17.0	3.09	10.51	6.26	16.76	16.76	10.46	5.42
18.0	3.27	14.74	6.63	21.37	21.37	12.52	6.53
19.0	3.45	19.05	7.00	26.04	26.04	14.61	7.54
20.0	3.64	23.42	7.36	30.79	30.79	16.73	8.47
21.0	3.82	27.86	7.73	35.60	35.60	18.88	9.32
22.0	4.00	32.37	8.10	40.47	40.47	21.05	10.12
23.0	4.18	36.94	8.47	45.41	45.41	23.24	10.86
24.0	4.36	41.57	8.84	50.40	50.40	25.46	11.55
25.0	4.55	46.25	9.21	55.45	55.45	27.70	12.20
26.0	4.73	50.98	9.57	60.55	60.55	29.97	12.81
27.0	4.91	55.76	9.94	65.71	65.71	32.25	13.38
28.0	5.09	60.60	10.31	70.91	70.91	34.55	13.93
29.0	5.27	65.47	10.68	76.15	76.15	36.87	14.44
30.0	5.45	70.39	11.05	81.44	81.44	39.20	14.93

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.7991E-02	0.1159E-04	0.1289E-03	0.1000E-04
0.3996E-01	0.5794E-04	0.6444E-03	0.5000E-04
0.7991E-01	0.1159E-03	0.1289E-02	0.1000E-03
0.3996E+01	0.5794E-02	0.6444E-01	0.5000E-02
0.5994E+01	0.8692E-02	0.9665E-01	0.7500E-02
0.7991E+01	0.1159E-01	0.1289E+00	0.1000E-01
0.1998E+02	0.2897E-01	0.3222E+00	0.2500E-01
0.3530E+02	0.5706E-01	0.6444E+00	0.5000E-01
0.4586E+02	0.8420E-01	0.9665E+00	0.7500E-01
0.5233E+02	0.1105E+00	0.1289E+01	0.1000E+00
0.6781E+02	0.2638E+00	0.3185E+01	0.2500E+00
0.7067E+02	0.5146E+00	0.5643E+01	0.5000E+00
0.7124E+02	0.6397E+00	0.6356E+01	0.6250E+00
0.7192E+02	0.7649E+00	0.7069E+01	0.7500E+00
0.7587E+02	0.1516E+01	0.1121E+02	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1086E-01	0.1215E-04	0.1841E-03	0.1000E-04
0.5430E-01	0.6076E-04	0.9205E-03	0.5000E-04
0.1086E+00	0.1215E-03	0.1841E-02	0.1000E-03
0.5430E+01	0.6076E-02	0.9205E-01	0.5000E-02
0.8145E+01	0.9114E-02	0.1381E+00	0.7500E-02
0.1086E+02	0.1215E-01	0.1841E+00	0.1000E-01
0.2719E+02	0.3038E-01	0.4603E+00	0.2500E-01
0.4674E+02	0.5935E-01	0.9205E+00	0.5000E-01
0.5844E+02	0.8677E-01	0.1381E+01	0.7500E-01
0.6416E+02	0.1130E+00	0.1841E+01	0.1000E+00
0.7242E+02	0.2648E+00	0.4455E+01	0.2500E+00
0.7538E+02	0.5156E+00	0.7567E+01	0.5000E+00
0.7572E+02	0.6407E+00	0.7981E+01	0.6250E+00
0.7614E+02	0.7659E+00	0.8395E+01	0.7500E+00
0.7967E+02	0.1517E+01	0.1193E+02	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5168E-02	0.1103E-04	0.7364E-04	0.1000E-04
0.2584E-01	0.5516E-04	0.3682E-03	0.5000E-04
0.5168E-01	0.1103E-03	0.7364E-03	0.1000E-03
0.2584E+01	0.5516E-02	0.3682E-01	0.5000E-02
0.3876E+01	0.8274E-02	0.5523E-01	0.7500E-02
0.5168E+01	0.1103E-01	0.7364E-01	0.1000E-01
0.1292E+02	0.2758E-01	0.1841E+00	0.2500E-01
0.2393E+02	0.5479E-01	0.3682E+00	0.5000E-01
0.3306E+02	0.8162E-01	0.5523E+00	0.7500E-01
0.4024E+02	0.1081E+00	0.7364E+00	0.1000E+00
0.6320E+02	0.2628E+00	0.1915E+01	0.2500E+00
0.6590E+02	0.5135E+00	0.3719E+01	0.5000E+00
0.6676E+02	0.6387E+00	0.4731E+01	0.6250E+00
0.6771E+02	0.7640E+00	0.5744E+01	0.7500E+00
0.7206E+02	0.1515E+01	0.1049E+02	0.1500E+01

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

OXFORD BASIN Cutoff at 10, L=30' Compression, Fill 10 ft

PROPOSED DEPTH = 30.0 FT

NUMBER OF LAYERS = 3

WATER TABLE DEPTH = 10.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 2.50

FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.107E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.100E+02

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.100E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.200E+02

LAYER NO 3----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.896E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.200E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.646E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.400E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	1.500 FT.
DIAMETER OF BASE	=	1.500 FT.
END OF STEM TO BASE	=	0.000 FT.
ANGLE OF BELL	=	0.000 DEG.
IGNORED TOP PORTION	=	10.000 FT.
IGNORED BOTTOM PORTION	=	0.000 FT.
AREA OF ONE PERCENT STEEL	=	2.545 SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM	=	0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	0.72	0.19	1.19	1.39	0.59	0.48	1.94
12.0	0.79	0.39	1.19	1.58	0.79	0.55	2.01
13.0	0.85	0.58	1.19	1.78	0.98	0.63	2.09
14.0	0.92	0.78	1.19	1.97	1.18	0.71	2.15
15.0	0.98	0.97	1.19	2.17	1.37	0.79	2.21
16.0	1.05	1.17	1.19	2.36	1.56	0.86	2.25
17.0	1.11	1.36	1.19	2.55	1.76	0.94	2.30
18.0	1.18	1.56	0.51	2.07	1.73	0.79	1.75
19.0	1.24	1.75	0.00	1.75	1.75	0.70	1.41
20.0	1.31	1.94	0.00	1.94	1.94	0.78	1.49
21.0	1.37	4.46	0.00	4.46	4.46	1.78	3.24
22.0	1.44	7.04	0.00	7.04	7.04	2.82	4.89
23.0	1.51	9.71	0.00	9.71	9.71	3.88	6.45
24.0	1.57	12.44	0.00	12.44	12.44	4.98	7.92
25.0	1.64	15.24	0.00	15.24	15.24	6.10	9.31
26.0	1.70	18.10	0.00	18.10	18.10	7.24	10.64
27.0	1.77	21.03	0.00	21.03	21.03	8.41	11.90
28.0	1.83	24.01	0.00	24.01	24.01	9.61	13.10
29.0	1.90	27.06	0.00	27.06	27.06	10.82	14.25
30.0	1.96	30.15	0.00	30.15	30.15	12.06	15.36

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4400E-02	0.1244E-04	0.1718E-08	0.1000E-04
0.2200E-01	0.6219E-04	0.8591E-08	0.5000E-04
0.4400E-01	0.1244E-03	0.1718E-07	0.1000E-03
0.2200E+01	0.6219E-02	0.8591E-06	0.5000E-02
0.3300E+01	0.9329E-02	0.1289E-05	0.7500E-02
0.4400E+01	0.1244E-01	0.1718E-05	0.1000E-01
0.9968E+01	0.3056E-01	0.4296E-05	0.2500E-01
0.1569E+02	0.5881E-01	0.8591E-05	0.5000E-01
0.1798E+02	0.8514E-01	0.1289E-04	0.7500E-01
0.1974E+02	0.1112E+00	0.1713E-04	0.1000E+00
0.2114E+02	0.2620E+00	0.4011E-04	0.2500E+00
0.2091E+02	0.5119E+00	0.6097E-04	0.5000E+00
0.2089E+02	0.6369E+00	0.7077E-04	0.6250E+00
0.2087E+02	0.7931E+00	0.8182E-04	0.7813E+00
0.2086E+02	0.9119E+00	0.8969E-04	0.9000E+00

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6024E-02	0.1332E-04	0.2455E-08	0.1000E-04
0.3012E-01	0.6659E-04	0.1227E-07	0.5000E-04
0.6024E-01	0.1332E-03	0.2455E-07	0.1000E-03
0.3012E+01	0.6659E-02	0.1227E-05	0.5000E-02
0.4518E+01	0.9989E-02	0.1841E-05	0.7500E-02
0.6029E+01	0.1332E-01	0.2455E-05	0.1000E-01
0.1331E+02	0.3241E-01	0.6137E-05	0.2500E-01
0.1949E+02	0.6099E-01	0.1227E-04	0.5000E-01
0.2103E+02	0.8689E-01	0.1841E-04	0.7500E-01
0.2194E+02	0.1124E+00	0.2435E-04	0.1000E+00
0.2202E+02	0.2625E+00	0.5548E-04	0.2500E+00
0.2191E+02	0.5124E+00	0.7109E-04	0.5000E+00
0.2191E+02	0.6374E+00	0.7924E-04	0.6250E+00
0.2191E+02	0.7937E+00	0.8844E-04	0.7813E+00
0.2191E+02	0.9124E+00	0.9544E-04	0.9000E+00

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2815E-02	0.1157E-04	0.9819E-09	0.1000E-04
0.1407E-01	0.5787E-04	0.4909E-08	0.5000E-04
0.2815E-01	0.1157E-03	0.9819E-08	0.1000E-03
0.1407E+01	0.5787E-02	0.4909E-06	0.5000E-02
0.2111E+01	0.8680E-02	0.7364E-06	0.7500E-02
0.2815E+01	0.1157E-01	0.9819E-06	0.1000E-01
0.6659E+01	0.2873E-01	0.2455E-05	0.2500E-01
0.1165E+02	0.5653E-01	0.4909E-05	0.5000E-01
0.1483E+02	0.8334E-01	0.7364E-05	0.7500E-01
0.1753E+02	0.1099E+00	0.9917E-05	0.1000E+00
0.2021E+02	0.2615E+00	0.2474E-04	0.2500E+00
0.1991E+02	0.5113E+00	0.5086E-04	0.5000E+00
0.1988E+02	0.6363E+00	0.6230E-04	0.6250E+00
0.1983E+02	0.7925E+00	0.7521E-04	0.7813E+00
0.1980E+02	0.9113E+00	0.8395E-04	0.9000E+00

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.000 FT.
DIAMETER OF BASE	=	2.000 FT.
END OF STEM TO BASE	=	0.000 FT.
ANGLE OF BELL	=	0.000 DEG.
IGNORED TOP PORTION	=	10.000 FT.
IGNORED BOTTOM PORTION	=	0.000 FT.
AREA OF ONE PERCENT STEEL	=	4.524 SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM	=	0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	1.28	0.26	2.12	2.38	0.97	0.81	1.86
12.0	1.40	0.52	2.12	2.64	1.23	0.91	1.89
13.0	1.51	0.78	2.12	2.90	1.48	1.02	1.92
14.0	1.63	1.04	2.12	3.16	1.74	1.12	1.94
15.0	1.75	1.30	2.12	3.42	2.00	1.23	1.96
16.0	1.86	1.56	2.12	3.68	2.26	1.33	1.97
17.0	1.98	1.81	1.36	3.18	2.27	1.18	1.61
18.0	2.09	2.07	0.45	2.53	2.23	0.98	1.21
19.0	2.21	2.33	0.00	2.33	2.33	0.93	1.06
20.0	2.33	2.59	0.00	2.59	2.59	1.04	1.11
21.0	2.44	5.94	0.00	5.94	5.94	2.38	2.43
22.0	2.56	9.39	0.00	9.39	9.39	3.76	3.67
23.0	2.68	12.94	0.00	12.94	12.94	5.18	4.84
24.0	2.79	16.58	0.00	16.58	16.58	6.63	5.94
25.0	2.91	20.32	0.00	20.32	20.32	8.13	6.98
26.0	3.03	24.14	0.00	24.14	24.14	9.65	7.98
27.0	3.14	28.04	0.00	28.04	28.04	11.22	8.92

28.0	3.26	32.02	0.00	32.02	32.02	12.81	9.83
29.0	3.37	36.08	0.00	36.08	36.08	14.43	10.69
30.0	3.49	40.21	0.00	40.21	40.21	16.08	11.52

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4355E-02	0.1136E-04	0.2291E-08	0.1000E-04
0.2178E-01	0.5681E-04	0.1146E-07	0.5000E-04
0.4355E-01	0.1136E-03	0.2291E-07	0.1000E-03
0.2178E+01	0.5681E-02	0.1146E-05	0.5000E-02
0.3266E+01	0.8522E-02	0.1718E-05	0.7500E-02
0.4355E+01	0.1136E-01	0.2291E-05	0.1000E-01
0.1070E+02	0.2835E-01	0.5728E-05	0.2500E-01
0.1789E+02	0.5565E-01	0.1146E-04	0.5000E-01
0.2194E+02	0.8194E-01	0.1718E-04	0.7500E-01
0.2393E+02	0.1076E+00	0.2291E-04	0.1000E+00
0.2816E+02	0.2590E+00	0.5603E-04	0.2500E+00
0.2790E+02	0.5089E+00	0.9040E-04	0.5000E+00
0.2788E+02	0.6339E+00	0.1035E-03	0.6250E+00
0.2786E+02	0.7902E+00	0.1207E-03	0.7813E+00
0.2781E+02	0.1209E+01	0.1595E-03	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5940E-02	0.1185E-04	0.3273E-08	0.1000E-04
0.2970E-01	0.5925E-04	0.1636E-07	0.5000E-04
0.5940E-01	0.1185E-03	0.3273E-07	0.1000E-03
0.2970E+01	0.5925E-02	0.1636E-05	0.5000E-02
0.4455E+01	0.8887E-02	0.2455E-05	0.7500E-02
0.5940E+01	0.1185E-01	0.3273E-05	0.1000E-01
0.1450E+02	0.2953E-01	0.8182E-05	0.2500E-01
0.2321E+02	0.5735E-01	0.1636E-04	0.5000E-01
0.2684E+02	0.8353E-01	0.2455E-04	0.7500E-01
0.2801E+02	0.1089E+00	0.3273E-04	0.1000E+00
0.2944E+02	0.2594E+00	0.7790E-04	0.2500E+00
0.2921E+02	0.5093E+00	0.1135E-03	0.5000E+00
0.2921E+02	0.6343E+00	0.1220E-03	0.6250E+00
0.2921E+02	0.7906E+00	0.1368E-03	0.7813E+00
0.2921E+02	0.1209E+01	0.1697E-03	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2797E-02	0.1088E-04	0.1309E-08	0.1000E-04
0.1398E-01	0.5441E-04	0.6546E-08	0.5000E-04
0.2797E-01	0.1088E-03	0.1309E-07	0.1000E-03
0.1398E+01	0.5441E-02	0.6546E-06	0.5000E-02
0.2097E+01	0.8161E-02	0.9819E-06	0.7500E-02
0.2797E+01	0.1088E-01	0.1309E-05	0.1000E-01
0.6929E+01	0.2718E-01	0.3273E-05	0.2500E-01
0.1250E+02	0.5395E-01	0.6546E-05	0.5000E-01
0.1672E+02	0.8028E-01	0.9819E-05	0.7500E-01
0.1972E+02	0.1062E+00	0.1309E-04	0.1000E+00
0.2688E+02	0.2586E+00	0.3417E-04	0.2500E+00
0.2659E+02	0.5085E+00	0.6729E-04	0.5000E+00
0.2656E+02	0.6335E+00	0.8496E-04	0.6250E+00
0.2652E+02	0.7897E+00	0.1046E-03	0.7813E+00
0.2640E+02	0.1208E+01	0.1492E-03	0.1200E+01

DRILLED SHAFT INFORMATION

```
DIAMETER OF STEM          =    2.500  FT.
DIAMETER OF BASE          =    2.500  FT.
END OF STEM TO BASE       =    0.000  FT.
ANGLE OF BELL             =    0.000  DEG.
IGNORED TOP PORTION       =   10.000  FT.
IGNORED BOTTOM PORTION    =    0.000  FT.
AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
ELASTIC MODULUS, Ec       = 0.380E+07 LB/SQ IN
VOLUME OF UNDERREAM       =    0.000  CU.YDS.
```

PREDICTED RESULTS

```
QS     = ULTIMATE SIDE RESISTANCE;
QB     = ULTIMATE BASE RESISTANCE;
WT     = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU     = TOTAL ULTIMATE RESISTANCE;
QBD    = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY
         APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN    = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY
         APPLIED TO THE ULTIMATE SIDE RESISTANCE AND
         THE ULTIMATE BASE RESISTANCE.
```

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	2.00	0.32	3.31	3.64	1.43	1.23	1.82
12.0	2.18	0.65	3.31	3.96	1.75	1.36	1.82
13.0	2.36	0.97	3.31	4.29	2.08	1.49	1.81
14.0	2.55	1.30	3.31	4.61	2.40	1.62	1.81
15.0	2.73	1.62	3.31	4.93	2.72	1.75	1.81
16.0	2.91	1.94	2.41	4.35	2.75	1.58	1.50
17.0	3.09	2.27	1.36	3.62	2.72	1.36	1.17
18.0	3.27	2.59	0.45	3.04	2.74	1.19	0.93
19.0	3.45	2.92	0.00	2.92	2.92	1.17	0.84
20.0	3.64	3.24	0.00	3.24	3.24	1.30	0.89
21.0	3.82	7.43	0.00	7.43	7.43	2.97	1.95
22.0	4.00	11.74	0.00	11.74	11.74	4.70	2.94
23.0	4.18	16.18	0.00	16.18	16.18	6.47	3.87
24.0	4.36	20.73	0.00	20.73	20.73	8.29	4.75
25.0	4.55	25.40	0.00	25.40	25.40	10.16	5.59
26.0	4.73	30.17	0.00	30.17	30.17	12.07	6.38
27.0	4.91	35.05	0.00	35.05	35.05	14.02	7.14
28.0	5.09	40.02	0.00	40.02	40.02	16.01	7.86
29.0	5.27	45.10	0.00	45.10	45.10	18.04	8.55
30.0	5.45	50.26	0.00	50.26	50.26	20.10	9.21

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4335E-02	0.1087E-04	0.2864E-08	0.1000E-04
0.2167E-01	0.5435E-04	0.1432E-07	0.5000E-04
0.4335E-01	0.1087E-03	0.2864E-07	0.1000E-03
0.2167E+01	0.5435E-02	0.1432E-05	0.5000E-02
0.3251E+01	0.8152E-02	0.2148E-05	0.7500E-02
0.4335E+01	0.1087E-01	0.2864E-05	0.1000E-01
0.1084E+02	0.2717E-01	0.7160E-05	0.2500E-01
0.1893E+02	0.5382E-01	0.1432E-04	0.5000E-01
0.2452E+02	0.7996E-01	0.2148E-04	0.7500E-01
0.2790E+02	0.1057E+00	0.2864E-04	0.1000E+00
0.3499E+02	0.2571E+00	0.7078E-04	0.2500E+00
0.3507E+02	0.5072E+00	0.1254E-03	0.5000E+00
0.3488E+02	0.6321E+00	0.1412E-03	0.6250E+00
0.3486E+02	0.7571E+00	0.1571E-03	0.7500E+00
0.3476E+02	0.1507E+01	0.2492E-03	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5902E-02	0.1118E-04	0.4091E-08	0.1000E-04
0.2951E-01	0.5589E-04	0.2046E-07	0.5000E-04
0.5902E-01	0.1118E-03	0.4091E-07	0.1000E-03
0.2951E+01	0.5589E-02	0.2046E-05	0.5000E-02
0.4426E+01	0.8384E-02	0.3068E-05	0.7500E-02
0.5902E+01	0.1118E-01	0.4091E-05	0.1000E-01
0.1475E+02	0.2795E-01	0.1023E-04	0.2500E-01
0.2498E+02	0.5504E-01	0.2046E-04	0.5000E-01
0.3099E+02	0.8129E-01	0.3068E-04	0.7500E-01
0.3383E+02	0.1069E+00	0.4091E-04	0.1000E+00
0.3684E+02	0.2575E+00	0.9901E-04	0.2500E+00
0.3662E+02	0.5075E+00	0.1681E-03	0.5000E+00
0.3651E+02	0.6325E+00	0.1774E-03	0.6250E+00
0.3651E+02	0.7575E+00	0.1866E-03	0.7500E+00
0.3651E+02	0.1507E+01	0.2651E-03	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2788E-02	0.1056E-04	0.1636E-08	0.1000E-04
0.1394E-01	0.5281E-04	0.8182E-08	0.5000E-04
0.2788E-01	0.1056E-03	0.1636E-07	0.1000E-03
0.1394E+01	0.5281E-02	0.8182E-06	0.5000E-02
0.2091E+01	0.7922E-02	0.1227E-05	0.7500E-02
0.2788E+01	0.1056E-01	0.1636E-05	0.1000E-01
0.6971E+01	0.2641E-01	0.4091E-05	0.2500E-01
0.1290E+02	0.5261E-01	0.8182E-05	0.5000E-01
0.1781E+02	0.7860E-01	0.1227E-04	0.7500E-01
0.2162E+02	0.1044E+00	0.1636E-04	0.1000E+00
0.3314E+02	0.2568E+00	0.4255E-04	0.2500E+00
0.3340E+02	0.5068E+00	0.8264E-04	0.5000E+00
0.3324E+02	0.6318E+00	0.1051E-03	0.6250E+00
0.3320E+02	0.7568E+00	0.1276E-03	0.7500E+00
0.3301E+02	0.1507E+01	0.2332E-03	0.1500E+01

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

OXFORD BASIN Cutoff at 10, L=30' Uplift Fill 10 ft

PROPOSED DEPTH = 30.0 FT

REDUCTION FACTOR APPLIED FOR UPLIFT FRICTION = 0.700

NUMBER OF LAYERS = 3

WATER TABLE DEPTH = 10.0 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 2.50
FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.107E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.300E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.150E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.100E+02

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.100E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.550E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.150E+03
INTERNAL FRICTION ANGLE, DEG.	= 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.200E+02

LAYER NO 3----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA	= 0.896E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.200E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA	= 0.646E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.000E+00
INTERNAL FRICTION ANGLE, DEG.	= 0.320E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.350E+02
SOIL UNIT WEIGHT, LB/CU FT	= 0.120E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.400E+04
DEPTH, FT	= 0.400E+02

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	1.500	FT.
DIAMETER OF BASE	=	1.500	FT.
END OF STEM TO BASE	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	10.000	FT.
IGNORED BOTTOM PORTION	=	0.000	FT.
AREA OF ONE PERCENT STEEL	=	2.545	SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07	LB/SQ IN
VOLUME OF UNDERREAM	=	0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	0.72	0.14	1.46	1.59	1.59	1.51	2.24
12.0	0.79	0.27	1.59	1.86	1.86	1.70	2.37
13.0	0.85	0.41	1.72	2.13	2.13	1.89	2.50
14.0	0.92	0.54	1.86	2.40	2.40	2.07	2.62
15.0	0.98	0.68	1.99	2.67	2.67	2.26	2.72
16.0	1.05	0.82	2.12	2.94	2.94	2.45	2.80
17.0	1.11	0.95	2.25	3.21	3.21	2.63	2.88
18.0	1.18	1.09	2.39	3.47	3.47	2.82	2.95
19.0	1.24	1.22	2.52	3.74	3.74	3.01	3.01
20.0	1.31	1.36	2.65	4.01	4.01	3.20	3.06
21.0	1.37	3.12	2.78	5.90	5.90	4.03	4.29
22.0	1.44	4.93	2.92	7.85	7.85	4.89	5.45
23.0	1.51	6.79	3.05	9.84	9.84	5.77	6.54
24.0	1.57	8.71	3.18	11.89	11.89	6.66	7.57
25.0	1.64	10.67	3.31	13.98	13.98	7.58	8.54
26.0	1.70	12.67	3.45	16.12	16.12	8.51	9.47
27.0	1.77	14.72	3.58	18.30	18.30	9.47	10.35
28.0	1.83	16.81	3.71	20.52	20.52	10.44	11.20
29.0	1.90	18.94	3.84	22.78	22.78	11.42	12.00
30.0	1.96	21.11	3.98	25.08	25.08	12.42	12.77

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3140E-02	0.1176E-04	0.7732E-04	0.1000E-04
0.1570E-01	0.5879E-04	0.3866E-03	0.5000E-04
0.3140E-01	0.1176E-03	0.7732E-03	0.1000E-03
0.1570E+01	0.5879E-02	0.3866E-01	0.5000E-02
0.2355E+01	0.8819E-02	0.5799E-01	0.7500E-02
0.3140E+01	0.1176E-01	0.7732E-01	0.1000E-01
0.7141E+01	0.2903E-01	0.1933E+00	0.2500E-01
0.1135E+02	0.5644E-01	0.3866E+00	0.5000E-01
0.1316E+02	0.8253E-01	0.5799E+00	0.7500E-01
0.1458E+02	0.1084E+00	0.7710E+00	0.1000E+00
0.1660E+02	0.2597E+00	0.1805E+01	0.2500E+00
0.1738E+02	0.5104E+00	0.2744E+01	0.5000E+00
0.1781E+02	0.6357E+00	0.3185E+01	0.6250E+00
0.1829E+02	0.7923E+00	0.3682E+01	0.7813E+00
0.1864E+02	0.9113E+00	0.4036E+01	0.9000E+00

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4295E-02	0.1239E-04	0.1105E-03	0.1000E-04
0.2147E-01	0.6197E-04	0.5523E-03	0.5000E-04
0.4295E-01	0.1239E-03	0.1105E-02	0.1000E-03
0.2147E+01	0.6197E-02	0.5523E-01	0.5000E-02
0.3221E+01	0.9296E-02	0.8285E-01	0.7500E-02
0.4295E+01	0.1239E-01	0.1105E+00	0.1000E-01
0.9547E+01	0.3038E-01	0.2762E+00	0.2500E-01
0.1418E+02	0.5810E-01	0.5523E+00	0.5000E-01
0.1554E+02	0.8394E-01	0.8285E+00	0.7500E-01
0.1645E+02	0.1095E+00	0.1096E+01	0.1000E+00
0.1791E+02	0.2606E+00	0.2496E+01	0.2500E+00
0.1853E+02	0.5111E+00	0.3199E+01	0.5000E+00
0.1890E+02	0.6364E+00	0.3566E+01	0.6250E+00
0.1932E+02	0.7929E+00	0.3980E+01	0.7813E+00
0.1963E+02	0.9119E+00	0.4295E+01	0.9000E+00

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2007E-02	0.1113E-04	0.4418E-04	0.1000E-04
0.1004E-01	0.5566E-04	0.2209E-03	0.5000E-04
0.2007E-01	0.1113E-03	0.4418E-03	0.1000E-03
0.1004E+01	0.5566E-02	0.2209E-01	0.5000E-02
0.1505E+01	0.8349E-02	0.3314E-01	0.7500E-02
0.2007E+01	0.1113E-01	0.4418E-01	0.1000E-01
0.4755E+01	0.2768E-01	0.1105E+00	0.2500E-01
0.8352E+01	0.5472E-01	0.2209E+00	0.5000E-01
0.1070E+02	0.8108E-01	0.3314E+00	0.7500E-01
0.1271E+02	0.1073E+00	0.4463E+00	0.1000E+00
0.1526E+02	0.2589E+00	0.1113E+01	0.2500E+00
0.1623E+02	0.5096E+00	0.2289E+01	0.5000E+00
0.1672E+02	0.6350E+00	0.2803E+01	0.6250E+00
0.1727E+02	0.7917E+00	0.3384E+01	0.7813E+00
0.1764E+02	0.9107E+00	0.3778E+01	0.9000E+00

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.000	FT.
DIAMETER OF BASE	=	2.000	FT.
END OF STEM TO BASE	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	10.000	FT.
IGNORED BOTTOM PORTION	=	0.000	FT.
AREA OF ONE PERCENT STEEL	=	4.524	SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07	LB/SQ IN
VOLUME OF UNDERREAM	=	0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	1.28	0.18	2.59	2.77	2.77	2.66	2.18
12.0	1.40	0.36	2.83	3.19	3.19	2.97	2.28
13.0	1.51	0.54	3.06	3.61	3.61	3.28	2.38
14.0	1.63	0.73	3.30	4.02	4.02	3.59	2.47
15.0	1.75	0.91	3.53	4.44	4.44	3.90	2.54
16.0	1.86	1.09	3.77	4.86	4.86	4.21	2.61
17.0	1.98	1.27	4.01	5.28	5.28	4.51	2.67
18.0	2.09	1.45	4.24	5.69	5.69	4.82	2.72
19.0	2.21	1.63	4.48	6.11	6.11	5.13	2.76
20.0	2.33	1.81	4.71	6.53	6.53	5.44	2.80
21.0	2.44	4.16	4.95	9.11	9.11	6.61	3.73
22.0	2.56	6.58	5.18	11.76	11.76	7.81	4.59
23.0	2.68	9.06	5.42	14.48	14.48	9.04	5.41

24.0	2.79	11.61	5.66	17.26	17.26	10.30	6.18
25.0	2.91	14.22	5.89	20.11	20.11	11.58	6.91
26.0	3.03	16.90	6.13	23.02	23.02	12.89	7.61
27.0	3.14	19.63	6.36	25.99	25.99	14.21	8.27
28.0	3.26	22.41	6.60	29.01	29.01	15.56	8.90
29.0	3.37	25.25	6.83	32.09	32.09	16.94	9.51
30.0	3.49	28.14	7.07	35.21	35.21	18.33	10.09

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3143E-02	0.1100E-04	0.1031E-03	0.1000E-04
0.1571E-01	0.5498E-04	0.5155E-03	0.5000E-04
0.3143E-01	0.1100E-03	0.1031E-02	0.1000E-03
0.1571E+01	0.5498E-02	0.5155E-01	0.5000E-02
0.2357E+01	0.8246E-02	0.7732E-01	0.7500E-02
0.3143E+01	0.1100E-01	0.1031E+00	0.1000E-01
0.7732E+01	0.2745E-01	0.2577E+00	0.2500E-01
0.1302E+02	0.5417E-01	0.5155E+00	0.5000E-01
0.1612E+02	0.8018E-01	0.7732E+00	0.7500E-01
0.1778E+02	0.1057E+00	0.1031E+01	0.1000E+00
0.2223E+02	0.2573E+00	0.2521E+01	0.2500E+00
0.2360E+02	0.5080E+00	0.4068E+01	0.5000E+00
0.2418E+02	0.6332E+00	0.4657E+01	0.6250E+00
0.2494E+02	0.7898E+00	0.5431E+01	0.7813E+00
0.2664E+02	0.1209E+01	0.7176E+01	0.1200E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4289E-02	0.1135E-04	0.1473E-03	0.1000E-04
0.2144E-01	0.5677E-04	0.7364E-03	0.5000E-04
0.4289E-01	0.1135E-03	0.1473E-02	0.1000E-03
0.2144E+01	0.5677E-02	0.7364E-01	0.5000E-02
0.3217E+01	0.8515E-02	0.1105E+00	0.7500E-02
0.4289E+01	0.1135E-01	0.1473E+00	0.1000E-01
0.1050E+02	0.2832E-01	0.3682E+00	0.2500E-01
0.1696E+02	0.5545E-01	0.7364E+00	0.5000E-01
0.1989E+02	0.8144E-01	0.1105E+01	0.7500E-01
0.2108E+02	0.1069E+00	0.1473E+01	0.1000E+00
0.2411E+02	0.2580E+00	0.3505E+01	0.2500E+00
0.2556E+02	0.5087E+00	0.5108E+01	0.5000E+00
0.2594E+02	0.6338E+00	0.5491E+01	0.6250E+00
0.2660E+02	0.7904E+00	0.6155E+01	0.7813E+00
0.2808E+02	0.1210E+01	0.7635E+01	0.1200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2013E-02	0.1064E-04	0.5891E-04	0.1000E-04
0.1006E-01	0.5320E-04	0.2946E-03	0.5000E-04
0.2013E-01	0.1064E-03	0.5891E-03	0.1000E-03
0.1006E+01	0.5320E-02	0.2946E-01	0.5000E-02
0.1510E+01	0.7981E-02	0.4418E-01	0.7500E-02
0.2013E+01	0.1064E-01	0.5891E-01	0.1000E-01
0.4990E+01	0.2659E-01	0.1473E+00	0.2500E-01
0.9035E+01	0.5288E-01	0.2946E+00	0.5000E-01
0.1214E+02	0.7888E-01	0.4418E+00	0.7500E-01
0.1438E+02	0.1046E+00	0.5891E+00	0.1000E+00
0.2035E+02	0.2567E+00	0.1538E+01	0.2500E+00
0.2164E+02	0.5072E+00	0.3028E+01	0.5000E+00
0.2241E+02	0.6326E+00	0.3823E+01	0.6250E+00
0.2327E+02	0.7892E+00	0.4708E+01	0.7813E+00
0.2520E+02	0.1209E+01	0.6716E+01	0.1200E+01

DRILLED SHAFT INFORMATION

DIAMETER OF STEM	=	2.500	FT.
DIAMETER OF BASE	=	2.500	FT.
END OF STEM TO BASE	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	10.000	FT.
IGNORED BOTTOM PORTION	=	0.000	FT.
AREA OF ONE PERCENT STEEL	=	7.069	SQ.IN.
ELASTIC MODULUS, Ec	=	0.380E+07	LB/SQ IN
VOLUME OF UNDERREAM	=	0.000	CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
11.0	2.00	0.23	4.05	4.28	4.28	4.14	2.15
12.0	2.18	0.45	4.42	4.87	4.87	4.60	2.23
13.0	2.36	0.68	4.79	5.47	5.47	5.06	2.31
14.0	2.55	0.91	5.15	6.06	6.06	5.52	2.38
15.0	2.73	1.13	5.52	6.66	6.66	5.98	2.44
16.0	2.91	1.36	5.89	7.25	7.25	6.44	2.49
17.0	3.09	1.59	6.26	7.85	7.85	6.89	2.54
18.0	3.27	1.81	6.63	8.44	8.44	7.35	2.58
19.0	3.45	2.04	7.00	9.04	9.04	7.81	2.62
20.0	3.64	2.27	7.36	9.63	9.63	8.27	2.65
21.0	3.82	5.20	7.73	12.93	12.93	9.81	3.39
22.0	4.00	8.22	8.10	16.32	16.32	11.39	4.08
23.0	4.18	11.32	8.47	19.79	19.79	13.00	4.73
24.0	4.36	14.51	8.84	23.35	23.35	14.64	5.35
25.0	4.55	17.78	9.21	26.98	26.98	16.32	5.94
26.0	4.73	21.12	9.57	30.69	30.69	18.02	6.49
27.0	4.91	24.53	9.94	34.47	34.47	19.75	7.02
28.0	5.09	28.02	10.31	38.33	38.33	21.52	7.53
29.0	5.27	31.57	10.68	42.24	42.24	23.30	8.01
30.0	5.45	35.18	11.05	46.23	46.23	25.12	8.47

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3158E-02	0.1064E-04	0.1289E-03	0.1000E-04
0.1579E-01	0.5321E-04	0.6444E-03	0.5000E-04
0.3158E-01	0.1064E-03	0.1289E-02	0.1000E-03
0.1579E+01	0.5321E-02	0.6444E-01	0.5000E-02
0.2368E+01	0.7982E-02	0.9665E-01	0.7500E-02
0.3158E+01	0.1064E-01	0.1289E+00	0.1000E-01
0.7894E+01	0.2661E-01	0.3222E+00	0.2500E-01
0.1388E+02	0.5285E-01	0.6444E+00	0.5000E-01
0.1812E+02	0.7873E-01	0.9665E+00	0.7500E-01
0.2081E+02	0.1043E+00	0.1289E+01	0.1000E+00
0.2768E+02	0.2559E+00	0.3185E+01	0.2500E+00
0.3019E+02	0.5065E+00	0.5643E+01	0.5000E+00
0.3077E+02	0.6317E+00	0.6356E+01	0.6250E+00
0.3147E+02	0.7569E+00	0.7069E+01	0.7500E+00
0.3554E+02	0.1508E+01	0.1121E+02	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.4306E-02	0.1087E-04	0.1841E-03	0.1000E-04
0.2153E-01	0.5437E-04	0.9205E-03	0.5000E-04
0.4306E-01	0.1087E-03	0.1841E-02	0.1000E-03
0.2153E+01	0.5437E-02	0.9205E-01	0.5000E-02
0.3229E+01	0.8155E-02	0.1381E+00	0.7500E-02
0.4306E+01	0.1087E-01	0.1841E+00	0.1000E-01
0.1076E+02	0.2718E-01	0.4603E+00	0.2500E-01
0.1838E+02	0.5377E-01	0.9205E+00	0.5000E-01
0.2306E+02	0.7977E-01	0.1381E+01	0.7500E-01
0.2552E+02	0.1053E+00	0.1841E+01	0.1000E+00
0.3024E+02	0.2565E+00	0.4455E+01	0.2500E+00
0.3320E+02	0.5073E+00	0.7567E+01	0.5000E+00
0.3354E+02	0.6324E+00	0.7981E+01	0.6250E+00
0.3395E+02	0.7575E+00	0.8395E+01	0.7500E+00
0.3749E+02	0.1508E+01	0.1193E+02	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2023E-02	0.1041E-04	0.7364E-04	0.1000E-04
0.1012E-01	0.5207E-04	0.3682E-03	0.5000E-04
0.2023E-01	0.1041E-03	0.7364E-03	0.1000E-03
0.1012E+01	0.5207E-02	0.3682E-01	0.5000E-02
0.1517E+01	0.7810E-02	0.5523E-01	0.7500E-02
0.2023E+01	0.1041E-01	0.7364E-01	0.1000E-01
0.5058E+01	0.2603E-01	0.1841E+00	0.2500E-01
0.9389E+01	0.5192E-01	0.3682E+00	0.5000E-01
0.1301E+02	0.7767E-01	0.5523E+00	0.7500E-01
0.1587E+02	0.1033E+00	0.7364E+00	0.1000E+00
0.2511E+02	0.2552E+00	0.1915E+01	0.2500E+00
0.2710E+02	0.5058E+00	0.3719E+01	0.5000E+00
0.2800E+02	0.6310E+00	0.4731E+01	0.6250E+00
0.2899E+02	0.7563E+00	0.5744E+01	0.7500E+00
0.3360E+02	0.1508E+01	0.1049E+02	0.1500E+01

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 18 inch L=30 fill 5.lpd
Name of output file: pile 10 18 inch L=30 fill 5.lpo
Name of plot output file: pile 10 18 inch L=30 fill 5.lpp
Name of runtime file: pile 10 18 inch L=30 fill 5.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:54:39

Problem Title

RH Fdn Pile 148 cut off L=15 dia 18 Fill 5 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	18.00000000	2576.0000	254.0000	3600000.
2	360.0000	18.00000000	2576.0000	254.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 60.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 60.000 in
Distance from top of pile to bottom of layer = 120.000 in

Layer 3 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 180.000 in

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 180.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	60.00	0.06900
3	60.00	0.06900
4	120.00	0.06900
5	120.00	0.03300
6	180.00	0.03300
7	180.00	0.03300
8	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	60.000	0.00000	30.00	------	------
3	60.000	1.04100	0.00	0.02000	0.0
4	120.000	1.04100	0.00	0.02000	0.0
5	120.000	1.04100	0.00	0.02000	0.0
6	180.000	1.04100	0.00	0.02000	0.0
7	180.000	0.00000	32.00	------	------
8	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	5161.5665	-0.0030135	165.3543	0.0000	0.0000
1.800	0.244576	9518.6415	5151.6612	-0.0030126	198.6105	-11.0059	81.0000
3.600	0.239155	19001.4842	5122.3844	-0.0030098	231.7415	-21.5239	162.0000
5.400	0.233740	28414.3105	5074.6134	-0.0030052	264.6279	-31.5549	243.0000
7.200	0.228336	37724.4819	5009.2235	-0.0029988	297.1557	-41.1005	324.0000
9.000	0.222945	46900.9343	4927.0869	-0.0029906	329.2163	-50.1625	405.0000
10.800	0.217570	55914.1718	4829.0711	-0.0029806	360.7066	-58.7438	486.0000
12.600	0.212214	64736.2588	4716.0389	-0.0029689	391.5291	-66.8475	567.0000
14.400	0.206882	73340.8098	4588.8464	-0.0029555	421.5916	-74.4774	648.0000
16.200	0.201575	81702.9779	4448.3428	-0.0029405	450.8073	-81.6377	729.0000
18.000	0.196296	89799.4408	4295.3690	-0.0029238	479.0946	-88.3332	810.0000
19.800	0.191049	97608.3863	4130.7568	-0.0029056	506.3774	-94.5692	891.0000
21.600	0.185836	105109.	3955.3283	-0.0028859	532.5847	-100.3513	972.0000
23.400	0.180659	112284.	3769.8949	-0.0028649	557.6506	-105.6858	1053.0000
25.200	0.175522	119114.	3575.2565	-0.0028424	581.5145	-110.5791	1134.0000
27.000	0.170427	125585.	3372.2010	-0.0028186	604.1205	-115.0381	1215.0000
28.800	0.165375	131680.	3161.5035	-0.0027937	625.4178	-119.0702	1296.0000
30.600	0.160370	137388.	2943.9259	-0.0027676	645.3605	-122.6827	1377.0000
32.400	0.155412	142697.	2720.2161	-0.0027404	663.9074	-125.8837	1458.0000
34.200	0.150504	147596.	2491.1077	-0.0027122	681.0220	-128.6811	1539.0000
36.000	0.145648	152075.	2257.3198	-0.0026831	696.6724	-131.0832	1620.0000
37.800	0.140845	156128.	2019.5563	-0.0026532	710.8312	-133.0985	1701.0000
39.600	0.136096	159747.	1778.5057	-0.0026226	723.4753	-134.7355	1782.0000
41.400	0.131404	162927.	1534.8412	-0.0025912	734.5860	-136.0029	1863.0000
43.200	0.126768	165664.	1289.2201	-0.0025594	744.1488	-136.9094	1944.0000
45.000	0.122190	167955.	1042.2842	-0.0025270	752.1533	-137.4638	2025.0000
46.800	0.117671	169798.	794.6594	-0.0024942	758.5932	-137.6749	2106.0000
48.600	0.113211	171193.	546.9559	-0.0024611	763.4659	-137.5513	2187.0000
50.400	0.108811	172139.	299.7682	-0.0024278	766.7727	-137.1017	2268.0000
52.200	0.104471	172639.	53.6756	-0.0023943	768.5188	-136.3345	2349.0000
54.000	0.100191	172695.	-190.7579	-0.0023608	768.7127	-135.2582	2430.0000
55.800	0.095972	172309.	-432.9831	-0.0023273	767.3666	-133.8809	2511.0000
57.600	0.091813	171488.	-672.4654	-0.0022940	764.4962	-132.2106	2592.0000
59.400	0.087714	170235.	-908.6843	-0.0022608	760.1204	-130.2549	2673.0000
61.200	0.083674	168558.	-1059.3620	-0.0022279	754.2614	-37.1648	799.4906
63.000	0.079693	166758.	-1126.3558	-0.0021954	747.9730	-37.2727	841.8653
64.800	0.075771	164835.	-1193.1613	-0.0021632	741.2542	-36.9556	877.9123
66.600	0.071906	162790.	-1259.1058	-0.0021314	734.1086	-36.3161	909.0942
68.400	0.068098	160625.	-1323.8873	-0.0021000	726.5436	-35.6633	942.6756
70.200	0.064346	158342.	-1387.4805	-0.0020691	718.5666	-34.9958	978.9709

72.000	0.060649	155943.	-1449.8579	-0.0020386	710.1853	-34.3123	1018.3547
73.800	0.057007	153430.	-1510.9890	-0.0020085	701.4077	-33.6112	1061.2776
75.600	0.053418	150807.	-1570.8405	-0.0019790	692.2417	-32.8905	1108.2873
77.400	0.049882	148075.	-1629.3751	-0.0019500	682.6956	-32.1480	1160.0565
79.200	0.046398	145236.	-1686.5515	-0.0019215	672.7781	-31.3813	1217.4219
81.000	0.042965	142294.	-1742.3231	-0.0018936	662.4979	-30.5872	1281.4389
82.800	0.039581	139250.	-1796.6374	-0.0018663	651.8641	-29.7620	1353.4597
84.600	0.036246	136108.	-1849.4343	-0.0018396	640.8863	-28.9013	1435.2486
86.400	0.032959	132870.	-1900.6450	-0.0018135	629.5744	-27.9995	1529.1565
88.200	0.029718	129540.	-1950.1892	-0.0017880	617.9387	-27.0496	1638.3944
90.000	0.026522	126120.	-1997.9723	-0.0017632	605.9901	-26.0427	1767.4779
91.800	0.023370	122614.	-2043.8810	-0.0017391	593.7403	-24.9670	1922.9876
93.600	0.020261	119025.	-2087.7770	-0.0017156	581.2016	-23.8064	2114.9433
95.400	0.017194	115357.	-2129.4871	-0.0016929	568.3873	-22.5382	2359.4750
97.200	0.014167	111615.	-2168.7873	-0.0016708	555.3120	-21.1286	2684.5210
99.000	0.011179	107802.	-2205.3742	-0.0016495	541.9917	-19.5235	3143.6054
100.800	0.008229	103925.	-2238.8090	-0.0016290	528.4450	-17.6263	3855.7265
102.600	0.005315	99888.5837	-2268.3828	-0.0016092	514.6933	-15.2334	5159.3933
104.400	0.002436	96001.7386	-2292.6566	-0.0015902	500.7641	-11.7374	8674.7405
106.200	-0.000410	91975.4555	-2297.3415	-0.0015719	486.6971	6.5320	28673.6049
108.000	-0.003223	87968.9863	-2279.8416	-0.0015545	472.6994	12.9124	7210.3148
109.800	-0.006006	84003.0624	-2253.9260	-0.0015378	458.8433	15.8828	4759.9436
111.600	-0.008759	80087.3659	-2223.4233	-0.0015219	445.1627	18.0091	3700.7087
113.400	-0.011485	76228.8437	-2189.4766	-0.0015067	431.6818	19.7095	3089.0288
115.200	-0.014184	72433.0616	-2152.7075	-0.0014923	418.4202	21.1451	2683.4621
117.000	-0.016857	68704.7266	-2113.5195	-0.0014786	405.3941	22.3972	2391.5860
118.800	-0.019506	65047.9503	-2072.1999	-0.0014656	392.6181	23.5135	2169.7602
120.600	-0.022133	61466.4032	-2028.9659	-0.0014533	380.1050	24.5244	1994.4723
122.400	-0.024738	57963.4131	-1983.9882	-0.0014417	367.8663	25.4508	1851.8417
124.200	-0.027323	54542.0330	-1937.4055	-0.0014308	355.9127	26.3078	1733.1025
126.000	-0.029889	51205.0899	-1889.3325	-0.0014205	344.2541	27.1066	1632.4244
127.800	-0.032437	47955.2207	-1839.8665	-0.0014109	332.8997	27.8557	1545.7662
129.600	-0.034968	44794.9003	-1789.0904	-0.0014019	321.8583	28.5621	1470.2316
131.400	-0.037484	41726.4638	-1737.0766	-0.0013935	311.1378	29.2310	1403.6861
133.200	-0.039985	38752.1236	-1683.8883	-0.0013857	300.7461	29.8671	1344.5195
135.000	-0.042473	35873.9840	-1629.5814	-0.0013785	290.6905	30.4739	1291.4918
136.800	-0.044948	33094.0535	-1574.2058	-0.0013718	280.9780	31.0546	1243.6323
138.600	-0.047411	30414.2542	-1517.8061	-0.0013656	271.6153	31.6117	1200.1685
140.400	-0.049864	27836.4307	-1460.4226	-0.0013599	262.6089	32.1477	1160.4783
142.200	-0.052307	25362.3571	-1402.0919	-0.0013548	253.9651	32.6642	1124.0539
144.000	-0.054741	22993.7434	-1342.8472	-0.0013501	245.6896	33.1632	1090.4771
145.800	-0.057167	20732.2412	-1282.7190	-0.0013458	237.7884	33.6460	1059.3995
147.600	-0.059586	18579.4477	-1221.7350	-0.0013420	230.2670	34.1140	1030.5289
149.400	-0.061998	16536.9109	-1159.9210	-0.0013386	223.1308	34.5682	1003.6182
151.200	-0.064405	14606.1323	-1097.3009	-0.0013356	216.3851	35.0098	978.4567
153.000	-0.066807	12788.5711	-1033.8965	-0.0013329	210.0349	35.4396	954.8637
154.800	-0.069204	11085.6464	-969.7283	-0.0013306	204.0852	35.8584	932.6836
156.600	-0.071597	9498.7403	-904.8154	-0.0013286	198.5409	36.2670	911.7810
158.400	-0.073987	8029.2000	-839.1756	-0.0013269	193.4067	36.6661	892.0381
160.200	-0.076374	6678.3401	-772.8255	-0.0013255	188.6870	37.0562	873.3518
162.000	-0.078759	5447.4443	-705.7807	-0.0013243	184.3866	37.4379	855.6312
163.800	-0.081141	4337.7676	-638.0560	-0.0013234	180.5096	37.8117	838.7961
165.600	-0.083523	3350.5371	-569.6653	-0.0013226	177.0604	38.1780	822.7753
167.400	-0.085903	2486.9543	-500.6215	-0.0013221	174.0432	38.5372	807.5055
169.200	-0.088282	1748.1956	-430.9372	-0.0013217	171.4622	38.8898	792.9303
171.000	-0.090661	1135.4142	-360.6241	-0.0013214	169.3212	39.2359	778.9989
172.800	-0.093039	649.7405	-289.6933	-0.0013212	167.6244	39.5760	765.6659
174.600	-0.095417	292.2836	-218.1556	-0.0013211	166.3755	39.9104	752.8903
176.400	-0.097795	64.1319	-146.0210	-0.0013211	165.5784	40.2392	740.6352
178.200	-0.100173	-33.6458	-73.2994	-0.0013211	165.4719	40.5627	728.8670
180.000	-0.102551	0.0000	0.0000	-0.0013211	165.3543	40.8811	358.7777

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.25000000 in
Computed slope at pile head = -0.00301351
Maximum bending moment = 172694.55977 lbs-in
Maximum shear force = 5161.56654 lbs
Depth of maximum bending moment = 54.00000000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 20
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.500000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	9057.4104	-0.0062464	165.3543	0.0000	0.0000
1.800	0.488757	16775.5637	9043.4878	-0.0062447	223.9646	-15.4695	56.9715
3.600	0.477519	33500.7599	9000.9153	-0.0062399	282.3989	-31.8332	119.9948
5.400	0.466293	50122.3249	8928.2726	-0.0062317	340.4711	-48.8808	188.6914
7.200	0.455085	66584.7805	8824.5154	-0.0062204	397.9875	-66.4050	262.6520
9.000	0.443900	82831.1070	8688.9700	-0.0062059	454.7487	-84.2011	341.4332
10.800	0.432743	98803.4063	8521.2740	-0.0061883	510.5526	-102.1277	424.8009
12.600	0.421622	114443.	8321.3746	-0.0061676	565.1953	-119.9829	512.2344
14.400	0.410540	129693.	8089.5575	-0.0061439	618.4739	-137.5917	603.2665
16.200	0.399504	144495.	7826.4190	-0.0061173	670.1884	-154.7844	697.3951
18.000	0.388518	158793.	7532.8562	-0.0060879	720.1433	-171.3965	794.0785
19.800	0.377587	172533.	7210.3841	-0.0060557	768.1499	-186.9058	891.0000
21.600	0.366717	185666.	6863.9443	-0.0060209	814.0319	-198.0274	972.0000
23.400	0.355912	198154.	6498.3319	-0.0059837	857.6628	-208.2086	1053.0000
25.200	0.345176	209965.	6115.2293	-0.0059441	898.9265	-217.4609	1134.0000
27.000	0.334513	221068.	5716.2976	-0.0059022	937.7179	-225.7966	1215.0000
28.800	0.323928	231436.	5303.1753	-0.0058583	973.9420	-233.2282	1296.0000
30.600	0.313423	241045.	4877.4780	-0.0058125	1007.5141	-239.7689	1377.0000
32.400	0.303003	249874.	4440.7967	-0.0057648	1038.3597	-245.4325	1458.0000
34.200	0.292670	257903.	3994.6978	-0.0057156	1066.4142	-250.2329	1539.0000
36.000	0.282427	265119.	3540.7223	-0.0056648	1091.6228	-254.1844	1620.0000
37.800	0.272277	271506.	3080.3849	-0.0056127	1113.9406	-257.3016	1701.0000
39.600	0.262221	277057.	2615.1743	-0.0055595	1133.3318	-259.5991	1782.0000
41.400	0.252263	281762.	2146.5524	-0.0055052	1149.7702	-261.0919	1863.0000
43.200	0.242402	285617.	1675.9546	-0.0054502	1163.2386	-261.7946	1944.0000
45.000	0.232642	288619.	1204.7894	-0.0053944	1173.7288	-261.7223	2025.0000
46.800	0.222982	290770.	734.4388	-0.0053382	1181.2416	-260.8894	2106.0000
48.600	0.213424	292070.	266.2587	-0.0052817	1185.7863	-259.3107	2187.0000
50.400	0.203968	292527.	-198.4212	-0.0052249	1187.3806	-257.0003	2268.0000
52.200	0.194615	292146.	-658.2964	-0.0051682	1186.0508	-253.9722	2349.0000
54.000	0.185363	290938.	-1112.0875	-0.0051116	1181.8310	-250.2401	2430.0000
55.800	0.176213	288915.	-1558.5390	-0.0050553	1174.7636	-245.8171	2511.0000
57.600	0.167164	286092.	-1996.4188	-0.0049995	1164.8987	-240.7160	2592.0000
59.400	0.158215	282484.	-2424.5172	-0.0049443	1152.2944	-234.9489	2673.0000
61.200	0.149364	278111.	-2676.5465	-0.0048899	1137.0159	-45.0837	543.3064
63.000	0.140611	273588.	-2757.6573	-0.0048364	1121.2129	-45.0395	576.5624
64.800	0.131953	268915.	-2838.2086	-0.0047837	1104.8860	-44.4620	606.5140
66.600	0.123390	264094.	-2917.3549	-0.0047320	1088.0420	-43.4784	634.2611
68.400	0.114918	259128.	-2994.6992	-0.0046812	1070.6923	-42.4597	665.0597
70.200	0.106537	254021.	-3070.1741	-0.0046314	1052.8487	-41.4012	699.4951
72.000	0.098245	248775.	-3143.7032	-0.0045826	1034.5233	-40.2979	738.3193

73.800	0.090040	243396.	-3215.2001	-0.0045349	1015.7291	-39.1431	782.5172
75.600	0.081919	237886.	-3284.5650	-0.0044882	996.4793	-37.9290	833.4070
77.400	0.073882	232250.	-3351.6822	-0.0044425	976.7880	-36.6455	892.7978
79.200	0.065926	226492.	-3416.4149	-0.0043980	956.6699	-35.2797	963.2493
81.000	0.058049	220616.	-3478.5997	-0.0043546	936.1408	-33.8145	1048.5193
82.800	0.050250	214628.	-3538.0363	-0.0043124	915.2177	-32.2263	1154.3819
84.600	0.042525	208531.	-3594.4738	-0.0042713	893.9187	-30.4819	1290.2429
86.400	0.034873	202333.	-3647.5855	-0.0042314	872.2640	-28.5311	1472.6549
88.200	0.027292	196040.	-3696.9261	-0.0041928	850.2760	-26.2919	1734.0534
90.000	0.019779	189658.	-3741.8426	-0.0041553	827.9803	-23.6154	2149.1282
91.800	0.012333	183197.	-3781.2522	-0.0041192	805.4076	-20.1730	2944.3600
93.600	0.004950	176669.	-3812.7956	-0.0040842	782.5971	-14.8753	5409.1443
95.400	-0.002371	170089.	-3815.6894	-0.0040506	759.6091	11.6600	8853.1175
97.200	-0.009632	163545.	-3788.4662	-0.0040182	736.7445	18.5880	3473.6648
99.000	-0.016836	157058.	-3751.5876	-0.0039871	714.0818	22.3881	2393.5670
100.800	-0.023986	150642.	-3708.7673	-0.0039572	691.6646	25.1901	1890.3954
102.600	-0.031082	144305.	-3661.3801	-0.0039286	669.5247	27.4624	1590.3713
104.400	-0.038128	138055.	-3610.2062	-0.0039012	647.6884	29.3974	1387.8178
106.200	-0.045127	131898.	-3555.7625	-0.0038750	626.1777	31.0956	1240.3350
108.000	-0.052078	125840.	-3498.4217	-0.0038500	605.0123	32.6164	1127.3295
109.800	-0.058986	119886.	-3438.4679	-0.0038261	584.2096	33.9989	1037.4932
111.600	-0.065853	114040.	-3376.1261	-0.0038034	563.7857	35.2698	964.0571
113.400	-0.072679	108307.	-3311.5796	-0.0037819	543.7551	36.4485	902.7014
115.200	-0.079467	102690.	-3244.9814	-0.0037614	524.1316	37.5495	850.5290
117.000	-0.086220	97193.5058	-3176.4610	-0.0037420	504.9279	38.5842	805.5181
118.800	-0.092938	91820.5629	-3106.1300	-0.0037236	486.1560	39.5614	766.2118
120.600	-0.099625	86574.4515	-3034.0854	-0.0037063	467.8272	40.4882	731.5310
122.400	-0.106281	81458.2514	-2960.4127	-0.0036900	449.9523	41.3704	700.6585
124.200	-0.112909	76474.8961	-2885.1875	-0.0036747	432.5415	42.2130	672.9626
126.000	-0.119510	71627.1889	-2808.4777	-0.0036603	415.6046	43.0201	647.9472
127.800	-0.126086	66917.8158	-2730.3441	-0.0036469	399.1510	43.7951	625.2167
129.600	-0.132639	62349.3567	-2650.8417	-0.0036343	383.1898	44.5409	604.4511
131.400	-0.139170	57924.2952	-2570.0207	-0.0036227	367.7296	45.2602	585.3892
133.200	-0.145680	53645.0268	-2487.9268	-0.0036118	352.7787	45.9552	567.8149
135.000	-0.152172	49513.8662	-2404.6020	-0.0036018	338.3453	46.6279	551.5481
136.800	-0.158647	45533.0535	-2320.0848	-0.0035926	324.4372	47.2800	536.4374
138.600	-0.165105	41704.7600	-2234.4110	-0.0035841	311.0620	47.9131	522.3544
140.400	-0.171550	38031.0929	-2147.6136	-0.0035764	298.2269	48.5285	509.1895
142.200	-0.177980	34514.1001	-2059.7233	-0.0035693	285.9393	49.1274	496.8487
144.000	-0.184399	31155.7736	-1970.7687	-0.0035630	274.2060	49.7110	485.2505
145.800	-0.190807	27958.0536	-1880.7765	-0.0035572	263.0339	50.2803	474.3244
147.600	-0.197205	24922.8315	-1789.7718	-0.0035521	252.4294	50.8361	464.0085
149.400	-0.203595	22051.9525	-1697.7780	-0.0035475	242.3992	51.3793	454.2488
151.200	-0.209976	19347.2187	-1604.8172	-0.0035435	232.9494	51.9105	444.9975
153.000	-0.216351	16810.3912	-1510.9101	-0.0035400	224.0863	52.4306	436.2124
154.800	-0.222720	14443.1922	-1416.0764	-0.0035370	215.8158	52.9401	427.8559
156.600	-0.229085	12247.3074	-1320.3346	-0.0035344	208.1438	53.4396	419.8946
158.400	-0.235444	10224.3874	-1223.7023	-0.0035322	201.0762	53.9296	412.2986
160.200	-0.241800	8376.0493	-1126.1960	-0.0035304	194.6185	54.4106	405.0411
162.000	-0.248154	6703.8787	-1027.8317	-0.0035289	188.7763	54.8830	398.0979
163.800	-0.254505	5209.4309	-928.6244	-0.0035278	183.5550	55.3473	391.4471
165.600	-0.260854	3894.2317	-828.5885	-0.0035269	178.9600	55.8037	385.0692
167.400	-0.267201	2759.7796	-727.7377	-0.0035263	174.9964	56.2528	378.9461
169.200	-0.273548	1807.5459	-626.0850	-0.0035258	171.6695	56.6946	373.0616
171.000	-0.279894	1038.9763	-523.6431	-0.0035255	168.9843	57.1297	367.4010
172.800	-0.286240	455.4917	-420.4239	-0.0035254	166.9457	57.5582	361.9506
174.600	-0.292586	58.4891	-316.4391	-0.0035253	165.5587	57.9804	356.6981
176.400	-0.298931	-150.6577	-211.6998	-0.0035253	165.8807	58.3966	351.6321
178.200	-0.305277	-170.5973	-106.2166	-0.0035254	165.9504	58.8069	346.7422
180.000	-0.311623	0.0000	0.0000	-0.0035254	165.3543	59.2116	171.0094

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection = 0.50000000 in
Computed slope at pile head = -0.00624636
Maximum bending moment = 292526.63970 lbs-in
Maximum shear force = 9057.41038 lbs
Depth of maximum bending moment = 50.40000000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 23
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-599939.	12183.6557	0.0000	2261.4132	0.0000	0.0000
1.800	0.249895	-578022.	12163.4142	-0.0001143	2184.8407	-11.2453	81.0000
3.600	0.249588	-556133.	12133.0768	-0.0002244	2108.3658	-22.4630	162.0000
5.400	0.249087	-534309.	12082.5960	-0.0003302	2032.1167	-33.6268	243.0000
7.200	0.248400	-512586.	12012.0911	-0.0004318	1956.2208	-44.7119	324.0000
9.000	0.247533	-491000.	11921.7250	-0.0005292	1880.8048	-55.6949	405.0000
10.800	0.246494	-469588.	11811.7014	-0.0006224	1805.9941	-66.5535	486.0000
12.600	0.245292	-448384.	11682.2629	-0.0007115	1731.9127	-77.2670	567.0000
14.400	0.243933	-427424.	11533.6884	-0.0007965	1658.6829	-87.8159	648.0000
16.200	0.242425	-406742.	11366.2903	-0.0008775	1586.4253	-98.1820	729.0000
18.000	0.240774	-386373.	11180.4131	-0.0009545	1515.2583	-108.3483	810.0000
19.800	0.238989	-366348.	10976.4302	-0.0010275	1445.2979	-118.2993	891.0000
21.600	0.237075	-346702.	10754.7423	-0.0010967	1376.6579	-128.0205	972.0000
23.400	0.235040	-327465.	10515.7751	-0.0011621	1309.4493	-137.4986	1053.0000
25.200	0.232891	-308669.	10259.9769	-0.0012239	1243.7804	-146.7216	1134.0000
27.000	0.230634	-290344.	9987.8171	-0.0012820	1179.7565	-155.6783	1215.0000
28.800	0.228276	-272520.	9699.7837	-0.0013366	1117.4800	-164.3588	1296.0000
30.600	0.225823	-255223.	9396.3819	-0.0013878	1057.0500	-172.7543	1377.0000
32.400	0.223280	-238483.	9078.1320	-0.0014358	998.5625	-180.8567	1458.0000
34.200	0.220654	-222325.	8745.5679	-0.0014805	942.1101	-188.6590	1539.0000
36.000	0.217950	-206775.	8399.2351	-0.0015221	887.7818	-196.1551	1620.0000
37.800	0.215174	-191857.	8039.6898	-0.0015608	835.6634	-203.3396	1701.0000
39.600	0.212331	-177596.	7667.4970	-0.0015967	785.8370	-210.2079	1782.0000
41.400	0.209426	-164013.	7283.2294	-0.0016298	738.3810	-216.7561	1863.0000
43.200	0.206464	-151130.	6887.4661	-0.0016604	693.3702	-222.9810	1944.0000
45.000	0.203449	-138967.	6480.7913	-0.0016886	650.8758	-228.8798	2025.0000
46.800	0.200385	-127544.	6063.7941	-0.0017144	610.9651	-234.4505	2106.0000
48.600	0.197277	-116878.	5637.0664	-0.0017381	573.7019	-239.6913	2187.0000
50.400	0.194128	-106987.	5201.2034	-0.0017599	539.1459	-244.6009	2268.0000
52.200	0.190941	-97887.7175	4756.8021	-0.0017798	507.3533	-249.1783	2349.0000
54.000	0.187721	-89593.8750	4304.4610	-0.0017980	478.3764	-253.4228	2430.0000
55.800	0.184469	-82119.8077	3844.7801	-0.0018146	452.2636	-257.3337	2511.0000
57.600	0.181188	-75478.2967	3378.3601	-0.0018299	429.0596	-260.9107	2592.0000
59.400	0.177881	-69681.0288	2905.8026	-0.0018440	408.8051	-264.1532	2673.0000
61.200	0.174550	-64738.5948	2625.3255	-0.0018570	391.5373	-47.4880	489.7080
63.000	0.171196	-59949.0719	2539.3017	-0.0018691	374.8037	-48.0941	505.6754
64.800	0.167821	-55314.4942	2452.6611	-0.0018803	358.6115	-48.1732	516.6929
66.600	0.164426	-50835.1860	2366.2436	-0.0018906	342.9617	-47.8462	523.7795
68.400	0.161014	-46510.1536	2280.4204	-0.0019001	327.8510	-47.5130	531.1534
70.200	0.157586	-42338.3807	2195.2027	-0.0019087	313.2757	-47.1734	538.8294
72.000	0.154143	-38318.8282	2110.6021	-0.0019165	299.2322	-46.8273	546.8238
73.800	0.150687	-34450.4338	2026.6304	-0.0019236	285.7169	-46.4746	555.1544

75.600	0.147218	-30732.1117	1943.2994	-0.0019299	272.7258	-46.1153	563.8405
77.400	0.143739	-27162.7522	1860.6214	-0.0019355	260.2553	-45.7491	572.9030
79.200	0.140250	-23741.2214	1778.6088	-0.0019405	248.3011	-45.3760	582.3650
81.000	0.136753	-20466.3605	1697.2742	-0.0019448	236.8595	-44.9957	592.2515
82.800	0.133249	-17336.9854	1616.6308	-0.0019484	225.9261	-44.6081	602.5902
84.600	0.129739	-14351.8861	1536.6919	-0.0019515	215.4968	-44.2129	613.4112
86.400	0.126224	-11509.8260	1457.4713	-0.0019540	205.5672	-43.8100	624.7481
88.200	0.122704	-8809.5414	1378.9832	-0.0019560	196.1330	-43.3990	636.6377
90.000	0.119182	-6249.7403	1301.2423	-0.0019575	187.1896	-42.9797	649.1207
91.800	0.115658	-3829.1018	1224.2639	-0.0019584	178.7324	-42.5519	662.2426
93.600	0.112132	-1546.2752	1148.0637	-0.0019590	170.7567	-42.1150	676.0537
95.400	0.108605	600.1215	1072.6582	-0.0019590	167.4510	-41.6689	690.6105
97.200	0.105079	2611.5023	998.0646	-0.0019587	174.4784	-41.2130	705.9761
99.000	0.101554	4489.3147	924.3007	-0.0019580	181.0390	-40.7469	722.2216
100.800	0.098030	6235.0414	851.3855	-0.0019570	187.1382	-40.2701	739.4273
102.600	0.094509	7850.2016	779.3386	-0.0019556	192.7813	-39.7820	757.6841
104.400	0.090990	9336.3527	708.1808	-0.0019540	197.9736	-39.2821	777.0955
106.200	0.087474	10695.0928	637.9343	-0.0019520	202.7207	-38.7696	797.7802
108.000	0.083963	11928.0624	568.6223	-0.0019498	207.0285	-38.2437	819.8743
109.800	0.080455	13036.9472	500.2696	-0.0019474	210.9027	-37.7037	843.5354
111.600	0.076952	14023.4810	432.9028	-0.0019448	214.3494	-37.1484	868.9466
113.400	0.073454	14889.4481	366.5501	-0.0019420	217.3749	-36.5768	896.3225
115.200	0.069961	15636.6880	301.2421	-0.0019390	219.9856	-35.9877	925.9157
117.000	0.066473	16267.0985	237.0116	-0.0019359	222.1881	-35.3795	958.0266
118.800	0.062991	16782.6405	173.8943	-0.0019327	223.9893	-34.7508	993.0147
120.600	0.059516	17185.3436	111.9290	-0.0019294	225.3963	-34.0996	1031.3151
122.400	0.056046	17477.3119	51.1580	-0.0019260	226.4164	-33.4237	1073.4591
124.200	0.052582	17660.7309	-8.3718	-0.0019226	227.0572	-32.7206	1120.1035
126.000	0.049124	17737.8762	-66.6088	-0.0019192	227.3267	-31.9872	1172.0709
127.800	0.045673	17711.1228	-123.4952	-0.0019158	227.2333	-31.2199	1230.4063
129.600	0.042227	17582.9568	-178.9662	-0.0019123	226.7855	-30.4145	1296.4607
131.400	0.038788	17355.9899	-232.9482	-0.0019089	225.9925	-29.5655	1372.0140
133.200	0.035355	17032.9760	-285.3570	-0.0019056	224.8640	-28.6664	1459.4653
135.000	0.031928	16616.8328	-336.0947	-0.0019023	223.4100	-27.7088	1562.1356
136.800	0.028507	16110.6693	-385.0463	-0.0018992	221.6416	-26.6818	1684.7716
138.600	0.025091	15517.8202	-432.0738	-0.0018961	219.5703	-25.5709	1834.4283
140.400	0.021681	14841.8935	-477.0081	-0.0018932	217.2088	-24.3561	2022.1164
142.200	0.018276	14086.8353	-519.6362	-0.0018903	214.5708	-23.0084	2266.1384
144.000	0.014876	13257.0230	-559.6790	-0.0018877	211.6716	-21.4835	2599.5983
145.800	0.011480	12357.4096	-596.7507	-0.0018852	208.5285	-19.7072	3089.9869
147.600	0.008089	11393.7634	-630.2719	-0.0018829	205.1617	-17.5386	3902.8704
149.400	0.004702	10373.1249	-659.2339	-0.0018808	201.5958	-14.6414	5605.4868
151.200	0.001318	9304.8962	-681.0516	-0.0018789	197.8637	-9.6005	13112.0039
153.000	-0.002062	8205.4252	-679.7040	-0.0018772	194.0224	11.0979	9685.8632
154.800	-0.005440	7141.7910	-655.9012	-0.0018757	190.3062	15.3497	5079.0388
156.600	-0.008815	6127.7849	-625.8563	-0.0018744	186.7635	18.0335	3682.4505
158.400	-0.012188	5172.1175	-591.5430	-0.0018733	183.4246	20.0923	2967.4271
160.200	-0.015559	4281.4734	-553.8421	-0.0018724	180.3129	21.7976	2521.7686
162.000	-0.018928	3461.3906	-513.2809	-0.0018716	177.4477	23.2704	2212.9148
163.800	-0.022297	2716.6532	-470.2184	-0.0018710	174.8457	24.5768	1984.0759
165.600	-0.025664	2051.5048	-424.9179	-0.0018706	172.5219	25.7571	1806.5234
167.400	-0.029031	1469.7791	-377.5825	-0.0018702	170.4894	26.8378	1664.0332
169.200	-0.032397	974.9864	-328.3745	-0.0018700	168.7607	27.8378	1546.6919
171.000	-0.035763	570.3738	-277.4270	-0.0018698	167.3471	28.7705	1448.0720
172.800	-0.039128	258.9694	-224.8518	-0.0018698	166.2591	29.6464	1363.8079
174.600	-0.042494	43.6155	-170.7441	-0.0018697	165.5067	30.4733	1290.8219
176.400	-0.045859	-73.0056	-115.1862	-0.0018697	165.6094	31.2577	1226.8769
178.200	-0.049225	-88.3507	-58.2503	-0.0018698	165.6630	32.0045	1170.3040
180.000	-0.052590	0.0000	0.0000	-0.0018698	165.3543	32.7180	559.9155

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection = 0.25000000 in

Computed slope at pile head = -0.00000213
Maximum bending moment = -599938.63276 lbs-in
Maximum shear force = 12183.65570 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 16
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-1061170.	20881.8323	0.0000	3872.8583	0.0000	0.0000
1.800	0.499815	-1023600.	20853.7559	-0.0002023	3741.5973	-15.5980	56.1737
3.600	0.499272	-986066.	20810.5880	-0.0003974	3610.4604	-32.3662	116.6884
5.400	0.498384	-948622.	20736.3510	-0.0005851	3479.6393	-50.1194	181.0148
7.200	0.497165	-911327.	20629.4400	-0.0007656	3349.3370	-68.6706	248.6239
9.000	0.495628	-874240.	20488.5877	-0.0009389	3219.7652	-87.8318	318.9839
10.800	0.493785	-837426.	20312.8728	-0.0011050	3091.1429	-107.4070	391.5319
12.600	0.491650	-800947.	20101.7122	-0.0012640	2963.6935	-127.2158	465.7552
14.400	0.489235	-764868.	19854.8529	-0.0014160	2837.6431	-147.0724	541.1111
16.200	0.486552	-729255.	19572.3749	-0.0015610	2713.2183	-166.7921	617.0474
18.000	0.483615	-694172.	19254.6895	-0.0016992	2590.6442	-186.1918	693.0001
19.800	0.480435	-659681.	18902.1136	-0.0018305	2470.1421	-205.5593	770.1491
21.600	0.477025	-625847.	18515.1749	-0.0019553	2351.9332	-224.3726	846.6447
23.400	0.473396	-592731.	18095.0212	-0.0020736	2236.2320	-242.4649	921.9274
25.200	0.469560	-560392.	17643.0978	-0.0021855	2123.2451	-259.6721	995.4206
27.000	0.465528	-528886.	17161.1434	-0.0022912	2013.1690	-275.8328	1066.5279
28.800	0.461312	-498265.	16649.0242	-0.0023909	1906.1881	-293.1886	1143.9971
30.600	0.456921	-468588.	16106.4850	-0.0024847	1802.5005	-309.6328	1219.7706
32.400	0.452367	-439906.	15535.2832	-0.0025729	1702.2940	-325.0359	1293.3409
34.200	0.447659	-412272.	14937.4074	-0.0026556	1605.7442	-339.2705	1364.1793
36.000	0.442807	-385730.	14315.0732	-0.0027330	1513.0138	-352.2119	1431.7336
37.800	0.437820	-360324.	13669.0249	-0.0028054	1424.2506	-365.6195	1503.1638
39.600	0.432707	-336097.	12999.9621	-0.0028730	1339.6077	-377.7837	1571.5257
41.400	0.427477	-313090.	12310.2147	-0.0029360	1259.2241	-388.6023	1636.3077
43.200	0.422138	-291337.	11602.2943	-0.0029947	1183.2233	-397.9760	1696.9746
45.000	0.416696	-270869.	10878.8888	-0.0030492	1111.7126	-405.8079	1752.9654
46.800	0.411160	-251712.	10138.7150	-0.0031000	1044.7818	-416.6075	1823.8468
48.600	0.405536	-233901.	9380.2251	-0.0031471	982.5539	-426.1591	1891.5351
50.400	0.399831	-217467.	8605.7434	-0.0031909	925.1382	-434.3761	1955.5196
52.200	0.394049	-202438.	7817.7495	-0.0032316	872.6284	-441.1727	2015.2578
54.000	0.388197	-188835.	7018.8767	-0.0032696	825.1022	-446.4638	2070.1733
55.800	0.382279	-176675.	6204.7732	-0.0033051	782.6203	-458.0956	2156.9926
57.600	0.376299	-165998.	5370.5581	-0.0033383	745.3149	-468.8100	2242.5226
59.400	0.370261	-156836.	4517.9455	-0.0033697	713.3078	-478.5372	2326.3807
61.200	0.364168	-149223.	4032.6502	-0.0033994	686.7097	-60.6797	299.9263
63.000	0.358023	-141805.	3922.6857	-0.0034276	660.7908	-61.5031	309.2138
64.800	0.351828	-134584.	3811.8436	-0.0034544	635.5609	-61.6547	315.4336
66.600	0.345587	-127560.	3701.1952	-0.0034799	611.0220	-61.2879	319.2203
68.400	0.339301	-120733.	3591.2134	-0.0035040	587.1703	-60.9141	323.1509
70.200	0.332972	-114102.	3481.9110	-0.0035268	564.0020	-60.5330	327.2325
72.000	0.326604	-107665.	3373.3011	-0.0035483	541.5130	-60.1446	331.4725
73.800	0.320199	-101421.	3265.3970	-0.0035686	519.6994	-59.7488	335.8788
75.600	0.313757	-95369.9757	3158.2121	-0.0035877	498.5569	-59.3455	340.4602

77.400	0.307283	-89509.4048	3051.7601	-0.0036056	478.0813	-58.9345	345.2260
79.200	0.300777	-83838.4681	2946.0551	-0.0036225	458.2682	-58.5156	350.1864
81.000	0.294242	-78355.8918	2841.1112	-0.0036382	439.1133	-58.0887	355.3526
82.800	0.287680	-73060.3730	2736.9431	-0.0036529	420.6118	-57.6536	360.7364
84.600	0.281092	-67950.5800	2633.5657	-0.0036666	402.7593	-57.2101	366.3511
86.400	0.274480	-63025.1507	2530.9943	-0.0036793	385.5509	-56.7580	372.2110
88.200	0.267846	-58282.6926	2429.2447	-0.0036911	368.9818	-56.2971	378.3317
90.000	0.261192	-53721.7819	2328.3330	-0.0037019	353.0469	-55.8270	384.7304
91.800	0.254519	-49340.9622	2228.2760	-0.0037119	337.7412	-55.3475	391.4260
93.600	0.247829	-45138.7444	2129.0908	-0.0037211	323.0596	-54.8583	398.4391
95.400	0.241123	-41113.6050	2030.7953	-0.0037295	308.9966	-54.3590	405.7928
97.200	0.234403	-37263.9854	1933.4080	-0.0037371	295.5468	-53.8492	413.5123
99.000	0.227670	-33588.2903	1836.9480	-0.0037440	282.7047	-53.3286	421.6258
100.800	0.220925	-30084.8871	1741.4352	-0.0037501	270.4646	-52.7967	430.1646
102.600	0.214169	-26752.1037	1646.8904	-0.0037556	258.8205	-52.2530	439.1636
104.400	0.207405	-23588.2276	1553.3354	-0.0037605	247.7666	-51.6970	448.6621
106.200	0.200632	-20591.5035	1460.7929	-0.0037648	237.2967	-51.1280	458.7039
108.000	0.193851	-17760.1321	1369.2867	-0.0037685	227.4045	-50.5455	469.3388
109.800	0.187065	-15092.2676	1278.8420	-0.0037717	218.0835	-49.9487	480.6230
111.600	0.180273	-12586.0152	1189.4851	-0.0037744	209.3272	-49.3368	492.6204
113.400	0.173477	-10239.4293	1101.2441	-0.0037766	201.1287	-48.7088	505.4042
115.200	0.166677	-8050.5098	1014.1485	-0.0037784	193.4811	-48.0640	519.0584
117.000	0.159875	-6017.1994	928.2300	-0.0037798	186.3772	-47.4011	533.6802
118.800	0.153070	-4137.3801	843.5221	-0.0037808	179.8095	-46.7188	549.3822
120.600	0.146264	-2408.8692	760.0608	-0.0037814	173.7704	-46.0159	566.2962
122.400	0.139457	-829.4144	677.8848	-0.0037817	168.2521	-45.2908	584.5776
124.200	0.132650	603.3103	597.0356	-0.0037817	167.4622	-44.5416	604.4105
126.000	0.125843	1891.7115	517.5585	-0.0037815	171.9636	-43.7664	626.0152
127.800	0.119036	3038.2819	439.5023	-0.0037810	175.9694	-42.9627	649.6577
129.600	0.112231	4045.6085	362.9207	-0.0037803	179.4888	-42.1280	675.6625
131.400	0.105427	4916.3812	287.8725	-0.0037795	182.5311	-41.2589	704.4299
133.200	0.098625	5653.4029	214.4228	-0.0037784	185.1061	-40.3519	736.4601
135.000	0.091825	6259.6015	142.6440	-0.0037773	187.2241	-39.4024	772.3873
136.800	0.085027	6738.0444	72.6171	-0.0037760	188.8956	-38.4052	813.0290
138.600	0.078231	7091.9557	4.4342	-0.0037747	190.1321	-37.3536	859.4589
140.400	0.071438	7324.7372	-61.7998	-0.0037733	190.9454	-36.2397	913.1193
142.200	0.064647	7439.9946	-125.9634	-0.0037718	191.3481	-35.0532	975.9978
144.000	0.057859	7441.5704	-187.9141	-0.0037704	191.3536	-33.7809	1050.9210
145.800	0.051074	7333.5868	-247.4819	-0.0037690	190.9763	-32.4054	1142.0629
147.600	0.044291	7120.5020	-304.4591	-0.0037676	190.2319	-30.9026	1255.8864
149.400	0.037511	6807.1881	-358.5857	-0.0037662	189.1372	-29.2381	1403.0219
151.200	0.030733	6399.0430	-409.5235	-0.0037649	187.7112	-27.3595	1602.4225
153.000	0.023957	5902.1593	-456.8097	-0.0037637	185.9752	-25.1807	1891.9301
154.800	0.017183	5323.6036	-499.7599	-0.0037626	183.9539	-22.5418	2361.2917
156.600	0.010412	4671.9345	-537.2173	-0.0037617	181.6771	-19.0776	3298.1907
158.400	0.003641	3958.3855	-566.4928	-0.0037608	179.1841	-13.4508	6648.8467
160.200	-0.003127	3201.1977	-567.1188	-0.0037601	176.5386	12.7553	7341.5721
162.000	-0.009895	2485.2903	-538.7712	-0.0037596	174.0374	18.7420	3409.3460
163.800	-0.016662	1830.0703	-501.8327	-0.0037592	171.7482	22.3009	2409.1900
165.600	-0.023428	1247.0783	-459.2749	-0.0037589	169.7114	24.9855	1919.6670
167.400	-0.030194	745.0212	-412.3156	-0.0037587	167.9573	27.1915	1621.0184
169.200	-0.036959	331.0534	-361.6642	-0.0037586	166.5110	29.0878	1416.6454
171.000	-0.043725	11.3254	-307.7969	-0.0037585	165.3939	30.7647	1266.4843
172.800	-0.050490	-208.7250	-251.0599	-0.0037586	166.0836	32.2764	1150.6740
174.600	-0.057255	-324.1969	-191.7186	-0.0037586	166.4870	33.6583	1058.1537
176.400	-0.064021	-330.6110	-129.9844	-0.0037587	166.5094	34.9353	982.2337
178.200	-0.070787	-223.8299	-66.0300	-0.0037587	166.1363	36.1252	918.6105
180.000	-0.077552	0.0000	0.0000	-0.0037587	165.3543	37.2415	432.1896

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

Pile-head deflection = 0.50000000 in
Computed slope at pile head = -0.00000365

Maximum bending moment = -1061170. lbs-in
Maximum shear force = 20881.83234 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 18
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	172695.	5161.5665
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	292527.	9057.4104
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-599939.	12183.6557
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-1061170.	20881.8323

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 18 inch L=30 fill 10.lpd
Name of output file: pile 10 18 inch L=30 fill 10.lpo
Name of plot output file: pile 10 18 inch L=30 fill 10.lpp
Name of runtime file: pile 10 18 inch L=30 fill 10.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:55:28

Problem Title

RH Fdn Pile 148 cut off L=15 dia 18 Fill 10 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	18.00000000	2576.0000	254.0000	3600000.
2	360.0000	18.00000000	2576.0000	254.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 120.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 240.000 in

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 240.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	120.00	0.06900
3	120.00	0.03300
4	240.00	0.03300
5	240.00	0.03300
6	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 6 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	120.000	0.00000	30.00	------	------
3	120.000	1.04100	0.00	0.02000	0.0
4	240.000	1.04100	0.00	0.02000	0.0
5	240.000	0.00000	32.00	------	------
6	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	5539.1988	-0.0031809	165.3543	0.0000	0.0000
1.800	0.244274	10211.0322	5529.3057	-0.0031799	201.0295	-10.9923	81.0000
3.600	0.238552	20386.2995	5500.0899	-0.0031769	236.5798	-21.4697	162.0000
5.400	0.232838	30491.7056	5452.4773	-0.0031720	271.8859	-31.4331	243.0000
7.200	0.227133	40494.8212	5387.3920	-0.0031651	306.8347	-40.8840	324.0000
9.000	0.221443	50364.8785	5305.7542	-0.0031563	341.3186	-49.8247	405.0000
10.800	0.215771	60072.7646	5208.4796	-0.0031456	375.2359	-58.2581	486.0000
12.600	0.210119	69591.0130	5096.4786	-0.0031330	408.4906	-66.1875	567.0000
14.400	0.204492	78893.7926	4970.6544	-0.0031186	440.9926	-73.6171	648.0000
16.200	0.198892	87956.8951	4831.9027	-0.0031024	472.6571	-80.5514	729.0000
18.000	0.193323	96757.7203	4681.1104	-0.0030844	503.4054	-86.9956	810.0000
19.800	0.187788	105275.	4519.1547	-0.0030648	533.1639	-92.9553	891.0000
21.600	0.182290	113490.	4346.9020	-0.0030436	561.8647	-98.4366	972.0000
23.400	0.176831	121384.	4165.2072	-0.0030208	589.4454	-103.4464	1053.0000
25.200	0.171415	128942.	3974.9131	-0.0029965	615.8490	-107.9916	1134.0000
27.000	0.166044	136147.	3776.8490	-0.0029708	641.0234	-112.0797	1215.0000
28.800	0.160720	142987.	3571.8305	-0.0029437	664.9222	-115.7186	1296.0000
30.600	0.155447	149451.	3360.6587	-0.0029153	687.5036	-118.9167	1377.0000
32.400	0.150225	155527.	3144.1195	-0.0028857	708.7314	-121.6824	1458.0000
34.200	0.145058	161206.	2922.9831	-0.0028550	728.5737	-124.0247	1539.0000
36.000	0.139947	166481.	2698.0037	-0.0028232	747.0038	-125.9525	1620.0000
37.800	0.134895	171346.	2469.9185	-0.0027904	763.9996	-127.4754	1701.0000
39.600	0.129902	175795.	2239.4481	-0.0027567	779.5436	-128.6028	1782.0000
41.400	0.124971	179824.	2007.2955	-0.0027222	793.6228	-129.3445	1863.0000
43.200	0.120102	183432.	1774.1463	-0.0026869	806.2286	-129.7101	1944.0000
45.000	0.115298	186618.	1540.6685	-0.0026510	817.3568	-129.7097	2025.0000
46.800	0.110558	189380.	1307.5118	-0.0026145	827.0070	-129.3532	2106.0000
48.600	0.105885	191720.	1075.3084	-0.0025775	835.1833	-128.6505	2187.0000
50.400	0.101279	193641.	844.6724	-0.0025401	841.8935	-127.6117	2268.0000
52.200	0.096741	195145.	616.1999	-0.0025024	847.1492	-126.2466	2349.0000
54.000	0.092270	196237.	390.4694	-0.0024644	850.9658	-124.5651	2430.0000
55.800	0.087869	196923.	168.0416	-0.0024263	853.3622	-122.5769	2511.0000
57.600	0.083536	197209.	-50.5400	-0.0023880	854.3610	-120.2916	2592.0000
59.400	0.079272	197102.	-264.7493	-0.0023498	853.9880	-117.7187	2673.0000
61.200	0.075077	196611.	-474.0768	-0.0023115	852.2724	-114.8674	2754.0000
63.000	0.070950	195745.	-678.0294	-0.0022735	849.2464	-111.7467	2835.0000
64.800	0.066892	194514.	-876.1303	-0.0022356	844.9454	-108.3654	2916.0000
66.600	0.062902	192929.	-1067.9180	-0.0021980	839.4077	-104.7320	2997.0000
68.400	0.058979	191002.	-1252.9462	-0.0021607	832.6746	-100.8549	3078.0000
70.200	0.055123	188745.	-1430.7831	-0.0021239	824.7900	-96.7417	3159.0000
72.000	0.051333	186172.	-1601.0109	-0.0020875	815.8007	-92.4003	3240.0000
73.800	0.047609	183297.	-1763.2251	-0.0020516	805.7558	-87.8377	3321.0000
75.600	0.043948	180135.	-1917.0339	-0.0020164	794.7073	-83.0609	3402.0000
77.400	0.040350	176701.	-2062.0575	-0.0019817	782.7092	-78.0765	3483.0000
79.200	0.036813	173011.	-2197.9277	-0.0019478	769.8183	-72.8904	3564.0000
81.000	0.033338	169083.	-2324.2867	-0.0019146	756.0934	-67.5085	3645.0000
82.800	0.029921	164933.	-2440.7868	-0.0018822	741.5957	-61.9360	3726.0000
84.600	0.026562	160580.	-2547.0894	-0.0018506	726.3884	-56.1780	3807.0000

86.400	0.023259	156043.	-2642.8645	-0.0018199	710.5369	-50.2387	3888.0000
88.200	0.020010	151341.	-2727.7896	-0.0017900	694.1087	-44.1225	3969.0000
90.000	0.016815	146494.	-2801.5493	-0.0017611	677.1734	-37.8328	4050.0000
91.800	0.013670	141522.	-2863.8345	-0.0017332	659.8022	-31.3730	4131.0000
93.600	0.010575	136446.	-2914.3414	-0.0017062	642.0686	-24.7459	4212.0000
95.400	0.007528	131288.	-2952.7712	-0.0016802	624.0480	-17.9539	4293.0000
97.200	0.004526	126070.	-2978.8289	-0.0016552	605.8173	-10.9991	4374.0000
99.000	0.001569	120815.	-2992.2231	-0.0016313	587.4557	-3.8833	4455.0000
100.800	-0.001346	115545.	-2992.6648	-0.0016083	569.0440	3.3924	4536.0000
102.600	-0.004221	110284.	-2979.8674	-0.0015864	550.6647	10.8269	4617.0000
104.400	-0.007057	105057.	-2953.5456	-0.0015655	532.4023	18.4196	4698.0000
106.200	-0.009857	99888.3324	-2913.4149	-0.0015456	514.3431	26.1701	4779.0000
108.000	-0.012622	94802.6978	-2859.1914	-0.0015267	496.5749	34.0783	4860.0000
109.800	-0.015353	89826.0858	-2790.5910	-0.0015088	479.1877	42.1444	4941.0000
111.600	-0.018053	84984.7034	-2707.3292	-0.0014919	462.2729	50.3688	5022.0000
113.400	-0.020724	80305.2688	-2609.1205	-0.0014758	445.9240	58.7520	5103.0000
115.200	-0.023366	75815.0124	-2495.6784	-0.0014607	430.2360	67.2948	5184.0000
117.000	-0.025982	71541.6785	-2366.7149	-0.0014464	415.3058	75.9979	5265.0000
118.800	-0.028573	67513.5281	-2221.9408	-0.0014329	401.2323	84.8622	5346.0000
120.600	-0.031141	63759.3407	-2120.8346	-0.0014201	388.1160	27.4780	1588.2977
122.400	-0.033686	60093.2463	-2070.7181	-0.0014081	375.3074	28.2070	1507.2501
124.200	-0.036210	56517.6608	-2019.3267	-0.0013968	362.8151	28.8946	1436.3630
126.000	-0.038714	53034.8644	-1966.7303	-0.0013862	350.6469	29.5459	1373.7293
127.800	-0.041200	49647.0185	-1912.9903	-0.0013762	338.8105	30.1651	1317.9001
129.600	-0.043668	46356.1791	-1858.1614	-0.0013669	327.3130	30.7559	1267.7534
131.400	-0.046121	43164.3086	-1802.2921	-0.0013582	316.1613	31.3211	1222.4059
133.200	-0.048558	40073.2852	-1745.4260	-0.0013501	305.3619	31.8634	1181.1519
135.000	-0.050981	37084.9112	-1687.6026	-0.0013426	294.9212	32.3848	1143.4203
136.800	-0.053391	34200.9197	-1628.8577	-0.0013357	284.8451	32.8873	1108.7438
138.600	-0.055789	31422.9813	-1569.2238	-0.0013293	275.1396	33.3725	1076.7358
140.400	-0.058177	28752.7088	-1508.7309	-0.0013235	265.8102	33.8419	1047.0739
142.200	-0.060554	26191.6620	-1447.4062	-0.0013182	256.8625	34.2967	1019.4866
144.000	-0.062922	23741.3522	-1385.2749	-0.0013133	248.3016	34.7381	993.7437
145.800	-0.065282	21403.2453	-1322.3604	-0.0013089	240.1327	35.1670	969.6487
147.600	-0.067634	19178.7653	-1258.6841	-0.0013050	232.3609	35.5844	947.0329
149.400	-0.069980	17069.2974	-1194.2662	-0.0013015	224.9909	35.9911	925.7504
151.200	-0.072320	15076.1902	-1129.1252	-0.0012984	218.0274	36.3878	905.6744
153.000	-0.074654	13200.7582	-1063.2785	-0.0012956	211.4750	36.7752	886.6943
154.800	-0.076984	11444.2840	-996.7424	-0.0012932	205.3382	37.1538	868.7131
156.600	-0.079310	9808.0202	-929.5322	-0.0012912	199.6215	37.5242	851.6451
158.400	-0.081632	8293.1911	-861.6621	-0.0012894	194.3290	37.8870	835.4149
160.200	-0.083951	6900.9941	-793.1455	-0.0012879	189.4649	38.2425	819.9554
162.000	-0.086269	5632.6015	-723.9953	-0.0012867	185.0335	38.5911	805.2068
163.800	-0.088584	4489.1614	-654.2234	-0.0012857	181.0385	38.9333	791.1157
165.600	-0.090897	3471.7992	-583.8411	-0.0012850	177.4841	39.2693	777.6342
167.400	-0.093209	2581.6186	-512.8592	-0.0012844	174.3740	39.5995	764.7195
169.200	-0.095521	1819.7024	-441.2879	-0.0012839	171.7120	39.9241	752.3326
171.000	-0.097832	1187.1138	-369.1370	-0.0012836	169.5019	40.2435	740.4387
172.800	-0.100142	684.8968	-296.4158	-0.0012835	167.7472	40.5578	729.0060
174.600	-0.102452	314.0771	-223.1331	-0.0012834	166.4516	40.8673	718.0058
176.400	-0.104762	75.6629	-149.2975	-0.0012833	165.6187	41.1722	707.4118
178.200	-0.107072	-29.3544	-74.9172	-0.0012833	165.4569	41.4726	697.2003
180.000	-0.109382	0.0000	0.0000	-0.0012833	165.3543	41.7687	343.6747

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00318088
Maximum bending moment            =   197209.02756 lbs-in
Maximum shear force               =     5539.19883 lbs
Depth of maximum bending moment   =    57.60000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             13
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.500000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	10130.9374	-0.0063883	165.3543	0.0000	0.0000
1.800	0.488501	18718.6428	10117.0175	-0.0063865	230.7533	-15.4666	56.9903
3.600	0.477009	37386.8993	10074.4589	-0.0063810	295.9763	-31.8207	120.0761
5.400	0.465529	55951.5079	10001.8540	-0.0063720	360.8371	-48.8514	188.8870
7.200	0.454070	74357.0172	9898.1725	-0.0063593	425.1420	-66.3503	263.0227
9.000	0.442636	92546.4602	9762.7560	-0.0063431	488.6921	-84.1125	342.0475
10.800	0.431234	110462.	9595.2573	-0.0063234	551.2853	-101.9972	425.7430
12.600	0.419871	128045.	9395.6379	-0.0063003	612.7182	-119.8022	513.5951
14.400	0.408553	145239.	9164.1987	-0.0062738	672.7884	-137.3525	605.1462
16.200	0.397286	161985.	8901.5508	-0.0062439	731.2964	-154.4786	699.9030
18.000	0.386075	178229.	8608.6050	-0.0062109	788.0474	-171.0166	797.3320
19.800	0.374926	193915.	8287.6604	-0.0061748	842.8533	-185.5886	891.0000
21.600	0.363846	208998.	7943.8016	-0.0061357	895.5485	-196.4767	972.0000
23.400	0.352838	223441.	7581.2035	-0.0060937	946.0089	-206.4102	1053.0000
25.200	0.341908	237212.	7201.5724	-0.0060490	994.1212	-215.4022	1134.0000
27.000	0.331061	250281.	6806.5907	-0.0060017	1039.7831	-223.4664	1215.0000
28.800	0.320302	262623.	6397.9152	-0.0059519	1082.9026	-230.6174	1296.0000
30.600	0.309634	274213.	5977.1763	-0.0058998	1123.3980	-236.8703	1377.0000
32.400	0.299063	285033.	5545.9765	-0.0058456	1161.1980	-242.2406	1458.0000
34.200	0.288590	295063.	5105.8897	-0.0057893	1196.2413	-246.7447	1539.0000
36.000	0.278221	304289.	4658.4604	-0.0057311	1228.4763	-250.3990	1620.0000
37.800	0.267958	312700.	4205.2028	-0.0056712	1257.8612	-253.2206	1701.0000
39.600	0.257805	320285.	3747.6004	-0.0056098	1284.3637	-255.2266	1782.0000
41.400	0.247763	327039.	3287.1052	-0.0055470	1307.9606	-256.4347	1863.0000
43.200	0.237836	332958.	2825.1378	-0.0054829	1328.6380	-256.8624	1944.0000
45.000	0.228024	338039.	2363.0869	-0.0054178	1346.3906	-256.5275	2025.0000
46.800	0.218331	342284.	1902.3091	-0.0053518	1361.2220	-255.4478	2106.0000
48.600	0.208758	345696.	1444.1292	-0.0052850	1373.1443	-253.6410	2187.0000
50.400	0.199305	348282.	989.8399	-0.0052177	1382.1776	-251.1248	2268.0000
52.200	0.189974	350049.	540.7026	-0.0051499	1388.3504	-247.9167	2349.0000
54.000	0.180766	351007.	97.9471	-0.0050819	1391.6989	-244.0338	2430.0000
55.800	0.171680	351170.	-337.2273	-0.0050137	1392.2669	-239.4933	2511.0000
57.600	0.162716	350551.	-763.6519	-0.0049456	1390.1059	-234.3117	2592.0000
59.400	0.153876	349168.	-1180.1872	-0.0048777	1385.2745	-228.5053	2673.0000
61.200	0.145157	347040.	-1585.7228	-0.0048101	1377.8386	-222.0898	2754.0000
63.000	0.136559	344187.	-1979.1762	-0.0047430	1367.8709	-215.0807	2835.0000
64.800	0.128082	340632.	-2359.4921	-0.0046766	1355.4508	-207.4925	2916.0000
66.600	0.119723	336400.	-2725.6409	-0.0046109	1340.6645	-199.3395	2997.0000
68.400	0.111483	331517.	-3076.6183	-0.0045461	1323.6045	-190.6353	3078.0000
70.200	0.103358	326011.	-3411.4435	-0.0044822	1304.3694	-181.3927	3159.0000
72.000	0.095347	319913.	-3729.1583	-0.0044196	1283.0643	-171.6238	3240.0000
73.800	0.087447	313255.	-4028.8258	-0.0043581	1259.8001	-161.3401	3321.0000
75.600	0.079657	306069.	-4309.5291	-0.0042980	1234.6934	-150.5524	3402.0000
77.400	0.071974	298390.	-4570.3697	-0.0042393	1207.8669	-139.2705	3483.0000
79.200	0.064396	290256.	-4810.4663	-0.0041822	1179.4485	-127.5035	3564.0000
81.000	0.056918	281705.	-5028.9533	-0.0041267	1149.5718	-115.2598	3645.0000
82.800	0.049540	272776.	-5224.9794	-0.0040729	1118.3761	-102.5469	3726.0000
84.600	0.042256	263511.	-5397.7060	-0.0040208	1086.0055	-89.3715	3807.0000
86.400	0.035065	253952.	-5546.3059	-0.0039706	1052.6097	-75.7394	3888.0000

88.200	0.027962	244144.	-5669.9615	-0.0039223	1018.3436	-61.6557	3969.0000
90.000	0.020944	234133.	-5767.8638	-0.0038759	983.3670	-47.1247	4050.0000
91.800	0.014009	223966.	-5839.2109	-0.0038314	947.8449	-32.1498	4131.0000
93.600	0.007151	213692.	-5883.2062	-0.0037889	911.9475	-16.7339	4212.0000
95.400	0.000368	203360.	-5899.0576	-0.0037485	875.8496	-0.8787948	4293.0000
97.200	-0.006343	193022.	-5885.9759	-0.0037100	839.7314	15.4141	4374.0000
99.000	-0.012988	182731.	-5843.1735	-0.0036735	803.7778	32.1441	4455.0000
100.800	-0.019568	172542.	-5769.8638	-0.0036390	768.1787	49.3112	4536.0000
102.600	-0.026088	162510.	-5665.2593	-0.0036065	733.1289	66.9159	4617.0000
104.400	-0.032551	152692.	-5528.5716	-0.0035759	698.8283	84.9593	4698.0000
106.200	-0.038961	143148.	-5359.0099	-0.0035472	665.4815	103.4427	4779.0000
108.000	-0.045321	133936.	-5155.7802	-0.0035203	633.2984	122.3680	4860.0000
109.800	-0.051635	125119.	-4918.0855	-0.0034952	602.4937	141.7372	4941.0000
111.600	-0.057904	116759.	-4645.1246	-0.0034717	573.2869	161.5527	5022.0000
113.400	-0.064133	108921.	-4336.0921	-0.0034498	545.9029	181.8168	5103.0000
115.200	-0.070324	101671.	-3990.1784	-0.0034294	520.5715	202.5318	5184.0000
117.000	-0.076479	95075.3439	-3606.5697	-0.0034103	497.5275	223.7001	5265.0000
118.800	-0.082601	89203.0331	-3184.4482	-0.0033924	477.0109	245.3237	5346.0000
120.600	-0.088691	84124.2621	-2928.6029	-0.0033756	459.2667	38.9487	790.4689
122.400	-0.094753	79170.4507	-2857.7142	-0.0033597	441.9592	39.8165	756.3873
124.200	-0.100786	74344.4831	-2785.2995	-0.0033448	425.0983	40.6443	725.8892
126.000	-0.106794	69649.1120	-2711.4269	-0.0033309	408.6936	41.4363	698.4036
127.800	-0.112777	65086.9727	-2636.1577	-0.0033178	392.7545	42.1961	673.4771
129.600	-0.118738	60660.5938	-2559.5470	-0.0033056	377.2896	42.9268	650.7449
131.400	-0.124678	56372.4075	-2481.6451	-0.0032942	362.3076	43.6309	629.9100
133.200	-0.130597	52224.7583	-2402.4975	-0.0032837	347.8166	44.3108	610.7278
135.000	-0.136499	48219.9097	-2322.1462	-0.0032739	333.8245	44.9684	592.9951
136.800	-0.142384	44360.0511	-2240.6297	-0.0032650	320.3390	45.6056	576.5414
138.600	-0.148253	40647.3037	-2157.9833	-0.0032567	307.3674	46.2238	561.2227
140.400	-0.154108	37083.7248	-2074.2399	-0.0032492	294.9170	46.8244	546.9161
142.200	-0.159950	33671.3128	-1989.4301	-0.0032423	282.9948	47.4088	533.5165
144.000	-0.165780	30412.0112	-1903.5820	-0.0032361	271.6075	47.9779	520.9332
145.800	-0.171600	27307.7117	-1816.7223	-0.0032305	260.7617	48.5329	509.0876
147.600	-0.177410	24360.2581	-1728.8756	-0.0032255	250.4639	49.0746	497.9111
149.400	-0.183211	21571.4486	-1640.0651	-0.0032210	240.7204	49.6038	487.3435
151.200	-0.189005	18943.0387	-1550.3126	-0.0032171	231.5373	50.1212	477.3320
153.000	-0.194793	16476.7437	-1459.6386	-0.0032136	222.9206	50.6277	467.8300
154.800	-0.200574	14174.2406	-1368.0624	-0.0032107	214.8761	51.1237	458.7959
156.600	-0.206351	12037.1702	-1275.6022	-0.0032081	207.4097	51.6098	450.1928
158.400	-0.212123	10067.1392	-1182.2753	-0.0032060	200.5268	52.0867	441.9879
160.200	-0.217892	8265.7212	-1088.0981	-0.0032042	194.2330	52.5546	434.1516
162.000	-0.223659	6634.4589	-993.0862	-0.0032027	188.5337	53.0142	426.6573
163.800	-0.229422	5174.8653	-897.2543	-0.0032016	183.4342	53.4657	419.4810
165.600	-0.235184	3888.4248	-800.6164	-0.0032007	178.9397	53.9096	412.6013
167.400	-0.240945	2776.5943	-703.1862	-0.0032001	175.0552	54.3462	405.9983
169.200	-0.246705	1840.8049	-604.9763	-0.0031996	171.7857	54.7759	399.6544
171.000	-0.252464	1082.4623	-505.9991	-0.0031993	169.1362	55.1988	393.5533
172.800	-0.258222	502.9480	-406.2663	-0.0031992	167.1115	55.6153	387.6802
174.600	-0.263981	103.6200	-305.7894	-0.0031991	165.7164	56.0257	382.0216
176.400	-0.269739	-114.1862	-204.5791	-0.0031991	165.7533	56.4302	376.5651
178.200	-0.275497	-149.1570	-102.6459	-0.0031992	165.8755	56.8289	371.2994
180.000	-0.281256	0.0000	0.0000	-0.0031992	165.3543	57.2221	183.1069

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00638830
Maximum bending moment            =   351169.64682 lbs-in
Maximum shear force               =    10130.93740 lbs
Depth of maximum bending moment   =    55.80000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             11
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-819972.	16030.8801	0.0000	3030.1623	0.0000	0.0000
1.800	0.249857	-791128.	16010.6417	-0.0001564	2929.3896	-11.2436	81.0000
3.600	0.249437	-762310.	15980.3181	-0.0003071	2828.7036	-22.4493	162.0000
5.400	0.248751	-733553.	15929.8905	-0.0004523	2728.2327	-33.5814	243.0000
7.200	0.247809	-704894.	15859.5222	-0.0005919	2628.1043	-44.6056	324.0000
9.000	0.246620	-676369.	15769.4365	-0.0007259	2528.4447	-55.4896	405.0000
10.800	0.245195	-648014.	15659.9134	-0.0008545	2429.3785	-66.2028	486.0000
12.600	0.243544	-619864.	15531.2861	-0.0009775	2331.0285	-76.7164	567.0000
14.400	0.241676	-591954.	15383.9382	-0.0010951	2233.5152	-87.0035	648.0000
16.200	0.239602	-564316.	15218.3002	-0.0012073	2136.9564	-97.0387	729.0000
18.000	0.237330	-536985.	15034.8467	-0.0013142	2041.4671	-106.7985	810.0000
19.800	0.234871	-509992.	14834.0932	-0.0014158	1947.1593	-116.2609	891.0000
21.600	0.232233	-483368.	14616.5931	-0.0015122	1854.1413	-125.4058	972.0000
23.400	0.229427	-457144.	14382.9349	-0.0016035	1762.5182	-134.2145	1053.0000
25.200	0.226460	-431347.	14133.7388	-0.0016897	1672.3909	-142.6700	1134.0000
27.000	0.223343	-406007.	13869.6547	-0.0017710	1583.8565	-150.7568	1215.0000
28.800	0.220085	-381149.	13591.3586	-0.0018474	1497.0078	-158.4610	1296.0000
30.600	0.216693	-356799.	13299.5508	-0.0019190	1411.9333	-165.7700	1377.0000
32.400	0.213176	-332980.	12994.9523	-0.0019860	1328.7171	-172.6727	1458.0000
34.200	0.209543	-309717.	12678.3032	-0.0020483	1247.4384	-179.1596	1539.0000
36.000	0.205802	-287029.	12350.3598	-0.0021062	1168.1719	-185.2220	1620.0000
37.800	0.201961	-264937.	12011.8923	-0.0021598	1090.9874	-190.8530	1701.0000
39.600	0.198027	-243459.	11663.6827	-0.0022092	1015.9497	-196.0466	1782.0000
41.400	0.194008	-222613.	11306.5224	-0.0022544	943.1188	-200.7982	1863.0000
43.200	0.189911	-202415.	10941.2104	-0.0022956	872.5494	-205.1040	1944.0000
45.000	0.185744	-182878.	10568.5515	-0.0023330	804.2915	-208.9615	2025.0000
46.800	0.181512	-164015.	10189.3537	-0.0023667	738.3896	-212.3693	2106.0000
48.600	0.177223	-145838.	9804.4275	-0.0023968	674.8832	-215.3265	2187.0000
50.400	0.172884	-128357.	9414.5834	-0.0024234	613.8069	-217.8336	2268.0000
52.200	0.168499	-111580.	9020.6306	-0.0024467	555.1898	-219.8916	2349.0000
54.000	0.164076	-95512.8782	8623.3760	-0.0024668	499.0562	-221.5024	2430.0000
55.800	0.159619	-80162.4473	8223.6222	-0.0024838	445.4250	-222.6685	2511.0000
57.600	0.155134	-65532.2860	7822.1668	-0.0024980	394.3103	-223.3931	2592.0000
59.400	0.150626	-51624.9569	7419.8008	-0.0025093	345.7210	-223.6802	2673.0000
61.200	0.146101	-38441.5940	7017.3082	-0.0025181	299.6611	-223.5339	2754.0000
63.000	0.141561	-25981.9167	6615.4644	-0.0025243	256.1297	-222.9591	2835.0000
64.800	0.137013	-14244.2458	6215.0362	-0.0025282	215.1207	-221.9611	2916.0000
66.600	0.132460	-3225.5199	5816.7802	-0.0025299	176.6236	-220.5455	2997.0000
68.400	0.127905	7078.6858	5421.4429	-0.0025295	190.0858	-218.7182	3078.0000
70.200	0.123353	16674.1408	5029.7598	-0.0025272	223.6103	-216.4853	3159.0000
72.000	0.118807	25567.9388	4642.4552	-0.0025231	254.6833	-213.8532	3240.0000
73.800	0.114270	33768.4774	4260.2418	-0.0025174	283.3343	-210.8284	3321.0000
75.600	0.109745	41285.4364	3883.8203	-0.0025101	309.5969	-207.4176	3402.0000
77.400	0.105234	48129.7565	3513.8798	-0.0025014	333.5095	-203.6274	3483.0000
79.200	0.100740	54313.6174	3151.0970	-0.0024915	355.1146	-199.4646	3564.0000
81.000	0.096265	59850.4162	2796.1368	-0.0024804	374.4590	-194.9357	3645.0000
82.800	0.091810	64754.7452	2449.6522	-0.0024683	391.5937	-190.0473	3726.0000
84.600	0.087379	69042.3708	2112.2844	-0.0024553	406.5738	-184.8058	3807.0000
86.400	0.082971	72730.2125	1784.6633	-0.0024416	419.4583	-179.2177	3888.0000
88.200	0.078589	75836.3217	1467.4074	-0.0024271	430.3104	-173.2888	3969.0000

90.000	0.074233	78379.8623	1161.1247	-0.0024122	439.1970	-167.0253	4050.0000
91.800	0.069905	80381.0909	866.4127	-0.0023968	446.1889	-160.4325	4131.0000
93.600	0.065605	81861.3386	583.8591	-0.0023810	451.3606	-153.5159	4212.0000
95.400	0.061334	82842.9935	314.0423	-0.0023650	454.7903	-146.2806	4293.0000
97.200	0.057091	83349.4838	57.5318	-0.0023489	456.5598	-138.7311	4374.0000
99.000	0.052878	83405.2622	-185.1109	-0.0023327	456.7547	-130.8719	4455.0000
100.800	0.048693	83035.7919	-413.3317	-0.0023166	455.4639	-122.7068	4536.0000
102.600	0.044538	82267.5330	-626.5835	-0.0023005	452.7797	-114.2397	4617.0000
104.400	0.040411	81127.9305	-824.3254	-0.0022847	448.7982	-105.4735	4698.0000
106.200	0.036313	79645.4033	-1006.0216	-0.0022691	443.6186	-96.4112	4779.0000
108.000	0.032243	77849.3350	-1171.1414	-0.0022538	437.3435	-87.0552	4860.0000
109.800	0.028199	75770.0655	-1319.1579	-0.0022389	430.0789	-77.4076	4941.0000
111.600	0.024183	73438.8837	-1449.5476	-0.0022244	421.9343	-67.4699	5022.0000
113.400	0.020192	70888.0219	-1561.7895	-0.0022104	413.0221	-57.2434	5103.0000
115.200	0.016225	68150.6513	-1655.3647	-0.0021969	403.4583	-46.7290	5184.0000
117.000	0.012283	65260.8786	-1729.7555	-0.0021839	393.3621	-35.9274	5265.0000
118.800	0.008363	62253.7436	-1784.4449	-0.0021716	382.8558	-24.8386	5346.0000
120.600	0.004465	59165.2178	-1819.7386	-0.0021598	372.0651	-14.3766	5795.4102
122.400	0.000588	56029.2437	-1839.2449	-0.0021486	361.1087	-7.2971	22339.5746
124.200	-0.003270	52868.8050	-1834.1401	-0.0021380	350.0668	12.9690	7139.4892
126.000	-0.007109	49749.6102	-1807.3509	-0.0021281	339.1690	16.7968	4252.9668
127.800	-0.010931	46684.1069	-1774.7869	-0.0021187	328.4587	19.3854	3192.2318
129.600	-0.014736	43680.7272	-1738.0672	-0.0021099	317.9656	21.4143	2615.6925
131.400	-0.018527	40746.0889	-1697.9939	-0.0021018	307.7126	23.1116	2245.4652
133.200	-0.022303	37885.7343	-1655.0666	-0.0020941	297.7191	24.5854	1984.2352
135.000	-0.026065	35104.4805	-1609.6328	-0.0020870	288.0020	25.8966	1788.3379
136.800	-0.029816	32406.6164	-1561.9510	-0.0020805	278.5762	27.0832	1635.0224
138.600	-0.033555	29796.0265	-1512.2222	-0.0020744	269.4554	28.1710	1511.1726
140.400	-0.037284	27276.2732	-1460.6083	-0.0020689	260.6519	29.1779	1408.6516
142.200	-0.041003	24850.6560	-1407.2425	-0.0020639	252.1773	30.1174	1322.1212
144.000	-0.044714	22522.2546	-1352.2371	-0.0020593	244.0423	30.9997	1247.9221
145.800	-0.048417	20293.9616	-1295.6880	-0.0020551	236.2571	31.8327	1183.4548
147.600	-0.052112	18168.5088	-1237.6780	-0.0020514	228.8313	32.6228	1126.8180
149.400	-0.055802	16148.4872	-1178.2800	-0.0020480	221.7737	33.3751	1076.5860
151.200	-0.059485	14236.3639	-1117.5580	-0.0020451	215.0932	34.0938	1031.6671
153.000	-0.063164	12434.4957	-1055.5692	-0.0020425	208.7978	34.7826	991.2101
154.800	-0.066838	10745.1405	-992.3650	-0.0020402	202.8956	35.4443	954.5407
156.600	-0.070509	9170.4672	-927.9917	-0.0020383	197.3940	36.0816	921.1174
158.400	-0.074176	7712.5636	-862.4914	-0.0020367	192.3004	36.6966	890.4998
160.200	-0.077841	6373.4437	-795.9025	-0.0020353	187.6218	37.2912	862.3257
162.000	-0.081503	5155.0536	-728.2601	-0.0020342	183.3650	37.8670	836.2944
163.800	-0.085164	4059.2771	-659.5967	-0.0020333	179.5366	38.4257	812.1541
165.600	-0.088823	3087.9401	-589.9421	-0.0020326	176.1429	38.9683	789.6921
167.400	-0.092481	2242.8151	-519.3243	-0.0020321	173.1903	39.4960	768.7273
169.200	-0.096139	1525.6242	-447.7689	-0.0020317	170.6845	40.0099	749.1048
171.000	-0.099795	938.0432	-375.3002	-0.0020315	168.6317	40.5109	730.6910
172.800	-0.103452	481.7037	-301.9406	-0.0020313	167.0373	40.9997	713.3701
174.600	-0.107108	158.1962	-227.7114	-0.0020313	165.9070	41.4771	697.0412
176.400	-0.110765	-30.9276	-152.6325	-0.0020313	165.4624	41.9438	681.6159
178.200	-0.114421	-84.1529	-76.7228	-0.0020313	165.6483	42.4003	667.0166
180.000	-0.118077	0.0000	0.0000	-0.0020313	165.3543	42.8472	326.5873

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00000280
Maximum bending moment            =  -819971.71040 lbs-in
Maximum shear force               =    16030.88014 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =              14
Number of zero deflection points  =               1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-1617100.	30184.0188	0.0000	5815.1596	0.0000	0.0000
1.800	0.499718	-1562782.	30155.9444	-0.0003086	5625.3846	-15.5969	56.1806
3.600	0.498889	-1508492.	30112.7860	-0.0006067	5435.7060	-32.3569	116.7441
5.400	0.497533	-1454284.	30038.5869	-0.0008942	5246.3163	-50.0866	181.2055
7.200	0.495670	-1400218.	29931.7779	-0.0011712	5057.4191	-68.5901	249.0816
9.000	0.493317	-1346353.	29791.1441	-0.0014378	4869.2265	-87.6697	319.8863
10.800	0.490494	-1292752.	29615.8313	-0.0016939	4681.9573	-107.1224	393.1145
12.600	0.487219	-1239480.	29405.3389	-0.0019397	4495.8344	-126.7581	468.3001
14.400	0.483511	-1186600.	29159.5120	-0.0021751	4311.0828	-146.3828	544.9495
16.200	0.479389	-1134177.	28878.5440	-0.0024003	4127.9275	-165.8039	622.5577
18.000	0.474870	-1082274.	28562.9724	-0.0026155	3946.5909	-184.8312	700.6050
19.800	0.469973	-1030954.	28213.2526	-0.0028205	3767.2911	-203.7464	780.3503
21.600	0.464716	-980280.	27830.0608	-0.0030157	3590.2448	-222.0223	859.9669
23.400	0.459116	-930310.	27414.7009	-0.0032012	3415.6615	-239.4886	938.9332
25.200	0.453192	-881103.	26968.7805	-0.0033770	3243.7415	-255.9785	1016.7031
27.000	0.446959	-832712.	26494.2031	-0.0035433	3074.6740	-271.3297	1092.7025
28.800	0.440436	-785188.	25991.0414	-0.0037003	2908.6352	-287.7388	1175.9486
30.600	0.433638	-738585.	25459.2624	-0.0038482	2745.8133	-303.1267	1258.2568
32.400	0.426582	-692953.	24900.8213	-0.0039871	2586.3849	-317.3633	1339.1410
34.200	0.419285	-648339.	24317.9043	-0.0041173	2430.5135	-330.3223	1418.0824
36.000	0.411760	-604786.	23712.9213	-0.0042389	2278.3481	-341.8810	1494.5248
37.800	0.404025	-562331.	23086.8056	-0.0043522	2130.0217	-353.8031	1576.2548
39.600	0.396092	-521015.	22440.4371	-0.0044573	1985.6715	-364.3841	1655.9050
41.400	0.387978	-480872.	21776.3153	-0.0045545	1845.4194	-373.5290	1732.9635
43.200	0.379696	-441932.	21097.1070	-0.0046441	1709.3709	-381.1468	1806.8773
45.000	0.371260	-404220.	20405.6391	-0.0047262	1577.6143	-387.1508	1877.0467
46.800	0.362682	-367757.	19701.1604	-0.0048011	1450.2194	-395.6032	1963.3902
48.600	0.353975	-332570.	18982.7421	-0.0048691	1327.2839	-402.6393	2047.4604
50.400	0.345153	-298683.	18253.0120	-0.0049304	1208.8892	-408.1719	2128.6486
52.200	0.336226	-266114.	17514.7532	-0.0049852	1095.0996	-412.1156	2206.2769
54.000	0.327206	-234876.	16770.9012	-0.0050338	985.9615	-414.3866	2279.5883
55.800	0.318105	-204977.	16017.9539	-0.0050765	881.5021	-422.2216	2389.1483
57.600	0.308931	-176444.	15251.9935	-0.0051135	781.8117	-428.8454	2498.6861
59.400	0.299696	-149297.	14475.2714	-0.0051451	686.9667	-434.1791	2607.7176
61.200	0.290409	-123555.	13690.2320	-0.0051716	597.0290	-438.0869	2715.3338
63.000	0.281078	-99230.2832	12899.5672	-0.0051932	512.0440	-440.4295	2820.4713
64.800	0.271713	-76331.2231	12107.0230	-0.0052103	432.0395	-440.1752	2916.0000
66.600	0.262321	-54857.2107	11317.7768	-0.0052230	357.0138	-436.7650	2997.0000
68.400	0.252910	-34797.5120	10535.4592	-0.0052317	286.9295	-432.4767	3078.0000
70.200	0.243487	-16138.5272	9761.6420	-0.0052366	221.7389	-427.3201	3159.0000
72.000	0.234059	1136.1771	8997.8791	-0.0052381	169.3239	-421.3053	3240.0000
73.800	0.224630	17045.8355	8245.7059	-0.0052363	224.9089	-414.4427	3321.0000
75.600	0.215208	31612.4495	7506.6391	-0.0052316	275.8016	-406.7427	3402.0000
77.400	0.205796	44860.7533	6782.1762	-0.0052242	322.0883	-398.2161	3483.0000
79.200	0.196401	56818.1787	6073.7955	-0.0052143	363.8650	-388.8735	3564.0000
81.000	0.187025	67514.8203	5382.9565	-0.0052022	401.2369	-378.7255	3645.0000
82.800	0.177673	76983.4006	4711.0993	-0.0051882	434.3181	-367.7825	3726.0000
84.600	0.168347	85259.2361	4059.6460	-0.0051725	463.2321	-356.0546	3807.0000
86.400	0.159052	92380.2036	3430.0001	-0.0051552	488.1113	-343.5519	3888.0000
88.200	0.149789	98386.7073	2823.5481	-0.0051367	509.0967	-330.2837	3969.0000
90.000	0.140560	103322.	2241.6595	-0.0051171	526.3384	-316.2591	4050.0000

91.800	0.131367	107230.	1685.6882	-0.0050967	539.9947	-301.4868	4131.0000
93.600	0.122211	110161.	1156.9727	-0.0050756	550.2327	-285.9748	4212.0000
95.400	0.113095	112163.	656.8377	-0.0050540	557.2279	-269.7307	4293.0000
97.200	0.104017	113290.	186.5950	-0.0050322	561.1640	-252.7612	4374.0000
99.000	0.094979	113596.	-252.4555	-0.0050101	562.2331	-235.0727	4455.0000
100.800	0.085980	113138.	-659.0246	-0.0049881	560.6354	-216.6708	4536.0000
102.600	0.077022	111977.	-1031.8327	-0.0049663	556.5792	-197.5604	4617.0000
104.400	0.068102	110175.	-1369.6084	-0.0049447	550.2809	-177.7459	4698.0000
106.200	0.059221	107794.	-1671.0873	-0.0049236	541.9648	-157.2307	4779.0000
108.000	0.050377	104903.	-1935.0111	-0.0049029	531.8635	-136.0179	4860.0000
109.800	0.041570	101570.	-2160.1261	-0.0048829	520.2170	-114.1099	4941.0000
111.600	0.032799	97864.8970	-2345.1824	-0.0048635	507.2736	-91.5082	5022.0000
113.400	0.024061	93862.2905	-2488.9323	-0.0048449	493.2894	-68.2140	5103.0000
115.200	0.015357	89637.2935	-2590.1299	-0.0048271	478.5281	-44.2278	5184.0000
117.000	0.006684	85267.6830	-2647.5299	-0.0048101	463.2616	-19.5499	5265.0000
118.800	-0.001960	80833.4795	-2659.8868	-0.0047940	447.7694	5.8201	5346.0000
120.600	-0.010575	76416.9468	-2637.3936	-0.0047788	432.3390	19.1723	3263.4476
122.400	-0.019163	72061.4111	-2599.1030	-0.0047644	417.1217	23.3729	2195.4233
124.200	-0.027726	67780.5461	-2554.2759	-0.0047508	402.1652	26.4349	1716.1576
126.000	-0.036266	63584.3358	-2504.4658	-0.0047380	387.5046	28.9096	1434.8770
127.800	-0.044783	59480.8594	-2450.5334	-0.0047261	373.1679	31.0154	1246.6180
129.600	-0.053280	55477.0000	-2393.0417	-0.0047149	359.1793	32.8643	1110.2817
131.400	-0.061757	51578.8067	-2332.3940	-0.0047045	345.5598	34.5221	1006.1961
133.200	-0.070216	47791.7081	-2268.8960	-0.0046949	332.3285	36.0312	923.6643
135.000	-0.078659	44120.6495	-2202.7891	-0.0046860	319.5026	37.4209	856.3285
136.800	-0.087086	40570.1872	-2134.2693	-0.0046778	307.0980	38.7122	800.1525
138.600	-0.095499	37144.5570	-2063.4998	-0.0046702	295.1296	39.9206	752.4404
140.400	-0.103899	33847.7244	-1990.6189	-0.0046633	283.6111	41.0582	711.3174
142.200	-0.112287	30683.4238	-1915.7453	-0.0046571	272.5557	42.1346	675.4356
144.000	-0.120664	27655.1892	-1838.9825	-0.0046514	261.9757	43.1574	643.7993
145.800	-0.129032	24766.3789	-1760.4213	-0.0046463	251.8828	44.1328	615.6554
147.600	-0.137391	22020.1954	-1680.1424	-0.0046418	242.2882	45.0659	590.4232
149.400	-0.145742	19419.7023	-1598.2181	-0.0046378	233.2027	45.9611	567.6467
151.200	-0.154087	16967.8383	-1514.7133	-0.0046342	224.6364	46.8220	546.9629
153.000	-0.162425	14667.4286	-1429.6868	-0.0046312	216.5992	47.6518	528.0786
154.800	-0.170759	12521.1956	-1343.1923	-0.0046285	209.1007	48.4532	510.7544
156.600	-0.179088	10531.7673	-1255.2787	-0.0046263	202.1501	49.2285	494.7925
158.400	-0.187413	8701.6848	-1165.9912	-0.0046244	195.7562	49.9798	480.0282
160.200	-0.195736	7033.4093	-1075.3713	-0.0046229	189.9276	50.7089	466.3230
162.000	-0.204056	5529.3275	-983.4576	-0.0046217	184.6726	51.4175	453.5596
163.800	-0.212374	4191.7571	-890.2858	-0.0046207	179.9994	52.1068	441.6378
165.600	-0.220690	3022.9512	-795.8892	-0.0046200	175.9159	52.7783	430.4716
167.400	-0.229006	2025.1026	-700.2991	-0.0046195	172.4296	53.4330	419.9867
169.200	-0.237321	1200.3472	-603.5446	-0.0046192	169.5481	54.0720	410.1186
171.000	-0.245635	550.7674	-505.6532	-0.0046190	167.2786	54.6962	400.8109
172.800	-0.253949	78.3952	-406.6508	-0.0046190	165.6282	55.3065	392.0142
174.600	-0.262263	-214.7852	-306.5618	-0.0046190	166.1047	55.9036	383.6847
176.400	-0.270578	-326.8348	-205.4092	-0.0046190	166.4962	56.4882	375.7840
178.200	-0.278892	-255.8580	-103.2150	-0.0046191	166.2482	57.0609	368.2777
180.000	-0.287206	0.0000	0.0000	-0.0046191	165.3543	57.6224	180.5677

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00000527
Maximum bending moment            =      -1617100. lbs-in
Maximum shear force               =    30184.01883 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =              12
Number of zero deflection points  =               1
```

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

```
Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad
```

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	197209.	5539.1988
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	351170.	10130.9374
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-819972.	16030.8801
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-1617100.	30184.0188

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 24 inch L=30 fill 5.lpd
Name of output file: pile 10 24 inch L=30 fill 5.lpo
Name of plot output file: pile 10 24 inch L=30 fill 5.lpp
Name of runtime file: pile 10 24 inch L=30 fill 5.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:56:29

Problem Title

RH Fdn Pile 148 cut off L=15 dia 24 Fill 5 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	24.00000000	8143.0000	452.0000	3600000.
2	360.0000	24.00000000	8143.0000	452.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 60.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 60.000 in
Distance from top of pile to bottom of layer = 120.000 in

Layer 3 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 180.000 in

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 180.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	60.00	0.06900
3	60.00	0.06900
4	120.00	0.06900
5	120.00	0.03300
6	180.00	0.03300
7	180.00	0.03300
8	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	60.000	0.00000	30.00	------	------
3	60.000	1.04100	0.00	0.02000	0.0
4	120.000	1.04100	0.00	0.02000	0.0
5	120.000	1.04100	0.00	0.02000	0.0
6	180.000	1.04100	0.00	0.02000	0.0
7	180.000	0.00000	32.00	------	------
8	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	5917.4201	-0.0025177	92.9204	0.0000	0.0000
1.800	0.245468	10841.6951	5907.4786	-0.0025174	108.8973	-11.0461	81.0000
3.600	0.240937	21647.5506	5878.0213	-0.0025164	124.8214	-21.6844	162.0000
5.400	0.236409	32383.0483	5829.7816	-0.0025147	140.6419	-31.9152	243.0000
7.200	0.231884	43014.9903	5763.4926	-0.0025124	156.3098	-41.7392	324.0000
9.000	0.227364	53511.4977	5679.8860	-0.0025094	171.7780	-51.1570	405.0000
10.800	0.222850	63842.0079	5579.6921	-0.0025058	187.0017	-60.1696	486.0000
12.600	0.218343	73977.2721	5463.6390	-0.0025016	201.9376	-68.7782	567.0000
14.400	0.213845	83889.3517	5332.4530	-0.0024968	216.5446	-76.9841	648.0000
16.200	0.209355	93551.6134	5186.8574	-0.0024913	230.7835	-84.7888	729.0000
18.000	0.204876	102939.	5027.5727	-0.0024853	244.6169	-92.1942	810.0000
19.800	0.200408	112027.	4855.3161	-0.0024787	258.0094	-99.2020	891.0000
21.600	0.195953	120793.	4670.8013	-0.0024715	270.9274	-105.8144	972.0000
23.400	0.191511	129215.	4474.7380	-0.0024639	283.3395	-112.0337	1053.0000
25.200	0.187083	137274.	4267.8318	-0.0024557	295.2157	-117.8621	1134.0000
27.000	0.182670	144951.	4050.7837	-0.0024470	306.5282	-123.3023	1215.0000
28.800	0.178274	152227.	3824.2904	-0.0024379	317.2510	-128.3569	1296.0000
30.600	0.173894	159087.	3589.0433	-0.0024283	327.3599	-133.0287	1377.0000
32.400	0.169532	165515.	3345.7290	-0.0024184	336.8326	-137.3205	1458.0000
34.200	0.165188	171497.	3095.0286	-0.0024080	345.6484	-141.2354	1539.0000
36.000	0.160863	177021.	2837.6180	-0.0023973	353.7888	-144.7764	1620.0000
37.800	0.156557	182075.	2574.1673	-0.0023863	361.2366	-147.9466	1701.0000
39.600	0.152272	186649.	2305.3410	-0.0023750	367.9769	-150.7493	1782.0000
41.400	0.148007	190733.	2031.7978	-0.0023634	373.9960	-153.1876	1863.0000
43.200	0.143764	194321.	1754.1905	-0.0023516	379.2825	-155.2649	1944.0000
45.000	0.139542	197404.	1473.1661	-0.0023395	383.8263	-156.9844	2025.0000
46.800	0.135341	199978.	1189.3656	-0.0023273	387.6192	-158.3495	2106.0000
48.600	0.131163	202038.	903.4240	-0.0023150	390.6547	-159.3634	2187.0000
50.400	0.127007	203580.	615.9705	-0.0023025	392.9278	-160.0294	2268.0000
52.200	0.122874	204603.	327.6283	-0.0022900	394.4355	-160.3507	2349.0000
54.000	0.118763	205106.	39.0151	-0.0022774	395.1762	-160.3306	2430.0000
55.800	0.114675	205088.	-249.2574	-0.0022648	395.1500	-159.9721	2511.0000
57.600	0.110610	204551.	-536.5828	-0.0022523	394.3585	-159.2784	2592.0000
59.400	0.106567	203497.	-822.3604	-0.0022397	392.8051	-158.2523	2673.0000
61.200	0.102547	201929.	-1006.0449	-0.0022273	390.4948	-45.8415	804.6537
63.000	0.098549	200212.	-1088.7826	-0.0022149	387.9642	-46.0892	841.8215
64.800	0.094573	198344.	-1171.9335	-0.0022027	385.2121	-46.3007	881.2354
66.600	0.090619	196326.	-1255.4308	-0.0021906	382.2377	-46.4741	923.1302
68.400	0.086687	194156.	-1339.2043	-0.0021786	379.0400	-46.6076	967.7770
70.200	0.082776	191834.	-1422.6477	-0.0021668	375.6184	-46.1073	1002.6204

72.000	0.078887	189362.	-1504.9804	-0.0021550	371.9754	-45.3734	1035.3095
73.800	0.075018	186742.	-1585.9737	-0.0021435	368.1144	-44.6191	1070.6011
75.600	0.071170	183977.	-1665.5893	-0.0021321	364.0391	-43.8427	1108.8481
77.400	0.067342	181068.	-1743.7856	-0.0021209	359.7532	-43.0420	1150.4732
79.200	0.063535	178020.	-1820.5168	-0.0021099	355.2606	-42.2149	1195.9870
81.000	0.059747	174834.	-1895.7329	-0.0020991	350.5652	-41.3585	1246.0130
82.800	0.055978	171512.	-1969.3784	-0.0020884	345.6711	-40.4698	1301.3217
84.600	0.052229	168060.	-2041.3917	-0.0020780	340.5827	-39.5450	1362.8770
86.400	0.048497	164478.	-2111.7040	-0.0020678	335.3042	-38.5798	1431.9030
88.200	0.044784	160770.	-2180.2377	-0.0020578	329.8405	-37.5687	1509.9806
90.000	0.041089	156940.	-2246.9043	-0.0020480	324.1962	-36.5054	1599.1910
91.800	0.037412	152991.	-2311.6027	-0.0020385	318.3766	-35.3817	1702.3366
93.600	0.033751	148926.	-2374.2148	-0.0020293	312.3870	-34.1873	1823.2922
95.400	0.030106	144750.	-2434.6016	-0.0020202	306.2331	-32.9092	1967.5885
97.200	0.026478	140467.	-2492.5965	-0.0020115	299.9211	-31.5295	2143.4323
99.000	0.022865	136081.	-2547.9948	-0.0020030	293.4577	-30.0241	2363.6058
100.800	0.019267	131597.	-2600.5383	-0.0019948	286.8499	-28.3577	2649.3004
102.600	0.015684	127021.	-2649.8891	-0.0019868	280.1058	-26.4765	3038.7078
104.400	0.012114	122358.	-2695.5800	-0.0019792	273.2345	-24.2911	3609.2906
106.200	0.008558	117616.	-2736.9104	-0.0019718	266.2463	-21.6316	4549.4927
108.000	0.005016	112803.	-2772.6655	-0.0019647	259.1541	-18.0964	6494.2799
109.800	0.001485	107932.	-2799.7881	-0.0019580	251.9746	-12.0398	14589.6430
111.600	-0.002033	103020.	-2798.5379	-0.0019515	244.7370	13.4290	11890.1215
113.400	-0.005540	98151.9212	-2769.5911	-0.0019453	237.5628	18.7342	6086.9584
115.200	-0.009036	93343.8446	-2732.8885	-0.0019394	230.4773	22.0465	4391.6803
117.000	-0.012522	88606.7653	-2690.9280	-0.0019339	223.4965	24.5763	3532.7898
118.800	-0.015998	83948.9019	-2644.8103	-0.0019286	216.6324	26.6656	3000.2613
120.600	-0.019465	79377.0452	-2595.1919	-0.0019235	209.8950	28.4660	2632.3948
122.400	-0.022923	74897.0500	-2542.5187	-0.0019188	203.2930	30.0598	2360.4383
124.200	-0.026372	70514.1007	-2487.1175	-0.0019143	196.8340	31.4971	2149.7778
126.000	-0.029814	66232.8748	-2429.2400	-0.0019101	190.5250	32.8112	1980.9309
127.800	-0.033249	62057.6496	-2369.0874	-0.0019062	184.3721	34.0251	1842.0230
129.600	-0.036677	57992.3778	-2306.8244	-0.0019025	178.3813	35.1560	1725.3696
131.400	-0.040098	54040.7421	-2242.5892	-0.0018991	172.5579	36.2165	1625.7596
133.200	-0.043513	50206.1969	-2176.4995	-0.0018959	166.9071	37.2165	1539.5239
135.000	-0.046923	46492.0002	-2108.6569	-0.0018929	161.4337	38.1641	1463.9979
136.800	-0.050328	42901.2393	-2039.1504	-0.0018902	156.1421	39.0654	1397.1962
138.600	-0.053728	39436.8512	-1968.0583	-0.0018876	151.0368	39.9258	1337.6061
140.400	-0.057123	36101.6397	-1895.4504	-0.0018853	146.1218	40.7496	1284.0537
142.200	-0.060515	32898.2894	-1821.3893	-0.0018832	141.4012	41.5405	1235.6125
144.000	-0.063903	29829.3776	-1745.9315	-0.0018813	136.8787	42.3015	1191.5408
145.800	-0.067287	26897.3842	-1669.1282	-0.0018795	132.5579	43.0354	1151.2372
147.600	-0.070669	24104.7007	-1591.0263	-0.0018780	128.4424	43.7445	1114.2087
149.400	-0.074048	21453.6374	-1511.6686	-0.0018766	124.5357	44.4308	1080.0467
151.200	-0.077425	18946.4302	-1431.0945	-0.0018753	120.8409	45.0960	1048.4096
153.000	-0.080799	16585.2461	-1349.3405	-0.0018742	117.3613	45.7418	1019.0096
154.800	-0.084172	14372.1884	-1266.4404	-0.0018733	114.1000	46.3695	991.6019
156.600	-0.087543	12309.3009	-1182.4256	-0.0018725	111.0601	46.9803	965.9775
158.400	-0.090913	10398.5727	-1097.3254	-0.0018718	108.2443	47.5755	941.9562
160.200	-0.094281	8641.9407	-1011.1671	-0.0018712	105.6556	48.1559	919.3821
162.000	-0.097649	7041.2938	-923.9765	-0.0018707	103.2968	48.7225	898.1194
163.800	-0.101016	5598.4751	-835.7778	-0.0018703	101.1706	49.2761	878.0494
165.600	-0.104382	4315.2850	-746.5936	-0.0018700	99.2796	49.8174	859.0677
167.400	-0.107748	3193.4832	-656.4455	-0.0018698	97.6265	50.3472	841.0822
169.200	-0.111113	2234.7915	-565.3537	-0.0018696	96.2137	50.8659	824.0112
171.000	-0.114479	1440.8950	-473.3375	-0.0018695	95.0437	51.3743	807.7819
172.800	-0.117844	813.4444	-380.4152	-0.0018694	94.1191	51.8727	792.3296
174.600	-0.121208	354.0578	-286.6041	-0.0018694	93.4421	52.3618	777.5960
176.400	-0.124573	64.3217	-191.9208	-0.0018694	93.0151	52.8419	763.5289
178.200	-0.127938	-54.2070	-96.3811	-0.0018694	93.0002	53.3134	750.0813
180.000	-0.131303	0.0000	0.0000	-0.0018694	92.9204	53.7767	368.6053

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.25000000 in
Computed slope at pile head = -0.00251771
Maximum bending moment = 205105.78669 lbs-in
Maximum shear force = 5917.42010 lbs
Depth of maximum bending moment = 54.00000000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 21
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.500000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	10372.0487	-0.0053725	92.9204	0.0000	0.0000
1.800	0.490329	19075.8508	10355.3352	-0.0053719	121.0316	-18.5706	68.1726
3.600	0.480661	38091.4444	10304.4509	-0.0053702	149.0541	-37.9676	142.1826
5.400	0.470997	56983.8462	10218.0423	-0.0053673	176.8951	-58.0419	221.8178
7.200	0.461339	75687.9277	10095.0233	-0.0053632	204.4585	-78.6459	306.8516
9.000	0.451689	94136.8452	9934.5723	-0.0053580	231.6459	-99.6331	397.0418
10.800	0.442050	112263.	9737.4844	-0.0053516	258.3569	-119.3535	486.0000
12.600	0.432423	130001.	9507.4742	-0.0053442	284.4974	-136.2134	567.0000
14.400	0.422811	147297.	9247.8914	-0.0053357	309.9865	-152.2119	648.0000
16.200	0.413215	164100.	8960.2838	-0.0053261	334.7479	-167.3520	729.0000
18.000	0.403637	180360.	8646.1940	-0.0053156	358.7091	-181.6366	810.0000
19.800	0.394079	196030.	8307.1590	-0.0053040	381.8018	-195.0690	891.0000
21.600	0.384542	211068.	7944.7092	-0.0052915	403.9618	-207.6529	972.0000
23.400	0.375029	225431.	7560.3685	-0.0052781	425.1289	-219.3922	1053.0000
25.200	0.365541	239083.	7155.6536	-0.0052638	445.2469	-230.2910	1134.0000
27.000	0.356080	251987.	6732.0733	-0.0052488	464.2637	-240.3537	1215.0000
28.800	0.346646	264112.	6291.1285	-0.0052329	482.1312	-249.5850	1296.0000
30.600	0.337241	275427.	5834.3115	-0.0052164	498.8052	-257.9894	1377.0000
32.400	0.327867	285904.	5363.1061	-0.0051991	514.2455	-265.5722	1458.0000
34.200	0.318524	295520.	4878.9867	-0.0051813	528.4158	-272.3383	1539.0000
36.000	0.309214	304252.	4383.4187	-0.0051629	541.2838	-278.2929	1620.0000
37.800	0.299938	312081.	3877.8578	-0.0051439	552.8210	-283.4414	1701.0000
39.600	0.290696	318990.	3363.7503	-0.0051246	563.0027	-287.7892	1782.0000
41.400	0.281490	324965.	2842.5325	-0.0051048	571.8081	-291.3417	1863.0000
43.200	0.272319	329995.	2315.6310	-0.0050847	579.2202	-294.1044	1944.0000
45.000	0.263185	334070.	1784.4625	-0.0050643	585.2259	-296.0828	2025.0000
46.800	0.254087	337185.	1250.4339	-0.0050437	589.8155	-297.2823	2106.0000
48.600	0.245027	339334.	714.9423	-0.0050229	592.9835	-297.7083	2187.0000
50.400	0.236005	340518.	179.3752	-0.0050020	594.7276	-297.3662	2268.0000
52.200	0.227020	340737.	-354.8894	-0.0049811	595.0496	-296.2612	2349.0000
54.000	0.218073	339994.	-886.4831	-0.0049602	593.9547	-294.3984	2430.0000
55.800	0.209163	338295.	-1414.0461	-0.0049394	591.4519	-291.7827	2511.0000
57.600	0.200291	335650.	-1936.2277	-0.0049187	587.5536	-288.4191	2592.0000
59.400	0.191456	332068.	-2451.6856	-0.0048982	582.2759	-284.3120	2673.0000
61.200	0.182657	327564.	-2757.5787	-0.0048780	575.6384	-55.5693	547.6082
63.000	0.173895	322879.	-2857.7165	-0.0048580	568.7333	-55.6949	576.5018
64.800	0.165169	318011.	-2958.0247	-0.0048383	561.5601	-55.7586	607.6543
66.600	0.156477	312961.	-3058.3879	-0.0048189	554.1186	-55.7561	641.3777
68.400	0.147820	307730.	-3158.6831	-0.0047999	546.4086	-55.6829	678.0474
70.200	0.139198	302316.	-3258.1446	-0.0047812	538.4307	-54.8299	709.0189
72.000	0.130608	296723.	-3355.8017	-0.0047628	530.1889	-53.6780	739.7721

73.800	0.122052	290955.	-3451.3431	-0.0047447	521.6888	-52.4791	773.9539
75.600	0.113527	285016.	-3544.6791	-0.0047270	512.9362	-51.2276	812.2254
77.400	0.105034	278909.	-3635.7091	-0.0047097	503.9370	-49.9168	855.4371
79.200	0.096572	272639.	-3724.3189	-0.0046928	494.6975	-48.5385	904.7034
81.000	0.088140	266211.	-3810.3776	-0.0046763	485.2245	-47.0824	961.5163
82.800	0.079738	259629.	-3893.7340	-0.0046601	475.5248	-45.5358	1027.9261
84.600	0.071364	252898.	-3974.2103	-0.0046444	465.6059	-43.8823	1106.8361
86.400	0.063018	246024.	-4051.5943	-0.0046291	455.4758	-42.1000	1202.5132
88.200	0.054699	239012.	-4125.6275	-0.0046142	445.1429	-40.1591	1321.5234
90.000	0.046407	231869.	-4195.9861	-0.0045997	434.6167	-38.0171	1474.5816
91.800	0.038140	224602.	-4262.2505	-0.0045857	423.9074	-35.6101	1680.5876
93.600	0.029898	217219.	-4323.8497	-0.0045721	413.0265	-32.8335	1976.6986
95.400	0.021681	209728.	-4379.9468	-0.0045590	401.9874	-29.4966	2448.9093
97.200	0.013486	202140.	-4429.1528	-0.0045464	390.8060	-25.1768	3360.3939
99.000	0.005314	194470.	-4468.4170	-0.0045342	379.5030	-18.4501	6249.9631
100.800	-0.002837	186740.	-4471.5257	-0.0045225	368.1106	14.9960	9514.0618
102.600	-0.010967	179057.	-4436.8669	-0.0045113	356.7885	23.5137	3859.1653
104.400	-0.019078	171449.	-4390.2568	-0.0045005	345.5774	28.2752	2667.7882
106.200	-0.027169	163932.	-4336.1801	-0.0044902	334.5002	31.8101	2107.4698
108.000	-0.035242	156518.	-4276.3292	-0.0044804	323.5738	34.6909	1771.8291
109.800	-0.043299	149215.	-4211.6684	-0.0044710	312.8119	37.1544	1544.5772
111.600	-0.051338	142032.	-4142.8377	-0.0044620	302.2264	39.3242	1378.7746
113.400	-0.059362	134975.	-4070.2991	-0.0044535	291.8276	41.2742	1251.5373
115.200	-0.067371	128052.	-3994.4052	-0.0044455	281.6250	43.0524	1150.2655
117.000	-0.075366	121267.	-3915.4353	-0.0044378	271.6272	44.6919	1067.4025
118.800	-0.083347	114627.	-3833.6176	-0.0044306	261.8418	46.2167	998.1180
120.600	-0.091316	108136.	-3749.1423	-0.0044237	252.2764	47.6448	939.1681
122.400	-0.099272	101799.	-3662.1708	-0.0044173	242.9377	48.9902	888.2867
124.200	-0.107218	95620.4123	-3572.8424	-0.0044112	233.8322	50.2636	843.8389
126.000	-0.115153	89603.9896	-3481.2784	-0.0044055	224.9660	51.4741	804.6130
127.800	-0.123078	83753.9271	-3387.5859	-0.0044002	216.3450	52.6287	769.6903
129.600	-0.130993	78073.9929	-3291.8598	-0.0043952	207.9747	53.7336	738.3606
131.400	-0.138901	72567.7930	-3194.1853	-0.0043906	199.8605	54.7936	710.0651
133.200	-0.146800	67238.7876	-3094.6393	-0.0043863	192.0074	55.8131	684.3584
135.000	-0.154691	62090.3045	-2993.2913	-0.0043824	184.4203	56.7958	660.8797
136.800	-0.162576	57125.5515	-2890.2048	-0.0043787	177.1039	57.7448	639.3344
138.600	-0.170455	52347.6264	-2785.4380	-0.0043753	170.0629	58.6628	619.4786
140.400	-0.178327	47759.5258	-2679.0443	-0.0043723	163.3016	59.5523	601.1089
142.200	-0.186195	43364.1530	-2571.0733	-0.0043695	156.8243	60.4155	584.0542
144.000	-0.194058	39164.3252	-2461.5706	-0.0043669	150.6352	61.2542	568.1691
145.800	-0.201916	35162.7789	-2350.5789	-0.0043647	144.7383	62.0700	553.3298
147.600	-0.209770	31362.1764	-2238.1377	-0.0043626	139.1375	62.8646	539.4296
149.400	-0.217621	27765.1095	-2124.2843	-0.0043608	133.8366	63.6392	526.3762
151.200	-0.225469	24374.1049	-2009.0533	-0.0043592	128.8395	64.3952	514.0896
153.000	-0.233314	21191.6275	-1892.4774	-0.0043578	124.1496	65.1335	502.4996
154.800	-0.241157	18220.0844	-1774.5875	-0.0043566	119.7705	65.8553	491.5447
156.600	-0.248998	15461.8278	-1655.4125	-0.0043555	115.7058	66.5614	481.1705
158.400	-0.256837	12919.1583	-1534.9799	-0.0043547	111.9588	67.2527	471.3290
160.200	-0.264675	10594.3274	-1413.3156	-0.0043540	108.5328	67.9299	461.9774
162.000	-0.272511	8489.5403	-1290.4443	-0.0043534	105.4310	68.5938	453.0776
163.800	-0.280347	6606.9575	-1166.3894	-0.0043529	102.6568	69.2450	444.5954
165.600	-0.288182	4948.6979	-1041.1732	-0.0043526	100.2130	69.8841	436.5001
167.400	-0.296016	3516.8398	-914.8170	-0.0043523	98.1030	70.5117	428.7640
169.200	-0.303850	2313.4232	-787.3410	-0.0043521	96.3295	71.1283	421.3622
171.000	-0.311684	1340.4517	-658.7646	-0.0043520	94.8957	71.7344	414.2720
172.800	-0.319517	599.8932	-529.1063	-0.0043519	93.8044	72.3303	407.4728
174.600	-0.327351	93.6823	-398.3840	-0.0043519	93.0584	72.9167	400.9460
176.400	-0.335184	-176.2791	-266.6147	-0.0043519	93.1801	73.4937	394.6744
178.200	-0.343018	-208.1201	-133.8148	-0.0043519	93.2271	74.0618	388.6425
180.000	-0.350851	0.0000	0.0000	-0.0043519	92.9204	74.6213	191.4179

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection = 0.50000000 in
Computed slope at pile head = -0.00537253
Maximum bending moment = 340736.54592 lbs-in
Maximum shear force = 10372.04874 lbs
Depth of maximum bending moment = 52.20000000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 23
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-1066584.	15999.7676	0.0000	1664.7003	0.0000	0.0000
1.800	0.249941	-1037800.	15979.5223	-6.4607E-05	1622.2827	-11.2473	81.0000
3.600	0.249767	-1009048.	15949.1686	-0.0001274	1579.9118	-22.4791	162.0000
5.400	0.249482	-980364.	15898.6253	-0.0001885	1537.6413	-33.6801	243.0000
7.200	0.249089	-951784.	15827.9608	-0.0002478	1495.5249	-44.8360	324.0000
9.000	0.248590	-923345.	15737.2690	-0.0003054	1453.6160	-55.9328	405.0000
10.800	0.247989	-895084.	15626.6681	-0.0003612	1411.9679	-66.9571	486.0000
12.600	0.247290	-867035.	15496.3002	-0.0004153	1370.6334	-77.8962	567.0000
14.400	0.246494	-839234.	15346.3295	-0.0004677	1329.6649	-88.7378	648.0000
16.200	0.245606	-811717.	15176.9422	-0.0005184	1289.1143	-99.4703	729.0000
18.000	0.244628	-784519.	14988.3447	-0.0005674	1249.0331	-110.0825	810.0000
19.800	0.243563	-757673.	14780.7631	-0.0006148	1209.4722	-120.5637	891.0000
21.600	0.242415	-731215.	14554.4423	-0.0006605	1170.4817	-130.9039	972.0000
23.400	0.241185	-705178.	14309.6447	-0.0007046	1132.1112	-141.0934	1053.0000
25.200	0.239878	-679594.	14046.6498	-0.0007471	1094.4096	-151.1232	1134.0000
27.000	0.238496	-654497.	13765.7527	-0.0007880	1057.4249	-160.9847	1215.0000
28.800	0.237041	-629918.	13467.2638	-0.0008275	1021.2043	-170.6696	1296.0000
30.600	0.235517	-605889.	13151.5078	-0.0008654	985.7944	-180.1704	1377.0000
32.400	0.233926	-582442.	12818.8227	-0.0009019	951.2405	-189.4798	1458.0000
34.200	0.232270	-559605.	12469.5591	-0.0009370	917.5874	-198.5909	1539.0000
36.000	0.230553	-537410.	12104.0798	-0.0009706	884.8786	-207.4973	1620.0000
37.800	0.228776	-515884.	11722.7585	-0.0010030	853.1569	-216.1930	1701.0000
39.600	0.226942	-495056.	11325.9796	-0.0010340	822.4639	-224.6724	1782.0000
41.400	0.225053	-474954.	10914.1374	-0.0010638	792.8402	-232.9301	1863.0000
43.200	0.223112	-455604.	10487.6353	-0.0010924	764.3255	-240.9611	1944.0000
45.000	0.221121	-437033.	10046.8856	-0.0011198	736.9582	-248.7608	2025.0000
46.800	0.219081	-419266.	9592.3087	-0.0011461	710.7756	-256.3247	2106.0000
48.600	0.216995	-402328.	9124.3326	-0.0011713	685.8140	-263.6487	2187.0000
50.400	0.214864	-386242.	8643.3926	-0.0011955	662.1084	-270.7290	2268.0000
52.200	0.212691	-371031.	8149.9309	-0.0012187	639.6929	-277.5618	2349.0000
54.000	0.210477	-356718.	7644.3959	-0.0012411	618.6001	-284.1437	2430.0000
55.800	0.208223	-343323.	7127.2424	-0.0012626	598.8616	-290.4713	2511.0000
57.600	0.205932	-330869.	6598.9311	-0.0012833	580.5076	-296.5414	2592.0000
59.400	0.203603	-319373.	6059.9280	-0.0013032	563.5672	-302.3509	2673.0000
61.200	0.201240	-308856.	5736.1575	-0.0013225	548.0682	-57.3941	513.3642
63.000	0.198842	-298523.	5632.0858	-0.0013412	532.8412	-58.2412	527.2225
64.800	0.196412	-288377.	5526.5018	-0.0013592	517.8902	-59.0744	541.3832
66.600	0.193949	-278422.	5419.4306	-0.0013766	503.2193	-59.8935	555.8590
68.400	0.191456	-268659.	5310.8981	-0.0013934	488.8325	-60.6982	570.6631
70.200	0.188933	-259092.	5201.6317	-0.0014096	474.7336	-60.7089	578.3854
72.000	0.186381	-249720.	5092.6027	-0.0014252	460.9229	-60.4344	583.6525
73.800	0.183802	-240543.	4984.0729	-0.0014403	447.3989	-60.1543	589.1000

75.600	0.181196	-231560.	4876.0521	-0.0014548	434.1606	-59.8687	594.7347
77.400	0.178565	-222770.	4768.5504	-0.0014687	421.2065	-59.5775	600.5635
79.200	0.175909	-214171.	4661.5780	-0.0014821	408.5354	-59.2807	606.5937
81.000	0.173229	-205764.	4555.1450	-0.0014950	396.1458	-58.9782	612.8335
82.800	0.170527	-197547.	4449.2618	-0.0015074	384.0364	-58.6699	619.2914
84.600	0.167803	-189518.	4343.9386	-0.0015193	372.2058	-58.3558	625.9764
86.400	0.165057	-181679.	4239.1861	-0.0015307	360.6526	-58.0359	632.8983
88.200	0.162292	-174026.	4135.0148	-0.0015416	349.3752	-57.7100	640.0676
90.000	0.159508	-166559.	4031.4356	-0.0015521	338.3721	-57.3781	647.4955
91.800	0.156705	-159278.	3928.4593	-0.0015621	327.6419	-57.0400	655.1940
93.600	0.153884	-152181.	3826.0971	-0.0015716	317.1829	-56.6958	663.1761
95.400	0.151047	-145267.	3724.3603	-0.0015808	306.9936	-56.3452	671.4557
97.200	0.148194	-138534.	3623.2603	-0.0015895	297.0723	-55.9881	680.0477
99.000	0.145325	-131982.	3522.8089	-0.0015978	287.4174	-55.6246	688.9684
100.800	0.142442	-125610.	3423.0179	-0.0016057	278.0272	-55.2543	698.2352
102.600	0.139544	-119417.	3323.8997	-0.0016132	268.9000	-54.8771	707.8669
104.400	0.136634	-113400.	3225.4666	-0.0016204	260.0339	-54.4930	717.8841
106.200	0.133711	-107560.	3127.7314	-0.0016271	251.4273	-54.1016	728.3088
108.000	0.130776	-101895.	3030.7073	-0.0016336	243.0782	-53.7029	739.1652
109.800	0.127830	-96402.6156	2934.4076	-0.0016397	234.9849	-53.2967	750.4796
111.600	0.124874	-91082.8407	2838.8463	-0.0016454	227.1453	-52.8826	762.2804
113.400	0.121907	-85933.9826	2744.0376	-0.0016508	219.5577	-52.4605	774.5991
115.200	0.118930	-80954.6975	2649.9961	-0.0016560	212.2199	-52.0301	787.4697
117.000	0.115945	-76143.6141	2556.7370	-0.0016608	205.1300	-51.5911	800.9298
118.800	0.112952	-71499.3325	2464.2760	-0.0016653	198.2859	-51.1433	815.0207
120.600	0.109950	-67020.4232	2372.6294	-0.0016696	191.6856	-50.6863	829.7880
122.400	0.106941	-62705.4263	2281.8141	-0.0016736	185.3267	-50.2197	845.2819
124.200	0.103925	-58552.8500	2191.8475	-0.0016773	179.2073	-49.7432	861.5582
126.000	0.100903	-54561.1698	2102.7480	-0.0016808	173.3249	-49.2563	878.6790
127.800	0.097875	-50728.8266	2014.5347	-0.0016840	167.6773	-48.7586	896.7133
129.600	0.094841	-47054.2256	1927.2274	-0.0016870	162.2622	-48.2495	915.7385
131.400	0.091801	-43535.7347	1840.8471	-0.0016898	157.0772	-47.7286	935.8413
133.200	0.088757	-40171.6824	1755.4156	-0.0016923	152.1197	-47.1952	957.1197
135.000	0.085709	-36960.3563	1670.9560	-0.0016947	147.3873	-46.6487	979.6841
136.800	0.082656	-33900.0004	1587.4927	-0.0016969	142.8774	-46.0883	1003.6603
138.600	0.079600	-30988.8133	1505.0513	-0.0016989	138.5873	-45.5132	1029.1918
140.400	0.076540	-28224.9452	1423.6591	-0.0017007	134.5143	-44.9226	1056.4429
142.200	0.073478	-25606.4953	1343.3450	-0.0017023	130.6556	-44.3153	1085.6034
144.000	0.070412	-23131.5081	1264.1399	-0.0017038	127.0083	-43.6904	1116.8931
145.800	0.067344	-20797.9703	1186.0767	-0.0017052	123.5695	-43.0465	1150.5685
147.600	0.064273	-18603.8066	1109.1909	-0.0017064	120.3360	-42.3822	1186.9310
149.400	0.061201	-16546.8749	1033.5205	-0.0017075	117.3048	-41.6960	1226.3371
151.200	0.058126	-14624.9613	959.1068	-0.0017084	114.4726	-40.9859	1269.2123
153.000	0.055050	-12835.7743	885.9944	-0.0017093	111.8359	-40.2500	1316.0685
154.800	0.051973	-11176.9378	814.2322	-0.0017100	109.3913	-39.4858	1367.5281
156.600	0.048894	-9645.9834	743.8735	-0.0017107	107.1352	-38.6905	1424.3560
158.400	0.045815	-8240.3414	674.9774	-0.0017112	105.0638	-37.8608	1487.5039
160.200	0.042734	-6957.3301	607.6093	-0.0017117	103.1731	-36.9927	1558.1727
162.000	0.039653	-5794.1427	541.8424	-0.0017121	101.4589	-36.0816	1637.9015
163.800	0.036570	-4747.8330	477.7592	-0.0017124	99.9170	-35.1219	1728.6994
165.600	0.033488	-3815.2962	415.4537	-0.0017127	98.5428	-34.1064	1833.2445
167.400	0.030405	-2993.2465	355.0341	-0.0017129	97.3314	-33.0265	1955.1956
169.200	0.027322	-2278.1886	296.6267	-0.0017130	96.2776	-31.8707	2099.7004
171.000	0.024238	-1666.3811	240.3812	-0.0017131	95.3760	-30.6243	2274.2632
172.800	0.021154	-1153.7886	186.4789	-0.0017132	94.6206	-29.2671	2490.3143
174.600	0.018070	-736.0163	135.1447	-0.0017133	94.0050	-27.7708	2766.2620
176.400	0.014986	-408.2182	86.6671	-0.0017133	93.5219	-26.0931	3134.0032
178.200	0.011902	-164.9599	41.4336	-0.0017133	93.1634	-24.1664	3654.6709
180.000	0.008818	0.0000	0.0000	-0.0017133	92.9204	-21.8709	2232.1185

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection = 0.25000000 in

Computed slope at pile head = -8.836988E-07
Maximum bending moment = -1066584. lbs-in
Maximum shear force = 15999.76756 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 16
Number of zero deflection points = 0

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-1780948.	28830.5061	0.0000	2717.4287	0.0000	0.0000
1.800	0.499902	-1729079.	28796.8816	-0.0001078	2640.9918	-18.6803	67.2622
3.600	0.499612	-1677263.	28745.4914	-0.0002123	2564.6323	-38.4200	138.4196
5.400	0.499137	-1625563.	28657.7329	-0.0003137	2488.4448	-59.0893	213.0892
7.200	0.498483	-1574047.	28532.0510	-0.0004120	2412.5283	-80.5573	290.8892
9.000	0.497654	-1522785.	28367.1259	-0.0005071	2336.9856	-102.6928	371.4368
10.800	0.496657	-1471849.	28161.8748	-0.0005990	2261.9229	-125.3640	454.3479
12.600	0.495498	-1421312.	27915.4098	-0.0006878	2187.4486	-148.4860	539.4067
14.400	0.494181	-1371249.	27626.9625	-0.0007735	2113.6736	-172.0111	626.5315
16.200	0.492713	-1321738.	27295.9900	-0.0008562	2040.7105	-195.7361	715.0714
18.000	0.491099	-1272854.	26922.2459	-0.0009359	1968.6730	-219.5352	804.6516
19.800	0.489344	-1224676.	26506.6616	-0.0010126	1897.6749	-242.2252	891.0000
21.600	0.487453	-1177277.	26051.7566	-0.0010863	1827.8250	-263.2249	972.0000
23.400	0.485433	-1130726.	25559.2737	-0.0011572	1759.2239	-283.9783	1053.0000
25.200	0.483288	-1085089.	25029.6691	-0.0012252	1691.9709	-304.4712	1134.0000
27.000	0.481022	-1040434.	24463.4239	-0.0012904	1626.1642	-324.6901	1215.0000
28.800	0.478642	-996826.	23861.0427	-0.0013530	1561.9007	-344.6223	1296.0000
30.600	0.476152	-954329.	23223.0523	-0.0014129	1499.2759	-364.2560	1377.0000
32.400	0.473556	-913009.	22549.9999	-0.0014702	1438.3837	-383.5801	1458.0000
34.200	0.470859	-872927.	21842.4520	-0.0015251	1379.3167	-402.5843	1539.0000
36.000	0.468065	-834146.	21100.9931	-0.0015775	1322.1659	-421.2589	1620.0000
37.800	0.465180	-796725.	20326.2246	-0.0016275	1267.0208	-439.5950	1701.0000
39.600	0.462206	-760725.	19518.7632	-0.0016753	1213.9692	-457.5843	1782.0000
41.400	0.459149	-726204.	18679.2404	-0.0017210	1163.0972	-475.2189	1863.0000
43.200	0.456011	-693220.	17808.3010	-0.0017646	1114.4892	-492.4916	1944.0000
45.000	0.452796	-661827.	16906.6024	-0.0018062	1068.2279	-509.3957	2025.0000
46.800	0.449508	-632083.	15974.8139	-0.0018459	1024.3943	-525.9249	2106.0000
48.600	0.446151	-604039.	15013.6154	-0.0018839	983.0675	-542.0734	2187.0000
50.400	0.442727	-577749.	14023.6974	-0.0019201	944.3248	-557.8355	2268.0000
52.200	0.439238	-553263.	13005.7599	-0.0019549	908.2416	-573.2062	2349.0000
54.000	0.435689	-530633.	11960.5121	-0.0019881	874.8915	-588.1803	2430.0000
55.800	0.432081	-509905.	10888.6720	-0.0020201	844.3461	-602.7532	2511.0000
57.600	0.428417	-491128.	9790.9659	-0.0020508	816.6751	-616.9202	2592.0000
59.400	0.424698	-474347.	8668.1286	-0.0020805	791.9464	-630.6768	2673.0000
61.200	0.420927	-459608.	8034.4594	-0.0021091	770.2256	-73.4001	313.8790
63.000	0.417105	-445104.	7901.3002	-0.0021369	748.8522	-74.5546	321.7370
64.800	0.413234	-430840.	7766.0744	-0.0021638	727.8318	-75.6962	329.7239
66.600	0.409316	-416819.	7628.8054	-0.0021898	707.1698	-76.8249	337.8438
68.400	0.405351	-403045.	7489.5169	-0.0022150	686.8717	-77.9402	346.1012
70.200	0.401342	-389522.	7349.1343	-0.0022393	666.9431	-78.0404	350.0078
72.000	0.397289	-376250.	7208.8988	-0.0022628	647.3843	-77.7769	352.3838
73.800	0.393195	-363228.	7069.1417	-0.0022855	628.1944	-77.5088	354.8256
75.600	0.389061	-350456.	6929.8712	-0.0023075	609.3721	-77.2362	357.3347
77.400	0.384889	-337932.	6791.0955	-0.0023286	590.9161	-76.9591	359.9128
79.200	0.380679	-325656.	6652.8226	-0.0023490	572.8253	-76.6775	362.5616
81.000	0.376432	-313626.	6515.0607	-0.0023686	555.0984	-76.3913	365.2830
82.800	0.372152	-301843.	6377.8180	-0.0023875	537.7341	-76.1006	368.0789
84.600	0.367837	-290305.	6241.1025	-0.0024057	520.7310	-75.8054	370.9513
86.400	0.363491	-279011.	6104.9225	-0.0024231	504.0879	-75.5057	373.9024
88.200	0.359114	-267961.	5969.2861	-0.0024399	487.8034	-75.2014	376.9345
90.000	0.354707	-257153.	5834.2015	-0.0024561	471.8762	-74.8925	380.0500
91.800	0.350272	-246587.	5699.6771	-0.0024715	456.3048	-74.5791	383.2515
93.600	0.345810	-236261.	5565.7209	-0.0024863	441.0877	-74.2611	386.5415
95.400	0.341322	-226174.	5432.3414	-0.0025005	426.2237	-73.9384	389.9229
97.200	0.336808	-216326.	5299.5470	-0.0025141	411.7111	-73.6110	393.3987
99.000	0.332271	-206716.	5167.3459	-0.0025271	397.5485	-73.2790	396.9721
100.800	0.327710	-197342.	5035.7469	-0.0025395	383.7343	-72.9422	400.6463
102.600	0.323128	-188203.	4904.7583	-0.0025514	370.2671	-72.6007	404.4250
104.400	0.318526	-179299.	4774.3888	-0.0025626	357.1453	-72.2543	408.3118
106.200	0.313903	-170628.	4644.6471	-0.0025734	344.3672	-71.9031	412.3108
108.000	0.309261	-162189.	4515.5421	-0.0025836	331.9312	-71.5469	416.4260
109.800	0.304602	-153981.	4387.0826	-0.0025933	319.8358	-71.1858	420.6620
111.600	0.299925	-146003.	4259.2777	-0.0026025	308.0792	-70.8196	425.0234
113.400	0.295233	-138254.	4132.1365	-0.0026112	296.6597	-70.4484	429.5154
115.200	0.290525	-130733.	4005.6683	-0.0026195	285.5757	-70.0719	434.1431
117.000	0.285803	-123438.	3879.8824	-0.0026273	274.8253	-69.6902	438.9124
118.800	0.281067	-116368.	3754.7884	-0.0026347	264.4068	-69.3031	443.8292
120.600	0.276318	-109522.	3630.3960	-0.0026416	254.3185	-68.9106	448.8999
122.400	0.271557	-102899.	3506.7152	-0.0026481	244.5584	-68.5126	454.1316
124.200	0.266785	-96497.4977	3383.7559	-0.0026542	235.1247	-68.1088	459.5314
126.000	0.262002	-90316.1884	3261.5285	-0.0026600	226.0156	-67.6994	465.1073
127.800	0.257209	-84353.8059	3140.0435	-0.0026653	217.2290	-67.2840	470.8676
129.600	0.252406	-78609.0322	3019.3114	-0.0026703	208.7632	-66.8627	476.8215
131.400	0.247595	-73080.5286	2899.3434	-0.0026750	200.6161	-66.4352	482.9784
133.200	0.242776	-67766.9356	2780.1505	-0.0026793	192.7857	-66.0013	489.3489
135.000	0.237950	-62666.8724	2661.7444	-0.0026833	185.2699	-65.5610	495.9442
136.800	0.233116	-57778.9361	2544.1368	-0.0026870	178.0668	-65.1141	502.7762
138.600	0.228277	-53101.7012	2427.3398	-0.0026904	171.1741	-64.6603	509.8579
140.400	0.223431	-48633.7194	2311.3658	-0.0026936	164.5898	-64.1996	517.2035
142.200	0.218580	-44373.5184	2196.2278	-0.0026964	158.3118	-63.7316	524.8281
144.000	0.213724	-40319.6017	2081.9389	-0.0026990	152.3377	-63.2561	532.7482
145.800	0.208863	-36470.4476	1968.5128	-0.0027014	146.6653	-62.7729	540.9817
147.600	0.203999	-32824.5084	1855.9636	-0.0027035	141.2925	-62.2818	549.5481
149.400	0.199131	-29380.2098	1744.3058	-0.0027054	136.2167	-61.7824	558.4687
151.200	0.194259	-26135.9498	1633.5547	-0.0027071	131.4358	-61.2745	567.7667
153.000	0.189385	-23090.0977	1523.7258	-0.0027086	126.9473	-60.7577	577.4675
154.800	0.184508	-20240.9932	1414.8354	-0.0027100	122.7487	-60.2316	587.5990
156.600	0.179629	-17586.9452	1306.9006	-0.0027111	118.8375	-59.6960	598.1918
158.400	0.174748	-15126.2306	1199.9388	-0.0027121	115.2113	-59.1504	609.2799
160.200	0.169866	-12857.0930	1093.9687	-0.0027130	111.8673	-58.5943	620.9005
162.000	0.164982	-10777.7411	989.0093	-0.0027137	108.8031	-58.0273	633.0952
163.800	0.160096	-8886.3475	885.0808	-0.0027143	106.0158	-57.4488	645.9101
165.600	0.155210	-7181.0468	782.2044	-0.0027148	103.5028	-56.8583	659.3965
167.400	0.150323	-5659.9338	680.4022	-0.0027152	101.2612	-56.2552	673.6121
169.200	0.145435	-4321.0615	579.6975	-0.0027155	99.2881	-55.6389	688.6215
171.000	0.140547	-3162.4391	480.1149	-0.0027157	97.5807	-55.0084	704.4975
172.800	0.135659	-2182.0294	381.6804	-0.0027159	96.1359	-54.3632	721.3226
174.600	0.130770	-1377.7463	284.4215	-0.0027160	94.9507	-53.7022	739.1905
176.400	0.125881	-747.4519	188.3675	-0.0027161	94.0218	-53.0245	758.2083
178.200	0.120992	-288.9536	93.5493	-0.0027161	93.3462	-52.3290	778.4989
180.000	0.116103	0.0000	0.0000	-0.0027161	92.9204	-51.6146	400.1020

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

Pile-head deflection = 0.50000000 in
Computed slope at pile head = -0.00000159
Maximum bending moment = -1780948. lbs-in
Maximum shear force = 28830.50612 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 14
Number of zero deflection points = 0

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	205106.	5917.4201
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	340737.	10372.0487
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-1066584.	15999.7676
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-1780948.	28830.5061

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 24 inch L=30 fill 10.lpd
Name of output file: pile 10 24 inch L=30 fill 10.lpo
Name of plot output file: pile 10 24 inch L=30 fill 10.lpp
Name of runtime file: pile 10 24 inch L=30 fill 10.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:56:49

Problem Title

RH Fdn Pile 148 cut off L=15 dia 24 Fill 10 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	24.00000000	8143.0000	452.0000	3600000.
2	360.0000	24.00000000	8143.0000	452.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 120.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 240.000 in

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 240.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	120.00	0.06900
3	120.00	0.03300
4	240.00	0.03300
5	240.00	0.03300
6	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 6 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	120.000	0.00000	30.00	------	------
3	120.000	1.04100	0.00	0.02000	0.0
4	240.000	1.04100	0.00	0.02000	0.0
5	240.000	0.00000	32.00	------	------
6	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	6478.5447	-0.0027025	92.9204	0.0000	0.0000
1.800	0.245135	11865.6898	6468.6167	-0.0027021	110.4063	-11.0311	81.0000
3.600	0.240272	23695.5838	6439.2267	-0.0027010	127.8395	-21.6245	162.0000
5.400	0.235412	35455.3043	6391.1621	-0.0026992	145.1694	-31.7806	243.0000
7.200	0.230555	47111.8912	6325.2097	-0.0026967	162.3472	-41.4999	324.0000
9.000	0.225704	58633.7997	6242.1548	-0.0026935	179.3265	-50.7833	405.0000
10.800	0.220859	69990.8981	6142.7811	-0.0026895	196.0630	-59.6318	486.0000
12.600	0.216021	81154.4644	6027.8704	-0.0026849	212.5143	-68.0467	567.0000
14.400	0.211193	92097.1826	5898.2018	-0.0026795	228.6401	-76.0295	648.0000
16.200	0.206375	102793.	5754.5515	-0.0026736	244.4023	-83.5819	729.0000
18.000	0.201568	113218.	5597.6926	-0.0026669	259.7647	-90.7058	810.0000
19.800	0.196774	123348.	5428.3946	-0.0026597	274.6933	-97.4032	891.0000
21.600	0.191994	133162.	5247.4228	-0.0026518	289.1559	-103.6765	972.0000
23.400	0.187228	142640.	5055.5386	-0.0026433	303.1226	-109.5282	1053.0000
25.200	0.182478	151762.	4853.4984	-0.0026343	316.5654	-114.9609	1134.0000
27.000	0.177744	160511.	4642.0540	-0.0026247	329.4582	-119.9774	1215.0000
28.800	0.173029	168870.	4421.9517	-0.0026146	341.7771	-124.5807	1296.0000
30.600	0.168332	176825.	4193.9327	-0.0026040	353.5000	-128.7738	1377.0000
32.400	0.163654	184362.	3958.7323	-0.0025929	364.6068	-132.5601	1458.0000
34.200	0.158997	191468.	3717.0797	-0.0025813	375.0795	-135.9428	1539.0000
36.000	0.154362	198134.	3469.6983	-0.0025694	384.9017	-138.9254	1620.0000
37.800	0.149748	204348.	3217.3051	-0.0025570	394.0593	-141.5115	1701.0000
39.600	0.145156	210103.	2960.6105	-0.0025443	402.5398	-143.7047	1782.0000
41.400	0.140588	215391.	2700.3184	-0.0025312	410.3328	-145.5087	1863.0000
43.200	0.136044	220206.	2437.1260	-0.0025179	417.4295	-146.9273	1944.0000
45.000	0.131524	224545.	2171.7235	-0.0025042	423.8232	-147.9643	2025.0000
46.800	0.127029	228403.	1904.7945	-0.0024903	429.5088	-148.6235	2106.0000
48.600	0.122559	231779.	1637.0153	-0.0024762	434.4833	-148.9089	2187.0000
50.400	0.118114	234671.	1369.0555	-0.0024619	438.7452	-148.8242	2268.0000
52.200	0.113696	237080.	1101.5777	-0.0024474	442.2949	-148.3734	2349.0000
54.000	0.109304	239007.	835.2375	-0.0024328	445.1346	-147.5603	2430.0000
55.800	0.104938	240454.	570.6834	-0.0024180	447.2680	-146.3887	2511.0000
57.600	0.100599	241427.	308.5573	-0.0024032	448.7009	-144.8625	2592.0000
59.400	0.096286	241929.	49.4942	-0.0023884	449.4405	-142.9854	2673.0000
61.200	0.092001	241966.	-205.8777	-0.0023735	449.4957	-140.7611	2754.0000
63.000	0.087742	241546.	-456.9366	-0.0023587	448.8771	-138.1932	2835.0000
64.800	0.083509	240678.	-703.0672	-0.0023439	447.5971	-135.2852	2916.0000
66.600	0.079304	239370.	-943.6605	-0.0023292	445.6695	-132.0407	2997.0000
68.400	0.075124	237633.	-1178.1136	-0.0023145	443.1098	-128.4628	3078.0000
70.200	0.070971	235478.	-1405.8295	-0.0023000	439.9351	-124.5549	3159.0000
72.000	0.066844	232919.	-1626.2170	-0.0022856	436.1641	-120.3201	3240.0000
73.800	0.062743	229970.	-1838.6902	-0.0022714	431.8170	-115.7613	3321.0000
75.600	0.058667	226644.	-2042.6687	-0.0022574	426.9157	-110.8815	3402.0000
77.400	0.054617	222957.	-2237.5771	-0.0022436	421.4833	-105.6833	3483.0000
79.200	0.050591	218928.	-2422.8445	-0.0022300	415.5448	-100.1694	3564.0000
81.000	0.046589	214572.	-2597.9048	-0.0022167	409.1266	-94.3421	3645.0000
82.800	0.042610	209910.	-2762.1959	-0.0022037	402.2564	-88.2037	3726.0000
84.600	0.038655	204962.	-2915.1599	-0.0021909	394.9637	-81.7563	3807.0000

86.400	0.034723	199747.	-3056.2424	-0.0021785	387.2792	-75.0019	3888.0000
88.200	0.030813	194288.	-3184.8922	-0.0021664	379.2352	-67.9423	3969.0000
90.000	0.026924	188609.	-3300.5616	-0.0021547	370.8655	-60.5791	4050.0000
91.800	0.023056	182732.	-3402.7052	-0.0021433	362.2053	-52.9138	4131.0000
93.600	0.019208	176683.	-3490.7804	-0.0021322	353.2911	-44.9475	4212.0000
95.400	0.015380	170488.	-3564.2466	-0.0021216	344.1612	-36.6816	4293.0000
97.200	0.011571	164173.	-3622.5653	-0.0021113	334.8549	-28.1169	4374.0000
99.000	0.007780	157766.	-3665.1993	-0.0021014	325.4133	-19.2543	4455.0000
100.800	0.004006	151296.	-3691.6131	-0.0020919	315.8786	-10.0944	4536.0000
102.600	0.000249	144792.	-3701.2720	-0.0020828	306.2948	-0.6377235	4617.0000
104.400	-0.003492	138286.	-3693.6422	-0.0020741	296.7068	9.1153	4698.0000
106.200	-0.007218	131809.	-3668.1904	-0.0020658	287.1615	19.1644	4779.0000
108.000	-0.010929	125393.	-3624.3838	-0.0020579	277.7068	29.5096	4860.0000
109.800	-0.014627	119072.	-3561.6896	-0.0020504	268.3921	40.1507	4941.0000
111.600	-0.018311	112881.	-3479.5750	-0.0020433	259.2683	51.0878	5022.0000
113.400	-0.021983	106855.	-3377.5070	-0.0020366	250.3876	62.3211	5103.0000
115.200	-0.025643	101030.	-3254.9521	-0.0020302	241.8038	73.8509	5184.0000
117.000	-0.029291	95443.8078	-3111.3766	-0.0020242	233.5719	85.6775	5265.0000
118.800	-0.032930	90134.9320	-2946.2459	-0.0020185	225.7484	97.8010	5346.0000
120.600	-0.036558	85142.5132	-2826.6215	-0.0020131	218.3913	35.1150	1728.9580
122.400	-0.040177	80263.4718	-2762.4043	-0.0020080	211.2013	36.2373	1623.5073
124.200	-0.043787	75501.4667	-2696.2283	-0.0020032	204.1837	37.2916	1532.9976
126.000	-0.047388	70859.9360	-2628.2075	-0.0019987	197.3437	38.2872	1454.3018
127.800	-0.050982	66342.1267	-2558.4407	-0.0019945	190.6860	39.2315	1385.1266
129.600	-0.054569	61951.1193	-2487.0149	-0.0019906	184.2151	40.1306	1323.7491
131.400	-0.058148	57689.8474	-2414.0068	-0.0019869	177.9355	40.9895	1268.8474
133.200	-0.061721	53561.1137	-2339.4851	-0.0019835	171.8511	41.8124	1219.3894
135.000	-0.065289	49567.6037	-2263.5113	-0.0019803	165.9661	42.6029	1174.5561
136.800	-0.068850	45711.8969	-2186.1412	-0.0019774	160.2841	43.3639	1133.6887
138.600	-0.072407	41996.4769	-2107.4254	-0.0019747	154.8088	44.0981	1096.2511
140.400	-0.075959	38423.7398	-2027.4102	-0.0019722	149.5438	44.8077	1061.8019
142.200	-0.079507	34996.0013	-1946.1380	-0.0019700	144.4925	45.4947	1029.9740
144.000	-0.083051	31715.5031	-1863.6481	-0.0019679	139.6582	46.1608	1000.4597
145.800	-0.086592	28584.4188	-1779.9764	-0.0019661	135.0440	46.8077	972.9991
147.600	-0.090129	25604.8585	-1695.1567	-0.0019644	130.6532	47.4365	947.3705
149.400	-0.093664	22778.8738	-1609.2200	-0.0019629	126.4886	48.0487	923.3841
151.200	-0.097196	20108.4609	-1522.1956	-0.0019616	122.5534	48.6452	900.8759
153.000	-0.100726	17595.5650	-1434.1106	-0.0019605	118.8502	49.2270	879.7041
154.800	-0.104253	15242.0830	-1344.9907	-0.0019594	115.3820	49.7951	859.7445
156.600	-0.107780	13049.8665	-1254.8598	-0.0019586	112.1514	50.3503	840.8886
158.400	-0.111304	11020.7244	-1163.7405	-0.0019578	109.1611	50.8933	823.0408
160.200	-0.114828	9156.4254	-1071.6543	-0.0019572	106.4138	51.4247	806.1165
162.000	-0.118350	7458.7001	-978.6213	-0.0019567	103.9119	51.9453	790.0408
163.800	-0.121872	5929.2428	-884.6606	-0.0019563	101.6580	52.4555	774.7468
165.600	-0.125393	4569.7137	-789.7905	-0.0019560	99.6546	52.9558	760.1747
167.400	-0.128913	3381.7402	-694.0281	-0.0019557	97.9039	53.4468	746.2710
169.200	-0.132433	2366.9189	-597.3899	-0.0019556	96.4084	53.9289	732.9874
171.000	-0.135953	1526.8162	-499.8916	-0.0019554	95.1704	54.4025	720.2806
172.800	-0.139473	862.9708	-401.5481	-0.0019554	94.1921	54.8680	708.1110
174.600	-0.142993	376.8936	-302.3737	-0.0019553	93.4758	55.3257	696.4431
176.400	-0.146512	70.0700	-202.3823	-0.0019553	93.0236	55.7759	685.2444
178.200	-0.150032	-56.0399	-101.5868	-0.0019553	93.0029	56.2190	674.4853
180.000	-0.153551	0.0000	0.0000	-0.0019553	92.9204	56.6552	332.0694

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00270250
Maximum bending moment            =   241966.07151 lbs-in
Maximum shear force               =     6478.54474 lbs
Depth of maximum bending moment   =    61.20000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             12
```

Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.500000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	11686.4879	-0.0055645	92.9204	0.0000	0.0000
1.800	0.489984	21456.3563	11669.7779	-0.0055639	124.5397	-18.5666	68.2062
3.600	0.479970	42852.4571	11618.9120	-0.0055619	156.0702	-37.9511	142.3254
5.400	0.469961	64125.3974	11532.5530	-0.0055586	187.4193	-58.0034	222.1590
7.200	0.459959	85210.1092	11409.6325	-0.0055540	218.4909	-78.5749	307.4943
9.000	0.449967	106040.	11249.3485	-0.0055482	249.1869	-99.5184	398.1033
10.800	0.439986	126547.	11052.8654	-0.0055410	279.4069	-118.7962	486.0000
12.600	0.430019	146668.	10824.0385	-0.0055326	309.0588	-135.4560	567.0000
14.400	0.420068	166350.	10566.0260	-0.0055230	338.0630	-151.2246	648.0000
16.200	0.410136	185541.	10280.4293	-0.0055122	366.3440	-166.1051	729.0000
18.000	0.400224	204193.	9968.8438	-0.0055002	393.8306	-180.1010	810.0000
19.800	0.390335	222260.	9632.8586	-0.0054872	420.4560	-193.2159	891.0000
21.600	0.380471	239701.	9274.0556	-0.0054730	446.1572	-205.4541	972.0000
23.400	0.370633	256474.	8894.0088	-0.0054577	470.8759	-216.8200	1053.0000
25.200	0.360823	272544.	8494.2843	-0.0054415	494.5575	-227.3183	1134.0000
27.000	0.351043	287876.	8076.4391	-0.0054243	517.1520	-236.9541	1215.0000
28.800	0.341295	302440.	7642.0210	-0.0054062	538.6130	-245.7326	1296.0000
30.600	0.331581	316205.	7192.5681	-0.0053872	558.8988	-253.6594	1377.0000
32.400	0.321902	329147.	6729.6084	-0.0053674	577.9712	-260.7402	1458.0000
34.200	0.312258	341243.	6254.6593	-0.0053468	595.7964	-266.9810	1539.0000
36.000	0.302653	352473.	5769.2274	-0.0053255	612.3446	-272.3878	1620.0000
37.800	0.293087	362818.	5274.8081	-0.0053035	627.5898	-276.9670	1701.0000
39.600	0.283560	372264.	4772.8854	-0.0052810	641.5100	-280.7249	1782.0000
41.400	0.274075	380799.	4264.9319	-0.0052578	654.0874	-283.6680	1863.0000
43.200	0.264632	388413.	3752.4082	-0.0052342	665.3078	-285.8029	1944.0000
45.000	0.255232	395099.	3236.7631	-0.0052102	675.1609	-287.1362	2025.0000
46.800	0.245876	400853.	2719.4334	-0.0051857	683.6403	-287.6746	2106.0000
48.600	0.236564	405673.	2201.8441	-0.0051610	690.7434	-287.4247	2187.0000
50.400	0.227296	409560.	1685.4079	-0.0051359	696.4714	-286.3933	2268.0000
52.200	0.218074	412517.	1171.5258	-0.0051107	700.8291	-284.5868	2349.0000
54.000	0.208898	414550.	661.5870	-0.0050853	703.8253	-282.0119	2430.0000
55.800	0.199767	415667.	156.9686	-0.0050598	705.4721	-278.6751	2511.0000
57.600	0.190682	415880.	-340.9634	-0.0050343	705.7854	-274.5827	2592.0000
59.400	0.181644	415201.	-830.8545	-0.0050088	704.7849	-269.7409	2673.0000
61.200	0.172651	413646.	-1311.3615	-0.0049833	702.4936	-264.1558	2754.0000
63.000	0.163704	411234.	-1781.1517	-0.0049580	698.9383	-257.8333	2835.0000
64.800	0.154802	407984.	-2238.9031	-0.0049328	694.1491	-250.7793	2916.0000
66.600	0.145945	403919.	-2683.3038	-0.0049079	688.1596	-242.9992	2997.0000
68.400	0.137134	399066.	-3113.0516	-0.0048833	681.0072	-234.4983	3078.0000
70.200	0.128366	393451.	-3526.8537	-0.0048589	672.7325	-225.2818	3159.0000
72.000	0.119641	387104.	-3923.4263	-0.0048350	663.3793	-215.3544	3240.0000
73.800	0.110960	380058.	-4301.4941	-0.0048114	652.9953	-204.7208	3321.0000
75.600	0.102320	372346.	-4659.7896	-0.0047883	641.6312	-193.3853	3402.0000
77.400	0.093722	364006.	-4997.0529	-0.0047657	629.3413	-181.3518	3483.0000
79.200	0.085164	355077.	-5312.0312	-0.0047436	616.1829	-168.6241	3564.0000
81.000	0.076645	345600.	-5603.4780	-0.0047221	602.2170	-155.2056	3645.0000
82.800	0.068164	335619.	-5870.1526	-0.0047012	587.5077	-141.0995	3726.0000
84.600	0.059720	325178.	-6110.8200	-0.0046809	572.1224	-126.3087	3807.0000
86.400	0.051313	314328.	-6324.2497	-0.0046613	556.1317	-110.8355	3888.0000
88.200	0.042940	303116.	-6509.2156	-0.0046423	539.6097	-94.6822	3969.0000
90.000	0.034600	291596.	-6664.4951	-0.0046241	522.6336	-77.8507	4050.0000
91.800	0.026293	279823.	-6788.8692	-0.0046065	505.2838	-60.3426	4131.0000
93.600	0.018017	267853.	-6881.1209	-0.0045897	487.6439	-42.1593	4212.0000
95.400	0.009770	255745.	-6940.0358	-0.0045736	469.8009	-23.3017	4293.0000
97.200	0.001552	243560.	-6964.4009	-0.0045583	451.8449	-3.7706	4374.0000
99.000	-0.006640	231362.	-6953.0042	-0.0045437	433.8693	16.4335	4455.0000
100.800	-0.014806	219216.	-6904.6346	-0.0045299	415.9705	37.3105	4536.0000
102.600	-0.022947	207190.	-6818.0810	-0.0045168	398.2484	58.8602	4617.0000
104.400	-0.031066	195354.	-6692.1321	-0.0045044	380.8058	81.0829	4698.0000
106.200	-0.039163	183780.	-6525.5764	-0.0044928	363.7491	103.9790	4779.0000
108.000	-0.047240	172542.	-6317.2012	-0.0044819	347.1876	127.5490	4860.0000
109.800	-0.055298	161716.	-6065.7928	-0.0044716	331.2339	151.7936	4941.0000
111.600	-0.063338	151381.	-5770.1365	-0.0044620	316.0039	176.7135	5022.0000
113.400	-0.071361	141618.	-5429.0158	-0.0044530	301.6166	202.3095	5103.0000
115.200	-0.079369	132510.	-5041.2129	-0.0044446	288.1943	228.5826	5184.0000
117.000	-0.087362	124141.	-4605.5084	-0.0044367	275.8624	255.5335	5265.0000
118.800	-0.095341	116601.	-4120.6815	-0.0044293	264.7498	283.1630	5346.0000
120.600	-0.103307	109977.	-3821.1548	-0.0044224	254.9884	49.6444	864.9909
122.400	-0.111262	103513.	-3730.6764	-0.0044158	245.4633	50.8871	823.2564
124.200	-0.119204	97213.9365	-3638.0148	-0.0044096	236.1805	52.0702	786.2671
126.000	-0.127136	91083.0068	-3543.2712	-0.0044039	227.1456	53.2004	753.2132
127.800	-0.135058	85124.0236	-3446.5360	-0.0043984	218.3641	54.2831	723.4633
129.600	-0.142971	79340.5226	-3347.8904	-0.0043934	209.8412	55.3231	696.5176
131.400	-0.150874	73735.9002	-3247.4077	-0.0043887	201.5819	56.3243	671.9744
133.200	-0.158770	68313.4263	-3145.1547	-0.0043843	193.5910	57.2901	649.5070
135.000	-0.166658	63076.2552	-3041.1924	-0.0043803	185.8732	58.2236	628.8471
136.800	-0.174539	58027.4358	-2935.5767	-0.0043766	178.4330	59.1272	609.7715
138.600	-0.182414	53169.9192	-2828.3592	-0.0043732	171.2746	60.0033	592.0936
140.400	-0.190283	48506.5665	-2719.5876	-0.0043701	164.4025	60.8540	575.6555
142.200	-0.198146	44040.1557	-2609.3061	-0.0043672	157.8205	61.6809	560.3228
144.000	-0.206005	39773.3867	-2497.5561	-0.0043646	151.5327	62.4858	545.9805
145.800	-0.213859	35708.8870	-2384.3759	-0.0043623	145.5431	63.2700	532.5293
147.600	-0.221709	31849.2164	-2269.8015	-0.0043602	139.8552	64.0349	519.8834
149.400	-0.229556	28196.8708	-2153.8667	-0.0043584	134.4729	64.7815	507.9675
151.200	-0.237399	24754.2866	-2036.6034	-0.0043568	129.3997	65.5111	496.7162
153.000	-0.245240	21523.8433	-1918.0413	-0.0043554	124.6391	66.2245	486.0715
154.800	-0.253078	18507.8676	-1798.2088	-0.0043541	120.1946	66.9227	475.9823
156.600	-0.260915	15708.6355	-1677.1327	-0.0043531	116.0695	67.6064	466.4033
158.400	-0.268749	13128.3752	-1554.8382	-0.0043522	112.2671	68.2764	457.2940
160.200	-0.276583	10769.2695	-1431.3493	-0.0043515	108.7906	68.9334	448.6185
162.000	-0.284415	8633.4579	-1306.6891	-0.0043509	105.6431	69.5780	440.3443
163.800	-0.292246	6723.0391	-1180.8792	-0.0043504	102.8278	70.2108	432.4423
165.600	-0.300076	5040.0720	-1053.9403	-0.0043500	100.3477	70.8323	424.8862
167.400	-0.307906	3586.5783	-925.8924	-0.0043498	98.2057	71.4431	417.6523
169.200	-0.315735	2364.5436	-796.7544	-0.0043496	96.4049	72.0436	410.7190
171.000	-0.323564	1375.9192	-666.5444	-0.0043495	94.9480	72.6342	404.0666
172.800	-0.331393	622.6232	-535.2798	-0.0043494	93.8379	73.2153	397.6773
174.600	-0.339222	106.5420	-402.9773	-0.0043494	93.0774	73.7874	391.5348
176.400	-0.347051	-170.4685	-269.6530	-0.0043494	93.1716	74.3507	385.6242
178.200	-0.354880	-206.5819	-135.3223	-0.0043494	93.2248	74.9056	379.9317
180.000	-0.362709	0.0000	0.0000	-0.0043494	92.9204	75.4525	187.2223

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00556452
Maximum bending moment            =   415880.02098 lbs-in
Maximum shear force               =    11686.48788 lbs
Depth of maximum bending moment   =    57.60000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             10
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-1612047.	24143.3963	0.0000	2468.5268	0.0000	0.0000
1.800	0.249911	-1568603.	24123.1535	-9.7650E-05	2404.5058	-11.2460	81.0000
3.600	0.249648	-1525189.	24092.8106	-0.0001926	2340.5277	-22.4684	162.0000
5.400	0.249217	-1481840.	24042.3091	-0.0002850	2276.6464	-33.6444	243.0000
7.200	0.248623	-1438593.	23971.7523	-0.0003746	2212.9156	-44.7521	324.0000
9.000	0.247869	-1395485.	23881.2820	-0.0004616	2149.3887	-55.7705	405.0000
10.800	0.246961	-1352551.	23771.0771	-0.0005460	2086.1185	-66.6794	486.0000
12.600	0.245903	-1309827.	23641.3521	-0.0006277	2023.1574	-77.4595	567.0000
14.400	0.244701	-1267347.	23492.3554	-0.0007069	1960.5572	-88.0923	648.0000
16.200	0.243359	-1225147.	23324.3681	-0.0007834	1898.3690	-98.5602	729.0000
18.000	0.241881	-1183261.	23137.7021	-0.0008573	1836.6430	-108.8464	810.0000
19.800	0.240272	-1141722.	22932.6991	-0.0009287	1775.4285	-118.9348	891.0000
21.600	0.238538	-1100563.	22709.7286	-0.0009975	1714.7742	-128.8103	972.0000
23.400	0.236681	-1059816.	22469.1868	-0.0010639	1654.7273	-138.4585	1053.0000
25.200	0.234708	-1019513.	22211.4949	-0.0011277	1595.3342	-147.8658	1134.0000
27.000	0.232621	-979684.	21937.0982	-0.0011891	1536.6403	-157.0195	1215.0000
28.800	0.230427	-940360.	21646.4640	-0.0012480	1478.6893	-165.9074	1296.0000
30.600	0.228129	-901568.	21340.0809	-0.0013046	1421.5240	-174.5183	1377.0000
32.400	0.225730	-863338.	21018.4569	-0.0013588	1365.1858	-182.8417	1458.0000
34.200	0.223237	-825696.	20682.1186	-0.0014106	1309.7148	-190.8676	1539.0000
36.000	0.220652	-788669.	20331.6094	-0.0014602	1255.1494	-198.5870	1620.0000
37.800	0.217980	-752282.	19967.4888	-0.0015075	1201.5268	-205.9914	1701.0000
39.600	0.215225	-716558.	19590.3308	-0.0015526	1148.8825	-213.0730	1782.0000
41.400	0.212391	-681522.	19200.7228	-0.0015955	1097.2508	-219.8247	1863.0000
43.200	0.209481	-647194.	18799.2645	-0.0016363	1046.6639	-226.2400	1944.0000
45.000	0.206500	-613597.	18386.5669	-0.0016750	997.1529	-232.3129	2025.0000
46.800	0.203451	-580750.	17963.2509	-0.0017117	948.7468	-238.0382	2106.0000
48.600	0.200338	-548671.	17529.9466	-0.0017463	901.4734	-243.4111	2187.0000
50.400	0.197165	-517378.	17087.2920	-0.0017791	855.3584	-248.4274	2268.0000
52.200	0.193934	-486887.	16635.9322	-0.0018099	810.4260	-253.0834	2349.0000
54.000	0.190649	-457215.	16176.5187	-0.0018389	766.6987	-257.3760	2430.0000
55.800	0.187314	-428374.	15709.7080	-0.0018661	724.1971	-261.3025	2511.0000
57.600	0.183931	-400378.	15236.1611	-0.0018915	682.9402	-264.8607	2592.0000
59.400	0.180504	-373238.	14756.5428	-0.0019153	642.9452	-268.0486	2673.0000
61.200	0.177036	-346964.	14271.5204	-0.0019374	604.2275	-270.8651	2754.0000
63.000	0.173530	-321567.	13781.7637	-0.0019579	566.8007	-273.3090	2835.0000
64.800	0.169988	-297054.	13287.9438	-0.0019769	530.6766	-275.3798	2916.0000
66.600	0.166413	-273432.	12790.7326	-0.0019944	495.8654	-277.0771	2997.0000
68.400	0.162808	-250706.	12290.8023	-0.0020105	462.3752	-278.4010	3078.0000
70.200	0.159175	-228881.	11788.8247	-0.0020252	430.2126	-279.3518	3159.0000
72.000	0.155517	-207960.	11285.4709	-0.0020386	399.3822	-279.9302	3240.0000
73.800	0.151836	-187945.	10781.4106	-0.0020508	369.8870	-280.1369	3321.0000
75.600	0.148134	-168837.	10277.3117	-0.0020618	341.7281	-279.9730	3402.0000
77.400	0.144413	-150635.	9773.8402	-0.0020716	314.9047	-279.4399	3483.0000
79.200	0.140676	-133338.	9271.6592	-0.0020803	289.4146	-278.5389	3564.0000
81.000	0.136924	-116942.	8771.4296	-0.0020880	265.2535	-277.2718	3645.0000
82.800	0.133160	-101445.	8273.8087	-0.0020947	242.4154	-275.6403	3726.0000
84.600	0.129384	-86839.9538	7779.4509	-0.0021005	220.8928	-273.6462	3807.0000
86.400	0.125598	-73121.2533	7289.0070	-0.0021054	200.6761	-271.2915	3888.0000
88.200	0.121804	-60281.1978	6803.1241	-0.0021095	181.7542	-268.5783	3969.0000

90.000	0.118004	-48311.0562	6322.4458	-0.0021128	164.1143	-265.5087	4050.0000
91.800	0.114198	-37200.9385	5847.6117	-0.0021154	147.7418	-262.0848	4131.0000
93.600	0.110388	-26939.8029	5379.2575	-0.0021174	132.6204	-258.3088	4212.0000
95.400	0.106576	-17515.4627	4918.0151	-0.0021188	118.7322	-254.1827	4293.0000
97.200	0.102761	-8914.5933	4464.5126	-0.0021196	106.0574	-249.7089	4374.0000
99.000	0.098945	-1122.7393	4019.3743	-0.0021199	94.5749	-244.8892	4455.0000
100.800	0.095129	5875.6788	3583.2207	-0.0021197	101.5791	-239.7259	4536.0000
102.600	0.091314	12097.3578	3156.6687	-0.0021192	110.7477	-234.2208	4617.0000
104.400	0.087500	17560.1054	2740.3319	-0.0021183	118.7980	-228.3758	4698.0000
106.200	0.083688	22282.8341	2334.8203	-0.0021170	125.7576	-222.1927	4779.0000
108.000	0.079879	26285.5551	1940.7411	-0.0021155	131.6563	-215.6731	4860.0000
109.800	0.076072	29589.3730	1558.6984	-0.0021138	136.5250	-208.8188	4941.0000
111.600	0.072269	32216.4808	1189.2937	-0.0021119	140.3964	-201.6309	5022.0000
113.400	0.068469	34190.1550	833.1261	-0.0021099	143.3050	-194.1109	5103.0000
115.200	0.064674	35534.7512	490.7926	-0.0021078	145.2864	-186.2597	5184.0000
117.000	0.060882	36275.7010	162.8882	-0.0021056	146.3783	-178.0784	5265.0000
118.800	0.057094	36439.5084	-149.9933	-0.0021033	146.6197	-169.5678	5346.0000
120.600	0.053310	36053.7470	-338.4391	-0.0021011	146.0513	-39.8165	1344.4055
122.400	0.049530	35538.8129	-409.2408	-0.0020989	145.2924	-38.8521	1411.9580
124.200	0.045754	34897.8332	-478.2621	-0.0020967	144.3478	-37.8383	1488.6046
126.000	0.041981	34134.0954	-545.4080	-0.0020946	143.2223	-36.7682	1576.4808
127.800	0.038213	33251.0701	-610.5692	-0.0020925	141.9211	-35.6331	1678.4790
129.600	0.034448	32252.4392	-673.6187	-0.0020905	140.4494	-34.4219	1798.6266
131.400	0.030687	31142.1317	-734.4065	-0.0020886	138.8132	-33.1201	1942.7204
133.200	0.026929	29924.3704	-792.7523	-0.0020867	137.0187	-31.7085	2119.4518
135.000	0.023175	28603.7346	-848.4339	-0.0020849	135.0725	-30.1599	2342.5373
136.800	0.019424	27185.2479	-901.1695	-0.0020832	132.9821	-28.4352	2635.1131
138.600	0.015675	25674.5050	-950.5866	-0.0020816	130.7558	-26.4728	3039.8794
140.400	0.011930	24077.8711	-996.1634	-0.0020801	128.4029	-24.1681	3646.5312
142.200	0.008187	22402.8207	-1037.0982	-0.0020786	125.9345	-21.3150	4686.2614
144.000	0.004447	20658.6058	-1071.9281	-0.0020773	123.3641	-17.3849	7037.1135
145.800	0.000709	18857.9681	-1096.0236	-0.0020761	120.7106	-9.3880	23840.5554
147.600	-0.003027	17026.8257	-1090.6828	-0.0020750	118.0121	15.3223	9111.0479
149.400	-0.006761	15245.2485	-1058.8781	-0.0020740	115.3866	20.0163	5328.8682
151.200	-0.010494	13528.4533	-1020.0098	-0.0020731	112.8567	23.1706	3974.5687
153.000	-0.014224	11886.6682	-976.0792	-0.0020723	110.4372	25.6412	3244.7253
154.800	-0.017954	10327.9054	-928.0637	-0.0020717	108.1402	27.7093	2778.0417
156.600	-0.021682	8858.8727	-876.5690	-0.0020711	105.9753	29.5071	2449.5903
158.400	-0.025410	7485.4019	-822.0148	-0.0020706	103.9513	31.1087	2203.7061
160.200	-0.029136	6212.6885	-764.7129	-0.0020701	102.0757	32.5601	2011.5138
162.000	-0.032862	5045.4409	-704.9058	-0.0020698	100.3556	33.8923	1856.4176
163.800	-0.036588	3987.9808	-642.7884	-0.0020695	98.7973	35.1270	1728.1441
165.600	-0.040313	3044.3138	-578.5217	-0.0020693	97.4066	36.2805	1619.9648
167.400	-0.044037	2218.1814	-512.2409	-0.0020691	96.1892	37.3648	1527.2729
169.200	-0.047761	1513.1007	-444.0620	-0.0020690	95.1501	38.3896	1446.7992
171.000	-0.051486	932.3951	-374.0853	-0.0020690	94.2944	39.3623	1376.1541
172.800	-0.055210	479.2190	-302.3990	-0.0020689	93.6266	40.2891	1313.5469
174.600	-0.058934	156.5775	-229.0811	-0.0020689	93.1511	41.1752	1257.6070
176.400	-0.062658	-32.6570	-154.2012	-0.0020689	92.9685	42.0247	1207.2660
178.200	-0.066382	-85.7314	-77.8219	-0.0020689	93.0467	42.8412	1161.6779
180.000	-0.070106	0.0000	0.0000	-0.0020689	92.9204	43.6276	560.0815

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00000133
Maximum bending moment            =      -1612047. lbs-in
Maximum shear force               =    24143.39628 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             12
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-3229483.	47956.9225	0.0000	4852.0743	0.0000	0.0000
1.800	0.499822	-3143183.	47923.2997	-0.0001956	4724.8980	-18.6794	67.2697
3.600	0.499296	-3056929.	47871.9170	-0.0003860	4597.7894	-38.4125	138.4800
5.400	0.498432	-2970786.	47784.1891	-0.0005711	4470.8433	-59.0631	213.2959
7.200	0.497240	-2884820.	47658.5883	-0.0007508	4344.1589	-80.4934	291.3846
9.000	0.495729	-2799101.	47493.8361	-0.0009253	4217.8391	-102.5647	372.4139
10.800	0.493909	-2713702.	47288.9044	-0.0010946	4091.9898	-125.1372	456.0498
12.600	0.491788	-2628696.	47042.9739	-0.0012586	3966.7195	-148.1189	542.1317
14.400	0.489378	-2544157.	46755.3554	-0.0014174	3842.1384	-171.4572	630.6437
16.200	0.486686	-2460162.	46425.5978	-0.0015711	3718.3586	-194.9401	720.9830
18.000	0.483722	-2376787.	46054.2444	-0.0017196	3595.4927	-217.6748	810.0000
19.800	0.480495	-2294107.	45644.2764	-0.0018630	3473.6498	-237.8452	891.0000
21.600	0.477015	-2212186.	45198.3863	-0.0020013	3352.9269	-257.5882	972.0000
23.400	0.473291	-2131090.	44717.3694	-0.0021346	3233.4188	-276.8750	1053.0000
25.200	0.469331	-2050881.	44202.0715	-0.0022630	3115.2180	-295.6782	1134.0000
27.000	0.465144	-1971620.	43653.3863	-0.0023865	2998.4150	-313.9720	1215.0000
28.800	0.460739	-1893368.	43072.2526	-0.0025052	2883.0976	-331.7321	1296.0000
30.600	0.456125	-1816181.	42459.6517	-0.0026191	2769.3512	-348.9356	1377.0000
32.400	0.451310	-1740117.	41816.6045	-0.0027283	2657.2584	-365.5613	1458.0000
34.200	0.446303	-1665229.	41144.1690	-0.0028328	2546.8991	-381.5893	1539.0000
36.000	0.441112	-1591570.	40443.4378	-0.0029328	2438.3504	-397.0009	1620.0000
37.800	0.435745	-1519189.	39715.5358	-0.0030283	2331.6863	-411.7791	1701.0000
39.600	0.430210	-1448136.	38961.6172	-0.0031194	2226.9780	-425.9081	1782.0000
41.400	0.424515	-1378456.	38182.8639	-0.0032062	2124.2932	-439.3733	1863.0000
43.200	0.418668	-1310193.	37380.4827	-0.0032887	2023.6970	-452.1614	1944.0000
45.000	0.412676	-1243389.	36555.7032	-0.0033671	1925.2506	-464.2603	2025.0000
46.800	0.406546	-1178083.	35709.7757	-0.0034415	1829.0125	-475.6592	2106.0000
48.600	0.400287	-1114313.	34843.9691	-0.0035119	1735.0374	-486.3481	2187.0000
50.400	0.393904	-1052114.	33959.5691	-0.0035784	1643.3768	-496.3186	2268.0000
52.200	0.387404	-991518.	33057.8759	-0.0036411	1554.0788	-505.5628	2349.0000
54.000	0.380796	-932555.	32140.2027	-0.0037002	1467.1879	-514.0741	2430.0000
55.800	0.374084	-875254.	31207.8738	-0.0037557	1382.7451	-521.8469	2511.0000
57.600	0.367275	-819639.	30262.2230	-0.0038077	1300.7879	-528.8763	2592.0000
59.400	0.360376	-765734.	29304.5918	-0.0038564	1221.3504	-535.1584	2673.0000
61.200	0.353392	-713559.	28336.3282	-0.0039018	1144.4628	-540.6901	2754.0000
63.000	0.346330	-663133.	27358.7850	-0.0039441	1070.1520	-545.4690	2835.0000
64.800	0.339194	-614471.	26373.3187	-0.0039833	998.4410	-549.4936	2916.0000
66.600	0.331990	-567587.	25381.2880	-0.0040196	929.3495	-552.7628	2997.0000
68.400	0.324723	-522491.	24384.0527	-0.0040531	862.8933	-555.2764	3078.0000
70.200	0.317399	-479191.	23382.9727	-0.0040838	799.0849	-557.0347	3159.0000
72.000	0.310021	-437695.	22379.4069	-0.0041120	737.9327	-558.0384	3240.0000
73.800	0.302596	-398004.	21374.7122	-0.0041376	679.4421	-558.2890	3321.0000
75.600	0.295126	-360120.	20370.2428	-0.0041609	623.6143	-557.7881	3402.0000
77.400	0.287616	-324042.	19367.3495	-0.0041819	570.4474	-556.5379	3483.0000
79.200	0.280071	-289765.	18367.3786	-0.0042007	519.9355	-554.5409	3564.0000
81.000	0.272494	-257284.	17371.6718	-0.0042175	472.0693	-551.8000	3645.0000
82.800	0.264888	-226590.	16381.5653	-0.0042324	426.8360	-548.3183	3726.0000
84.600	0.257257	-197671.	15398.3897	-0.0042454	384.2193	-544.0991	3807.0000
86.400	0.249605	-170514.	14423.4693	-0.0042567	344.1990	-539.1459	3888.0000
88.200	0.241933	-145102.	13458.1218	-0.0042664	306.7518	-533.4624	3969.0000
90.000	0.234246	-121419.	12503.6584	-0.0042746	271.8508	-527.0524	4050.0000

91.800	0.226545	-99442.9940	11561.3834	-0.0042814	239.4654	-519.9198	4131.0000
93.600	0.218833	-79150.8717	10632.5942	-0.0042869	209.5617	-512.0683	4212.0000
95.400	0.211112	-60517.4832	9718.5810	-0.0042911	182.1024	-503.5019	4293.0000
97.200	0.203385	-43515.1600	8820.6274	-0.0042943	157.0468	-494.2244	4374.0000
99.000	0.195652	-28113.9216	7940.0100	-0.0042965	134.3507	-484.2395	4455.0000
100.800	0.187917	-14281.4885	7077.9987	-0.0042978	113.9664	-473.5508	4536.0000
102.600	0.180180	-1983.2939	6235.8572	-0.0042983	95.8431	-462.1620	4617.0000
104.400	0.172443	8817.5052	5414.8428	-0.0042981	105.9143	-450.0762	4698.0000
106.200	0.164707	18160.0164	4616.2072	-0.0042973	119.6820	-437.2967	4779.0000
108.000	0.156973	26085.6018	3841.1963	-0.0042959	131.3616	-423.8264	4860.0000
109.800	0.149241	32637.8687	3091.0515	-0.0042941	141.0174	-409.6679	4941.0000
111.600	0.141514	37862.6599	2367.0090	-0.0042920	148.7170	-394.8237	5022.0000
113.400	0.133790	41808.0467	1670.3015	-0.0042895	154.5311	-379.2958	5103.0000
115.200	0.126072	44524.3210	1002.1577	-0.0042869	158.5340	-363.0862	5184.0000
117.000	0.118358	46063.9894	363.8036	-0.0042841	160.8029	-346.1962	5265.0000
118.800	0.110649	46481.7683	-243.5374	-0.0042812	161.4186	-328.6271	5346.0000
120.600	0.102945	45834.5796	-583.9270	-0.0042784	160.4649	-49.5835	866.9695
122.400	0.095247	45026.5275	-672.0358	-0.0042756	159.2741	-48.3152	913.0760
124.200	0.087553	44061.7252	-757.7992	-0.0042729	157.8523	-46.9774	965.8087
126.000	0.079864	42944.5115	-841.0826	-0.0042702	156.2059	-45.5597	1026.8375
127.800	0.072180	41679.4849	-921.7303	-0.0042676	154.3417	-44.0488	1098.4717
129.600	0.064501	40271.5467	-999.5589	-0.0042651	152.2669	-42.4274	1184.0084
131.400	0.056826	38725.9567	-1074.3491	-0.0042627	149.9892	-40.6727	1288.3406
133.200	0.049155	37048.4072	-1145.8323	-0.0042604	147.5170	-38.7531	1419.0919
135.000	0.041488	35245.1257	-1213.6707	-0.0042581	144.8596	-36.6229	1588.9046
136.800	0.033826	33323.0224	-1277.4225	-0.0042560	142.0271	-34.2124	1820.5729
138.600	0.026167	31289.9162	-1336.4784	-0.0042540	139.0310	-31.4053	2160.3533
140.400	0.018511	29154.9116	-1389.9265	-0.0042522	135.8847	-27.9814	2720.8669
142.200	0.010859	26929.1119	-1436.1878	-0.0042505	132.6047	-23.4200	3882.1650
144.000	0.003210	24627.3063	-1471.2940	-0.0042489	129.2126	-15.5868	8741.5204
145.800	-0.004437	22274.8850	-1469.6611	-0.0042474	125.7459	17.4011	7059.1517
147.600	-0.012081	19978.7400	-1432.1438	-0.0042461	122.3622	24.2848	3618.2153
149.400	-0.019723	17761.1849	-1384.5553	-0.0042450	119.0943	28.5913	2609.3244
151.200	-0.027363	15636.1831	-1330.1255	-0.0042440	115.9627	31.8864	2097.5412
153.000	-0.035001	13614.4205	-1270.2766	-0.0042431	112.9834	34.6123	1779.9879
154.800	-0.042638	11704.7388	-1205.8568	-0.0042423	110.1691	36.9652	1560.5087
156.600	-0.050274	9914.7699	-1137.4421	-0.0042416	107.5313	39.0512	1398.1879
158.400	-0.057908	8251.2808	-1065.4545	-0.0042411	105.0799	40.9351	1272.4151
160.200	-0.065542	6720.3831	-990.2192	-0.0042406	102.8239	42.6597	1171.5846
162.000	-0.073174	5327.6716	-911.9959	-0.0042402	100.7715	44.2550	1088.6203
163.800	-0.080806	4078.3217	-830.9979	-0.0042399	98.9304	45.7428	1018.9416
165.600	-0.088438	2977.1594	-747.4038	-0.0042397	97.3077	47.1395	959.4412
167.400	-0.096069	2028.7154	-661.3660	-0.0042396	95.9100	48.4580	907.9311
169.200	-0.103701	1237.2660	-573.0162	-0.0042395	94.7437	49.7084	862.8215
171.000	-0.111332	606.8660	-482.4698	-0.0042394	93.8147	50.8988	822.9278
172.800	-0.118962	141.3753	-389.8285	-0.0042394	93.1287	52.0360	787.3471
174.600	-0.126593	-155.5195	-295.1831	-0.0042394	93.1495	53.1255	755.3786
176.400	-0.134224	-280.2868	-198.6152	-0.0042394	93.3334	54.1721	726.4690
178.200	-0.141855	-229.5352	-100.1985	-0.0042394	93.2586	55.1798	700.1755
180.000	-0.149486	0.0000	0.0000	-0.0042394	92.9204	56.1519	338.0693

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00000265
Maximum bending moment            =      -3229483. lbs-in
Maximum shear force               =    47956.92253 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             11
Number of zero deflection points  =              1
```

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

```
Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad
```

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	241966.	6478.5447
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	415880.	11686.4879
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-1612047.	24143.3963
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-3229483.	47956.9225

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 30 inch L=30 fill 5.lpd
Name of output file: pile 10 30 inch L=30 fill 5.lpo
Name of plot output file: pile 10 30 inch L=30 fill 5.lpp
Name of runtime file: pile 10 30 inch L=30 fill 5.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:56:11

Problem Title

RH Fdn Pile 148 cut off L=15 dia 30 Fill 5 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	30.00000000	19880.0000	707.0000	3600000.
2	360.0000	30.00000000	19880.0000	707.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 60.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 60.000 in
Distance from top of pile to bottom of layer = 120.000 in

Layer 3 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 180.000 in

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 180.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	60.00	0.06900
3	60.00	0.06900
4	120.00	0.06900
5	120.00	0.03300
6	180.00	0.03300
7	180.00	0.03300
8	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	60.000	0.00000	30.00	------	------
3	60.000	1.04100	0.00	0.02000	0.0
4	120.000	1.04100	0.00	0.02000	0.0
5	120.000	1.04100	0.00	0.02000	0.0
6	180.000	1.04100	0.00	0.02000	0.0
7	180.000	0.00000	32.00	------	------
8	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	6341.2638	-0.0023216	59.4059	0.0000	0.0000
1.800	0.245821	11589.7889	6331.3081	-0.0023215	68.1508	-11.0619	81.0000
3.600	0.241643	23143.7150	6301.7792	-0.0023210	76.8685	-21.7478	162.0000
5.400	0.237465	34627.1341	6253.3541	-0.0023203	85.5331	-32.0578	243.0000
7.200	0.233290	46006.6200	6186.7092	-0.0023193	94.1192	-41.9921	324.0000
9.000	0.229116	57249.9640	6102.5203	-0.0023180	102.6026	-51.5511	405.0000
10.800	0.224945	68326.1735	6001.4627	-0.0023164	110.9599	-60.7351	486.0000
12.600	0.220777	79205.4714	5884.2109	-0.0023146	119.1686	-69.5447	567.0000
14.400	0.216612	89859.2939	5751.4382	-0.0023124	127.2072	-77.9805	648.0000
16.200	0.212452	100260.	5603.8170	-0.0023100	135.0551	-86.0431	729.0000
18.000	0.208296	110382.	5442.0182	-0.0023074	142.6924	-93.7333	810.0000
19.800	0.204145	120200.	5266.7114	-0.0023045	150.1004	-101.0520	891.0000
21.600	0.200000	129691.	5078.5645	-0.0023014	157.2613	-108.0001	972.0000
23.400	0.195861	138831.	4878.2439	-0.0022980	164.1579	-114.5785	1053.0000
25.200	0.191727	147600.	4666.4138	-0.0022944	170.7742	-120.7883	1134.0000
27.000	0.187601	155977.	4443.7368	-0.0022906	177.0950	-126.6306	1215.0000
28.800	0.183481	163944.	4210.8734	-0.0022865	183.1060	-132.1066	1296.0000
30.600	0.179369	171482.	3968.4816	-0.0022823	188.7938	-137.2176	1377.0000
32.400	0.175265	178575.	3717.2175	-0.0022779	194.1460	-141.9647	1458.0000
34.200	0.171169	185208.	3457.7348	-0.0022733	199.1508	-146.3494	1539.0000
36.000	0.167081	191367.	3190.6847	-0.0022686	203.7976	-150.3730	1620.0000
37.800	0.163002	197038.	2916.7158	-0.0022637	208.0764	-154.0368	1701.0000
39.600	0.158932	202209.	2636.4746	-0.0022587	211.9785	-157.3424	1782.0000
41.400	0.154871	206871.	2350.6044	-0.0022536	215.4956	-160.2911	1863.0000
43.200	0.150819	211012.	2059.7464	-0.0022483	218.6205	-162.8844	1944.0000
45.000	0.146777	214626.	1764.5389	-0.0022429	221.3470	-165.1239	2025.0000
46.800	0.142744	217704.	1465.6177	-0.0022375	223.6694	-167.0109	2106.0000
48.600	0.138722	220240.	1163.6157	-0.0022320	225.5833	-168.5469	2187.0000
50.400	0.134709	222230.	859.1633	-0.0022264	227.0848	-169.7335	2268.0000
52.200	0.130707	223670.	552.8882	-0.0022208	228.1710	-170.5721	2349.0000
54.000	0.126714	224557.	245.4157	-0.0022152	228.8400	-171.0641	2430.0000
55.800	0.122732	224888.	-62.6319	-0.0022095	229.0904	-171.2110	2511.0000
57.600	0.118760	224665.	-370.6346	-0.0022039	228.9219	-171.0141	2592.0000
59.400	0.114798	223887.	-677.9747	-0.0021982	228.3350	-170.4749	2673.0000
61.200	0.110846	222557.	-879.0318	-0.0021926	227.3311	-52.9218	859.3833
63.000	0.106904	221054.	-974.5896	-0.0021871	226.1975	-53.2535	896.6545
64.800	0.102973	219379.	-1070.7102	-0.0021815	224.9333	-53.5471	936.0218
66.600	0.099051	217530.	-1167.3232	-0.0021760	223.5380	-53.8008	977.6920
68.400	0.095139	215506.	-1264.3553	-0.0021706	222.0108	-54.0127	1021.9017
70.200	0.091237	213306.	-1361.7293	-0.0021652	220.3512	-54.1807	1068.9230

72.000	0.087344	210931.	-1459.3642	-0.0021598	218.5589	-54.3025	1119.0702
73.800	0.083461	208379.	-1556.5219	-0.0021546	216.6336	-53.6505	1157.0705
75.600	0.079588	205653.	-1652.3338	-0.0021494	214.5768	-52.8072	1194.3132
77.400	0.075724	202756.	-1746.6047	-0.0021442	212.3906	-51.9383	1234.6038
79.200	0.071869	199689.	-1839.2864	-0.0021392	210.0771	-51.0414	1278.3650
81.000	0.068023	196458.	-1930.3263	-0.0021342	207.6386	-50.1141	1326.1047
82.800	0.064186	193063.	-2019.6670	-0.0021293	205.0772	-49.1534	1378.4389
84.600	0.060357	189509.	-2107.2453	-0.0021245	202.3955	-48.1559	1436.1234
86.400	0.056538	185798.	-2192.9915	-0.0021198	199.5957	-47.1176	1500.0960
88.200	0.052726	181935.	-2276.8279	-0.0021151	196.6805	-46.0340	1571.5368
90.000	0.048923	177921.	-2358.6678	-0.0021106	193.6525	-44.8993	1651.9539
91.800	0.045128	173762.	-2438.4132	-0.0021062	190.5144	-43.7067	1743.3085
93.600	0.041341	169462.	-2515.9523	-0.0021019	187.2693	-42.4479	1848.2041
95.400	0.037561	165023.	-2591.1567	-0.0020977	183.9201	-41.1125	1970.1806
97.200	0.033789	160451.	-2663.8764	-0.0020936	180.4702	-39.6871	2114.1895
99.000	0.030024	155749.	-2733.9337	-0.0020896	176.9231	-38.1543	2287.3980
100.800	0.026267	150924.	-2801.1142	-0.0020857	173.2824	-36.4907	2500.6273
102.600	0.022516	145981.	-2865.1526	-0.0020820	169.5524	-34.6631	2771.1086
104.400	0.018771	140925.	-2925.7104	-0.0020784	165.7374	-32.6233	3128.2530
106.200	0.015034	135762.	-2982.3365	-0.0020749	161.8424	-30.2947	3627.2462
108.000	0.011302	130502.	-3034.3917	-0.0020716	157.8732	-27.5445	4386.9271
109.800	0.007576	125152.	-3080.8747	-0.0020684	153.8364	-24.1034	5726.8498
111.600	0.003856	119723.	-3119.8814	-0.0020653	149.7406	-19.2374	8980.8136
113.400	0.000141	114233.	-3139.3838	-0.0020623	145.5975	-2.4319	31064.1268
115.200	-0.003569	108734.	-3124.6742	-0.0020595	141.4483	18.7760	9470.3405
117.000	-0.007273	103295.	-3086.3593	-0.0020569	137.3449	23.7961	5888.9933
118.800	-0.010973	97933.6298	-3040.3830	-0.0020543	133.2995	27.2887	4476.2583
120.600	-0.014669	92660.3624	-2988.7700	-0.0020519	129.3207	30.0591	3688.4863
122.400	-0.018360	87484.3102	-2932.5631	-0.0020497	125.4152	32.3931	3175.7329
124.200	-0.022048	82413.0452	-2872.4223	-0.0020475	121.5888	34.4299	2810.8894
126.000	-0.025731	77453.1766	-2808.8114	-0.0020455	117.8465	36.2489	2535.7283
127.800	-0.029412	72610.6071	-2742.0773	-0.0020436	114.1926	37.9001	2319.4958
129.600	-0.033089	67890.6959	-2672.4915	-0.0020419	110.6313	39.4175	2144.2897
131.400	-0.036762	63298.3682	-2600.2732	-0.0020402	107.1663	40.8251	1998.9224
133.200	-0.040433	58838.1934	-2525.6039	-0.0020387	103.8010	42.1408	1876.0120
135.000	-0.044102	54514.4429	-2448.6367	-0.0020373	100.5386	43.3782	1770.4748
136.800	-0.047767	50331.1343	-2369.5031	-0.0020359	97.3821	44.5481	1678.6854
138.600	-0.051431	46292.0657	-2288.3168	-0.0020347	94.3346	45.6588	1597.9834
140.400	-0.055092	42400.8437	-2205.1782	-0.0020336	91.3985	46.7174	1526.3681
142.200	-0.058752	38660.9056	-2120.1759	-0.0020326	88.5766	47.7296	1462.3038
144.000	-0.062410	35075.5378	-2033.3892	-0.0020317	85.8714	48.7001	1404.5905
145.800	-0.066066	31647.8917	-1944.8894	-0.0020308	83.2851	49.6330	1352.2755
147.600	-0.069721	28380.9963	-1854.7411	-0.0020301	80.8202	50.5317	1304.5923
149.400	-0.073374	25277.7698	-1763.0032	-0.0020294	78.4787	51.3993	1260.9164
151.200	-0.077027	22341.0289	-1669.7294	-0.0020288	76.2629	52.2383	1220.7335
153.000	-0.080678	19573.4976	-1574.9691	-0.0020283	74.1747	53.0509	1183.6160
154.800	-0.084328	16977.8140	-1478.7680	-0.0020278	72.2162	53.8392	1149.2051
156.600	-0.087978	14556.5370	-1381.1684	-0.0020274	70.3892	54.6049	1117.1974
158.400	-0.091627	12312.1521	-1282.2094	-0.0020271	68.6958	55.3495	1087.3342
160.200	-0.095275	10247.0763	-1181.9277	-0.0020268	67.1376	56.0746	1059.3941
162.000	-0.098923	8363.6626	-1080.3575	-0.0020266	65.7166	56.7812	1033.1854
163.800	-0.102571	6664.2043	-977.5308	-0.0020264	64.4343	57.4707	1008.5423
165.600	-0.106218	5150.9382	-873.4777	-0.0020262	63.2925	58.1439	985.3198
167.400	-0.109865	3826.0486	-768.2265	-0.0020261	62.2928	58.8018	963.3908
169.200	-0.113512	2691.6697	-661.8040	-0.0020260	61.4369	59.4454	942.6435
171.000	-0.117159	1749.8886	-554.2355	-0.0020260	60.7263	60.0752	922.9790
172.800	-0.120806	1002.7479	-445.5449	-0.0020259	60.1625	60.6921	904.3093
174.600	-0.124452	452.2477	-335.7550	-0.0020259	59.7472	61.2967	886.5561
176.400	-0.128099	100.3479	-224.8873	-0.0020259	59.4817	61.8896	869.6495
178.200	-0.131746	-51.0297	-112.9625	-0.0020259	59.4444	62.4714	853.5265
180.000	-0.135392	0.0000	0.0000	-0.0020259	59.4059	63.0425	419.0653

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00232161
Maximum bending moment            =   224888.41981 lbs-in
Maximum shear force               =     6341.26381 lbs
Depth of maximum bending moment   =    55.80000000 in
Depth of maximum shear force      =       0.00000 in
Number of iterations              =             17
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.500000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	11098.6218	-0.0049846	59.4059	0.0000	0.0000
1.800	0.491028	20354.3586	11079.1013	-0.0049844	74.7639	-21.6895	79.5089
3.600	0.482056	40638.4046	11020.5342	-0.0049836	90.0687	-43.3851	162.0000
5.400	0.473087	60781.8057	10924.0076	-0.0049823	105.2675	-63.8667	243.0000
7.200	0.464120	80718.1632	10791.3402	-0.0049806	120.3100	-83.5416	324.0000
9.000	0.455157	100384.	10623.9836	-0.0049783	135.1482	-102.4102	405.0000
10.800	0.446198	119717.	10423.3883	-0.0049755	149.7358	-120.4734	486.0000
12.600	0.437245	138660.	10191.0034	-0.0049723	164.0288	-137.7321	567.0000
14.400	0.428298	157157.	9928.2761	-0.0049686	177.9849	-154.1872	648.0000
16.200	0.419358	175153.	9636.6517	-0.0049644	191.5638	-169.8399	729.0000
18.000	0.410426	192599.	9317.5732	-0.0049598	204.7273	-184.6917	810.0000
19.800	0.401503	209446.	8972.4812	-0.0049547	217.4389	-198.7439	891.0000
21.600	0.392589	225649.	8602.8135	-0.0049492	229.6645	-211.9981	972.0000
23.400	0.383686	241165.	8210.0048	-0.0049434	241.3714	-224.4560	1053.0000
25.200	0.374793	255953.	7795.4867	-0.0049371	252.5292	-236.1196	1134.0000
27.000	0.365912	269975.	7360.6876	-0.0049305	263.1095	-246.9906	1215.0000
28.800	0.357043	283197.	6907.0321	-0.0049235	273.0855	-257.0711	1296.0000
30.600	0.348187	295585.	6435.9412	-0.0049163	282.4327	-266.3633	1377.0000
32.400	0.339345	307109.	5948.8319	-0.0049087	291.1283	-274.8692	1458.0000
34.200	0.330516	317743.	5447.1176	-0.0049008	299.1515	-282.5912	1539.0000
36.000	0.321702	327460.	4932.2071	-0.0048927	306.4834	-289.5316	1620.0000
37.800	0.312902	336239.	4405.5052	-0.0048844	313.1071	-295.6927	1701.0000
39.600	0.304118	344058.	3868.4126	-0.0048758	319.0073	-301.0769	1782.0000
41.400	0.295349	350902.	3322.3254	-0.0048671	324.1711	-305.6866	1863.0000
43.200	0.286597	356755.	2768.6355	-0.0048582	328.5870	-309.5244	1944.0000
45.000	0.277860	361604.	2208.7303	-0.0048491	332.2458	-312.5925	2025.0000
46.800	0.269140	365439.	1643.9928	-0.0048400	335.1398	-314.8936	2106.0000
48.600	0.260436	368254.	1075.8017	-0.0048308	337.2635	-316.4298	2187.0000
50.400	0.251749	370043.	505.5314	-0.0048215	338.6131	-317.2038	2268.0000
52.200	0.243079	370803.	-65.4480	-0.0048122	339.1867	-317.2178	2349.0000
54.000	0.234425	370535.	-635.7707	-0.0048028	338.9843	-316.4741	2430.0000
55.800	0.225789	369240.	-1204.0750	-0.0047935	338.0077	-314.9750	2511.0000
57.600	0.217169	366925.	-1769.0030	-0.0047843	336.2606	-312.7227	2592.0000
59.400	0.208565	363595.	-2329.2008	-0.0047751	333.7484	-309.7193	2673.0000
61.200	0.199978	359262.	-2665.9310	-0.0047660	330.4785	-64.4254	579.8920
63.000	0.191408	354718.	-2782.1127	-0.0047570	327.0507	-64.6653	608.1135
64.800	0.182853	349965.	-2898.6703	-0.0047482	323.4642	-64.8432	638.3145
66.600	0.174314	345001.	-3015.4890	-0.0047394	319.7187	-64.9554	670.7408
68.400	0.165791	339826.	-3132.4468	-0.0047308	315.8139	-64.9978	705.6831
70.200	0.157283	334440.	-3249.4139	-0.0047223	311.7497	-64.9657	743.4879
72.000	0.148791	328842.	-3366.2515	-0.0047140	307.5263	-64.8538	784.5715

73.800	0.140313	323034.	-3482.0345	-0.0047058	303.1438	-63.7940	818.3787
75.600	0.131850	317018.	-3595.6852	-0.0046977	298.6049	-62.4846	853.0329
77.400	0.123401	310800.	-3706.9296	-0.0046898	293.9128	-61.1203	891.5359
79.200	0.114966	304383.	-3815.6629	-0.0046821	289.0708	-59.6946	934.6235
81.000	0.106545	297771.	-3921.7680	-0.0046745	284.0825	-58.1999	983.2402
82.800	0.098138	290971.	-4025.1120	-0.0046671	278.9514	-56.6268	1038.6204
84.600	0.089744	283987.	-4125.5435	-0.0046599	273.6815	-54.9637	1102.4126
86.400	0.081362	276824.	-4222.8875	-0.0046528	268.2768	-53.1963	1176.8732
88.200	0.072994	269488.	-4316.9392	-0.0046460	262.7417	-51.3057	1265.1847
90.000	0.064637	261985.	-4407.4553	-0.0046393	257.0808	-49.2677	1372.0001
91.800	0.056292	254322.	-4494.1401	-0.0046328	251.2990	-47.0487	1504.4334
93.600	0.047959	246507.	-4576.6254	-0.0046265	245.4019	-44.6016	1673.9970
95.400	0.039637	238546.	-4654.4369	-0.0046204	239.3954	-41.8556	1900.7687
97.200	0.031325	230449.	-4726.9343	-0.0046145	233.2862	-38.6970	2223.5868
99.000	0.023024	222227.	-4793.1909	-0.0046088	227.0820	-34.9215	2730.0818
100.800	0.014734	213891.	-4851.7018	-0.0046033	220.7922	-30.0906	3676.1621
102.600	0.006452	205457.	-4899.3433	-0.0045981	214.4285	-22.8444	6372.7698
104.400	-0.001819	196948.	-4906.3904	-0.0045930	208.0087	15.0144	14854.3063
106.200	-0.010082	188488.	-4868.9997	-0.0045881	201.6253	26.5308	4736.5466
108.000	-0.018337	180114.	-4815.9802	-0.0045835	195.3065	32.3798	3178.5202
109.800	-0.026583	171844.	-4753.8581	-0.0045791	189.0666	36.6447	2481.3043
111.600	-0.034821	163692.	-4684.7932	-0.0045749	182.9160	40.0940	2072.5518
113.400	-0.043053	155670.	-4609.9800	-0.0045709	176.8632	43.0318	1799.1330
115.200	-0.051277	147787.	-4530.1995	-0.0045670	170.9154	45.6132	1601.1966
117.000	-0.059494	140052.	-4446.0108	-0.0045634	165.0789	47.9297	1450.1243
118.800	-0.067705	132472.	-4357.8381	-0.0045600	159.3593	50.0401	1330.3644
120.600	-0.075910	125053.	-4266.0158	-0.0045568	153.7619	51.9846	1232.6777
122.400	-0.084109	117803.	-4170.8164	-0.0045537	148.2914	53.7925	1151.2003
124.200	-0.092303	110727.	-4072.4665	-0.0045508	142.9522	55.4853	1082.0166
126.000	-0.100492	103830.	-3971.1580	-0.0045481	137.7486	57.0797	1022.4035
127.800	-0.108676	97118.1990	-3867.0563	-0.0045456	132.6843	58.5889	970.4038
129.600	-0.116856	90595.9666	-3760.3053	-0.0045432	127.7631	60.0233	924.5712
131.400	-0.125032	84268.0374	-3651.0319	-0.0045410	122.9885	61.3916	883.8122
133.200	-0.133204	78138.8567	-3539.3488	-0.0045390	118.3638	62.7008	847.2834
135.000	-0.141372	72212.6781	-3425.3566	-0.0045371	113.8924	63.9571	814.3225
136.800	-0.149538	66493.5832	-3309.1465	-0.0045354	109.5772	65.1653	784.4022
138.600	-0.157700	60985.4975	-3190.8007	-0.0045338	105.4212	66.3299	757.0965
140.400	-0.165859	55692.2049	-3070.3945	-0.0045323	101.4272	67.4547	732.0576
142.200	-0.174016	50617.3596	-2947.9969	-0.0045310	97.5981	68.5428	708.9979
144.000	-0.182171	45764.4965	-2823.6710	-0.0045297	93.9365	69.5971	687.6782
145.800	-0.190323	41137.0409	-2697.4756	-0.0045286	90.4450	70.6201	667.8969
147.600	-0.198474	36738.3161	-2569.4648	-0.0045277	87.1260	71.6141	649.4835
149.400	-0.206623	32571.5512	-2439.6892	-0.0045268	83.9821	72.5810	632.2922
151.200	-0.214770	28639.8869	-2308.1958	-0.0045260	81.0155	73.5227	616.1979
153.000	-0.222916	24946.3819	-2175.0287	-0.0045254	78.2287	74.4407	601.0925
154.800	-0.231061	21494.0174	-2040.2291	-0.0045248	75.6238	75.3365	586.8820
156.600	-0.239206	18285.7025	-1903.8359	-0.0045243	73.2030	76.2114	573.4841
158.400	-0.247349	15324.2778	-1765.8857	-0.0045238	70.9685	77.0666	560.8268
160.200	-0.255491	12612.5196	-1626.4130	-0.0045235	68.9224	77.9031	548.8466
162.000	-0.263633	10153.1436	-1485.4505	-0.0045232	67.0668	78.7220	537.4871
163.800	-0.271775	7948.8073	-1343.0290	-0.0045230	65.4035	79.5241	526.6983
165.600	-0.279916	6002.1141	-1199.1780	-0.0045228	63.9347	80.3103	516.4355
167.400	-0.288057	4315.6149	-1053.9254	-0.0045227	62.6622	81.0814	506.6587
169.200	-0.296198	2891.8115	-907.2978	-0.0045226	61.5879	81.8381	497.3322
171.000	-0.304338	1733.1581	-759.3204	-0.0045225	60.7137	82.5811	488.4234
172.800	-0.312479	842.0642	-610.0176	-0.0045225	60.0413	83.3109	479.9033
174.600	-0.320619	220.8960	-459.4125	-0.0045225	59.5726	84.0281	471.7453
176.400	-0.328760	-128.0215	-307.5272	-0.0045225	59.5025	84.7333	463.9254
178.200	-0.336900	-202.4026	-154.3829	-0.0045225	59.5587	85.4270	456.4217
180.000	-0.345041	0.0000	0.0000	-0.0045225	59.4059	86.1096	224.6071

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00498465
Maximum bending moment            =   370802.81098 lbs-in
Maximum shear force               =    11098.62183 lbs
Depth of maximum bending moment   =    52.20000000 in
Depth of maximum shear force      =       0.00000 in
Number of iterations              =             21
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-1385568.	18800.7383	0.0000	1104.8545	0.0000	0.0000
1.800	0.249969	-1351743.	18780.4908	-3.4423E-05	1079.3330	-11.2486	81.0000
3.600	0.249876	-1317953.	18750.1271	-6.7996E-05	1053.8371	-22.4888	162.0000
5.400	0.249724	-1284233.	18699.5457	-0.0001007	1028.3943	-33.7127	243.0000
7.200	0.249513	-1250619.	18628.7831	-0.0001326	1003.0321	-44.9124	324.0000
9.000	0.249247	-1217149.	18537.8895	-0.0001636	977.7779	-56.0805	405.0000
10.800	0.248924	-1183858.	18426.9284	-0.0001938	952.6590	-67.2096	486.0000
12.600	0.248549	-1150783.	18295.9762	-0.0002232	927.7028	-78.2929	567.0000
14.400	0.248121	-1117959.	18145.1215	-0.0002517	902.9362	-89.3235	648.0000
16.200	0.247643	-1085422.	17974.4646	-0.0002794	878.3865	-100.2952	729.0000
18.000	0.247115	-1053209.	17784.1172	-0.0003063	854.0804	-111.2018	810.0000
19.800	0.246540	-1021353.	17574.2022	-0.0003324	830.0446	-122.0372	891.0000
21.600	0.245918	-989891.	17344.8523	-0.0003577	806.3057	-132.7959	972.0000
23.400	0.245252	-958858.	17096.2107	-0.0003822	782.8900	-143.4725	1053.0000
25.200	0.244542	-928287.	16828.4299	-0.0004059	759.8237	-154.0618	1134.0000
27.000	0.243791	-898214.	16541.6714	-0.0004289	737.1327	-164.5588	1215.0000
28.800	0.242998	-868672.	16236.1056	-0.0004511	714.8426	-174.9589	1296.0000
30.600	0.242167	-839696.	15911.9108	-0.0004726	692.9791	-185.2575	1377.0000
32.400	0.241297	-811318.	15569.2735	-0.0004934	671.5672	-195.4506	1458.0000
34.200	0.240391	-783572.	15208.3874	-0.0005134	650.6320	-205.5340	1539.0000
36.000	0.239449	-756490.	14829.4534	-0.0005328	630.1981	-215.5038	1620.0000
37.800	0.238473	-730105.	14432.6790	-0.0005515	610.2900	-225.3566	1701.0000
39.600	0.237463	-704449.	14018.2783	-0.0005695	590.9318	-235.0887	1782.0000
41.400	0.236422	-679553.	13586.4711	-0.0005869	572.1472	-244.6970	1863.0000
43.200	0.235350	-655449.	13137.4832	-0.0006037	553.9599	-254.1784	1944.0000
45.000	0.234249	-632167.	12671.5457	-0.0006199	536.3930	-263.5300	2025.0000
46.800	0.233119	-609738.	12188.8947	-0.0006355	519.4695	-272.7489	2106.0000
48.600	0.231961	-588191.	11689.7714	-0.0006506	503.2119	-281.8326	2187.0000
50.400	0.230777	-567556.	11174.4214	-0.0006651	487.6424	-290.7785	2268.0000
52.200	0.229566	-547862.	10643.0950	-0.0006792	472.7829	-299.5843	2349.0000
54.000	0.228332	-529138.	10096.0462	-0.0006927	458.6551	-308.2477	2430.0000
55.800	0.227073	-511412.	9533.5334	-0.0007058	445.2800	-316.7665	2511.0000
57.600	0.225791	-494711.	8955.8187	-0.0007184	432.6786	-325.1387	2592.0000
59.400	0.224486	-479062.	8363.1677	-0.0007307	420.8714	-333.3623	2673.0000
61.200	0.223160	-464493.	8002.9990	-0.0007425	409.8784	-66.8252	539.0089
63.000	0.221813	-450139.	7881.7252	-0.0007540	399.0482	-67.9234	551.1939
64.800	0.220446	-436005.	7758.4816	-0.0007652	388.3833	-69.0139	563.5173
66.600	0.219059	-422093.	7633.2822	-0.0007760	377.8865	-70.0966	575.9825
68.400	0.217652	-408408.	7506.1410	-0.0007864	367.5605	-71.1714	588.5929
70.200	0.216227	-394952.	7377.0723	-0.0007965	357.4079	-72.2382	601.3523
72.000	0.214785	-381730.	7246.0906	-0.0008063	347.4313	-73.2970	614.2641
73.800	0.213325	-368744.	7114.1029	-0.0008157	337.6334	-73.3560	618.9664

75.600	0.211848	-355996.	6982.2148	-0.0008248	328.0142	-73.1864	621.8394
77.400	0.210355	-343483.	6850.6344	-0.0008336	318.5735	-73.0141	624.7780
79.200	0.208847	-331207.	6719.3664	-0.0008421	309.3108	-72.8392	627.7827
81.000	0.207324	-319166.	6588.4157	-0.0008503	300.2256	-72.6616	630.8542
82.800	0.205786	-307360.	6457.7868	-0.0008582	291.3176	-72.4816	633.9932
84.600	0.204234	-295789.	6327.4844	-0.0008658	282.5864	-72.2989	637.2005
86.400	0.202669	-284450.	6197.5130	-0.0008731	274.0315	-72.1138	640.4768
88.200	0.201091	-273345.	6067.8770	-0.0008801	265.6525	-71.9262	643.8231
90.000	0.199501	-262473.	5938.5810	-0.0008868	257.4490	-71.7361	647.2403
91.800	0.197899	-251833.	5809.6294	-0.0008933	249.4204	-71.5435	650.7291
93.600	0.196285	-241423.	5681.0266	-0.0008995	241.5664	-71.3485	654.2907
95.400	0.194660	-231245.	5552.7768	-0.0009054	233.8864	-71.1512	657.9261
97.200	0.193025	-221296.	5424.8845	-0.0009111	226.3801	-70.9514	661.6363
99.000	0.191380	-211577.	5297.3538	-0.0009166	219.0469	-70.7493	665.4225
100.800	0.189726	-202087.	5170.1891	-0.0009218	211.8863	-70.5448	669.2859
102.600	0.188062	-192825.	5043.3945	-0.0009267	204.8980	-70.3380	673.2277
104.400	0.186389	-183791.	4916.9742	-0.0009315	198.0812	-70.1289	677.2491
106.200	0.184709	-174983.	4790.9325	-0.0009360	191.4357	-69.9175	681.3516
108.000	0.183020	-166402.	4665.2733	-0.0009403	184.9609	-69.7038	685.5366
109.800	0.181324	-158046.	4540.0009	-0.0009444	178.6562	-69.4878	689.8056
111.600	0.179620	-149915.	4415.1193	-0.0009482	172.5211	-69.2695	694.1601
113.400	0.177910	-142009.	4290.6326	-0.0009519	166.5552	-69.0490	698.6017
115.200	0.176193	-134325.	4166.5450	-0.0009554	160.7579	-68.8262	703.1322
117.000	0.174471	-126864.	4042.8603	-0.0009587	155.1286	-68.6012	707.7533
118.800	0.172742	-119626.	3919.5827	-0.0009618	149.6669	-68.3739	712.4669
120.600	0.171008	-112609.	3796.7163	-0.0009647	144.3722	-68.1444	717.2749
122.400	0.169269	-105812.	3674.2650	-0.0009674	139.2439	-67.9126	722.1793
124.200	0.167525	-99234.9488	3552.2328	-0.0009700	134.2814	-67.6786	727.1823
126.000	0.165777	-92877.1421	3430.6239	-0.0009724	129.4843	-67.4424	732.2861
127.800	0.164025	-86737.6722	3309.4421	-0.0009747	124.8519	-67.2039	737.4930
129.600	0.162268	-80815.7782	3188.6917	-0.0009768	120.3836	-66.9632	742.8055
131.400	0.160508	-75110.6914	3068.3765	-0.0009788	116.0790	-66.7203	748.2260
133.200	0.158745	-69621.6353	2948.5008	-0.0009806	111.9374	-66.4750	753.7573
135.000	0.156978	-64347.8261	2829.0684	-0.0009823	107.9581	-66.2276	759.4021
136.800	0.155209	-59288.4717	2710.0836	-0.0009838	104.1407	-65.9778	765.1633
138.600	0.153437	-54442.7727	2591.5505	-0.0009852	100.4845	-65.7257	771.0441
140.400	0.151662	-49809.9215	2473.4731	-0.0009866	96.9889	-65.4714	777.0477
142.200	0.149885	-45389.1028	2355.8556	-0.0009877	93.6533	-65.2147	783.1773
144.000	0.148106	-41179.4935	2238.7023	-0.0009888	90.4770	-64.9557	789.4366
145.800	0.146325	-37180.2623	2122.0172	-0.0009898	87.4595	-64.6943	795.8292
147.600	0.144543	-33390.5701	2005.8048	-0.0009907	84.6000	-64.4306	802.3590
149.400	0.142759	-29809.5693	1890.0693	-0.0009915	81.8981	-64.1644	809.0301
151.200	0.140973	-26436.4047	1774.8151	-0.0009922	79.3529	-63.8958	815.8469
153.000	0.139187	-23270.2123	1660.0465	-0.0009928	76.9639	-63.6248	822.8139
154.800	0.137399	-20310.1200	1545.7681	-0.0009934	74.7305	-63.3513	829.9357
156.600	0.135610	-17555.2472	1431.9842	-0.0009939	72.6519	-63.0752	837.2175
158.400	0.133821	-15004.7047	1318.6996	-0.0009943	70.7274	-62.7966	844.6644
160.200	0.132031	-12657.5945	1205.9189	-0.0009946	68.9564	-62.5154	852.2822
162.000	0.130240	-10513.0102	1093.6467	-0.0009949	67.3383	-62.2315	860.0765
163.800	0.128449	-8570.0359	981.8879	-0.0009952	65.8723	-61.9449	868.0537
165.600	0.126658	-6827.7469	870.6473	-0.0009953	64.5577	-61.6557	876.2203
167.400	0.124866	-5285.2092	759.9301	-0.0009955	63.3938	-61.3636	884.5831
169.200	0.123074	-3941.4795	649.7411	-0.0009956	62.3799	-61.0686	893.1495
171.000	0.121282	-2795.6046	540.0856	-0.0009957	61.5153	-60.7708	901.9273
172.800	0.119490	-1846.6218	430.9689	-0.0009958	60.7993	-60.4700	910.9246
174.600	0.117697	-1093.5582	322.3964	-0.0009958	60.2311	-60.1661	920.1502
176.400	0.115905	-535.4308	214.3736	-0.0009958	59.8099	-59.8592	929.6132
178.200	0.114112	-171.2461	106.9062	-0.0009958	59.5352	-59.5490	939.3234
180.000	0.112320	0.0000	0.0000	-0.0009958	59.4059	-59.2356	474.6457

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection = 0.25000000 in

Computed slope at pile head = -4.253574E-07
Maximum bending moment = -1385568. lbs-in
Maximum shear force = 18800.73829 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 11
Number of zero deflection points = 0

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-2138873.	32391.8578	0.0000	1673.2438	0.0000	0.0000
1.800	0.499952	-2080601.	32352.6330	-5.3062E-05	1629.2759	-21.7916	78.4572
3.600	0.499809	-2022396.	32292.9037	-0.0001047	1585.3584	-44.5743	160.5288
5.400	0.499575	-1964331.	32192.0885	-0.0001548	1541.5469	-67.4426	243.0000
7.200	0.499252	-1906481.	32050.5114	-0.0002035	1497.8974	-89.8653	324.0000
9.000	0.498842	-1848918.	31868.6170	-0.0002507	1454.4649	-112.2395	405.0000
10.800	0.498349	-1791716.	31646.5026	-0.0002965	1411.3041	-134.5543	486.0000
12.600	0.497775	-1734946.	31384.2845	-0.0003408	1368.4698	-156.7991	567.0000
14.400	0.497122	-1678681.	31082.0977	-0.0003838	1326.0162	-178.9640	648.0000
16.200	0.496393	-1622992.	30740.0947	-0.0004253	1283.9977	-201.0394	729.0000
18.000	0.495591	-1567952.	30358.4448	-0.0004654	1242.4684	-223.0161	810.0000
19.800	0.494718	-1513632.	29937.3335	-0.0005042	1201.4821	-244.8854	891.0000
21.600	0.493776	-1460102.	29476.9614	-0.0005416	1161.0922	-266.6392	972.0000
23.400	0.492768	-1407433.	28977.5435	-0.0005776	1121.3521	-288.2695	1053.0000
25.200	0.491697	-1355695.	28439.3088	-0.0006124	1082.3147	-309.7690	1134.0000
27.000	0.490564	-1304959.	27862.4991	-0.0006458	1044.0326	-331.1306	1215.0000
28.800	0.489372	-1255292.	27247.3685	-0.0006780	1006.5581	-352.3478	1296.0000
30.600	0.488123	-1206765.	26594.1828	-0.0007090	969.9433	-373.4141	1377.0000
32.400	0.486820	-1159446.	25903.2186	-0.0007387	934.2395	-394.3239	1458.0000
34.200	0.485464	-1113402.	25174.7629	-0.0007673	899.4981	-415.0714	1539.0000
36.000	0.484057	-1068701.	24409.1122	-0.0007948	865.7699	-435.6515	1620.0000
37.800	0.482603	-1025409.	23606.5724	-0.0008211	833.1051	-456.0594	1701.0000
39.600	0.481101	-983593.	22767.4577	-0.0008464	801.5537	-476.2903	1782.0000
41.400	0.479556	-943318.	21892.0904	-0.0008706	771.1653	-496.3401	1863.0000
43.200	0.477967	-904650.	20980.8002	-0.0008938	741.9889	-516.2046	1944.0000
45.000	0.476338	-867652.	20033.9240	-0.0009161	714.0732	-535.8801	2025.0000
46.800	0.474669	-832389.	19051.8052	-0.0009375	687.4663	-555.3630	2106.0000
48.600	0.472963	-798924.	18034.7936	-0.0009580	662.2159	-574.6499	2187.0000
50.400	0.471220	-767319.	16983.2448	-0.0009777	638.3692	-593.7377	2268.0000
52.200	0.469443	-737637.	15897.5199	-0.0009966	615.9728	-612.6233	2349.0000
54.000	0.467633	-709937.	14777.9855	-0.0010148	595.0731	-631.3039	2430.0000
55.800	0.465790	-684282.	13625.0129	-0.0010324	575.7156	-649.7767	2511.0000
57.600	0.463916	-660731.	12438.9787	-0.0010493	557.9457	-668.0390	2592.0000
59.400	0.462012	-639343.	11220.2641	-0.0010656	541.8079	-686.0883	2673.0000
61.200	0.460080	-620177.	10526.2389	-0.0010815	527.3465	-85.0508	332.7500
63.000	0.458119	-601285.	10371.8432	-0.0010968	513.0922	-86.4999	339.8677
64.800	0.456131	-582673.	10214.8450	-0.0011117	499.0484	-87.9424	347.0414
66.600	0.454117	-564344.	10055.2563	-0.0011261	485.2188	-89.3783	354.2721
68.400	0.452077	-546304.	9893.0892	-0.0011401	471.6069	-90.8074	361.5609
70.200	0.450012	-528556.	9728.3557	-0.0011536	458.2161	-92.2298	368.9088
72.000	0.447924	-511107.	9561.0682	-0.0011667	445.0501	-93.6452	376.3169
73.800	0.445812	-493960.	9392.3800	-0.0011793	432.1123	-93.7861	378.6683
75.600	0.443678	-477116.	9223.6999	-0.0011916	419.4031	-93.6362	379.8816
77.400	0.441523	-460575.	9055.2913	-0.0012033	406.9221	-93.4844	381.1170
79.200	0.439346	-444335.	8887.1580	-0.0012147	394.6689	-93.3305	382.3747
81.000	0.437150	-428397.	8719.3033	-0.0012257	382.6433	-93.1747	383.6545
82.800	0.434934	-412760.	8551.7307	-0.0012363	370.8449	-93.0170	384.9565
84.600	0.432699	-397424.	8384.4437	-0.0012465	359.2732	-92.8574	386.2808
86.400	0.430447	-382388.	8217.4456	-0.0012563	347.9280	-92.6960	387.6273
88.200	0.428177	-367651.	8050.7396	-0.0012657	336.8089	-92.5328	388.9961
90.000	0.425890	-353214.	7884.3290	-0.0012748	325.9154	-92.3678	390.3872
91.800	0.423587	-339075.	7718.2171	-0.0012835	315.2473	-92.2010	391.8007
93.600	0.421270	-325234.	7552.4068	-0.0012918	304.8040	-92.0326	393.2366
95.400	0.418937	-311691.	7386.9014	-0.0012998	294.5853	-91.8624	394.6950
97.200	0.416590	-298445.	7221.7037	-0.0013075	284.5907	-91.6905	396.1759
99.000	0.414230	-285495.	7056.8169	-0.0013149	274.8198	-91.5171	397.6795
100.800	0.411857	-272842.	6892.2438	-0.0013219	265.2723	-91.3420	399.2057
102.600	0.409471	-260483.	6727.9872	-0.0013286	255.9476	-91.1653	400.7547
104.400	0.407074	-248420.	6564.0502	-0.0013350	246.8455	-90.9870	402.3266
106.200	0.404665	-236651.	6400.4354	-0.0013411	237.9654	-90.8072	403.9215
108.000	0.402246	-225176.	6237.1456	-0.0013469	229.3070	-90.6259	405.5395
109.800	0.399816	-213993.	6074.1835	-0.0013524	220.8698	-90.4431	407.1807
111.600	0.397377	-203104.	5911.5518	-0.0013577	212.6534	-90.2588	408.8453
113.400	0.394929	-192507.	5749.2532	-0.0013626	204.6574	-90.0730	410.5334
115.200	0.392472	-182201.	5587.2902	-0.0013673	196.8813	-89.8859	412.2451
117.000	0.390006	-172186.	5425.6654	-0.0013718	189.3247	-89.6973	413.9806
118.800	0.387533	-162461.	5264.3813	-0.0013760	181.9871	-89.5073	415.7400
120.600	0.385053	-153026.	5103.4405	-0.0013800	174.8681	-89.3159	417.5236
122.400	0.382565	-143880.	4942.8453	-0.0013837	167.9672	-89.1232	419.3315
124.200	0.380071	-135022.	4782.5983	-0.0013872	161.2840	-88.9291	421.1639
126.000	0.377571	-126453.	4622.7018	-0.0013905	154.8180	-88.7337	423.0210
127.800	0.375066	-118170.	4463.1582	-0.0013936	148.5687	-88.5370	424.9031
129.600	0.372554	-110175.	4303.9699	-0.0013965	142.5357	-88.3389	426.8103
131.400	0.370038	-102465.	4145.1392	-0.0013991	136.7185	-88.1396	428.7429
133.200	0.367518	-95040.5977	3986.6684	-0.0014016	131.1167	-87.9390	430.7011
135.000	0.364993	-87901.0038	3828.5598	-0.0014039	125.7296	-87.7372	432.6853
136.800	0.362464	-81045.5112	3670.8157	-0.0014060	120.5570	-87.5341	434.6957
138.600	0.359931	-74473.4749	3513.4382	-0.0014080	115.5982	-87.3297	436.7325
140.400	0.357395	-68184.2454	3356.4297	-0.0014098	110.8528	-87.1242	438.7962
142.200	0.354856	-62177.1684	3199.7924	-0.0014114	106.3203	-86.9173	440.8869
144.000	0.352314	-56451.5855	3043.5284	-0.0014129	102.0002	-86.7093	443.0051
145.800	0.349769	-51006.8334	2887.6399	-0.0014143	97.8920	-86.5001	445.1511
147.600	0.347222	-45842.2445	2732.1292	-0.0014155	93.9952	-86.2896	447.3253
149.400	0.344673	-40957.1468	2576.9984	-0.0014166	90.3092	-86.0780	449.5280
151.200	0.342123	-36350.8638	2422.2496	-0.0014175	86.8337	-85.8651	451.7596
153.000	0.339570	-32022.7147	2267.8851	-0.0014184	83.5679	-85.6511	454.0207
154.800	0.337016	-27972.0141	2113.9069	-0.0014192	80.5116	-85.4358	456.3115
156.600	0.334461	-24198.0723	1960.3173	-0.0014198	77.6640	-85.2193	458.6326
158.400	0.331905	-20700.1952	1807.1184	-0.0014204	75.0248	-85.0017	460.9845
160.200	0.329348	-17477.6842	1654.3123	-0.0014209	72.5933	-84.7828	463.3676
162.000	0.326790	-14529.8364	1501.9012	-0.0014213	70.3691	-84.5628	465.7825
163.800	0.324231	-11855.9445	1349.8873	-0.0014216	68.3516	-84.3415	468.2298
165.600	0.321672	-9455.2965	1198.2728	-0.0014219	66.5402	-84.1191	470.7100
167.400	0.319113	-7327.1763	1047.0598	-0.0014221	64.9345	-83.8954	473.2237
169.200	0.316553	-5470.8632	896.2506	-0.0014222	63.5339	-83.6704	475.7716
171.000	0.313993	-3885.6318	745.8474	-0.0014224	62.3378	-83.4443	478.3543
172.800	0.311432	-2570.7525	595.8524	-0.0014224	61.3456	-83.2169	480.9726
174.600	0.308872	-1525.4908	446.2678	-0.0014225	60.5570	-82.9882	483.6270
176.400	0.306311	-749.1080	297.0960	-0.0014225	59.9712	-82.7582	486.3185
178.200	0.303751	-240.8605	148.3393	-0.0014225	59.5877	-82.5270	489.0478
180.000	0.301190	0.0000	0.0000	-0.0014225	59.4059	-82.2945	245.9079

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

Pile-head deflection = 0.50000000 in
Computed slope at pile head = -7.327977E-07
Maximum bending moment = -2138873. lbs-in
Maximum shear force = 32391.85782 lbs
Depth of maximum bending moment = 0.00000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 10
Number of zero deflection points = 0

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	224888.	6341.2638
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	370803.	11098.6218
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-1385568.	18800.7383
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-2138873.	32391.8578

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.46)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
All Rights Reserved

This program is licensed to:

RIT
URS Corp

Files Used for Analysis

Path to file locations: L:\NESA\Projects\Miscellaneous\Oxford basin\Engineering Analysis\LPILE\
Name of input data file: pile 10 30 inch L=30 fill 10.lpd
Name of output file: pile 10 30 inch L=30 fill 10.lpo
Name of plot output file: pile 10 30 inch L=30 fill 10.lpp
Name of runtime file: pile 10 30 inch L=30 fill 10.lpr

Time and Date of Analysis

Date: November 21, 2011 Time: 13:55:08

Problem Title

RH Fdn Pile 148 cut off L=15 dia 30 Fill 10 ft

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 180.00 in

Depth of ground surface below top of pile = 0.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	30.00000000	19880.0000	707.0000	3600000.
2	360.0000	30.00000000	19880.0000	707.0000	3600000.

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 0.000 in
Distance from top of pile to bottom of layer = 120.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 2 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer = 120.000 in
Distance from top of pile to bottom of layer = 240.000 in

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 240.000 in
Distance from top of pile to bottom of layer = 480.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 300.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	0.00	0.06900
2	120.00	0.06900
3	120.00	0.03300
4	240.00	0.03300
5	240.00	0.03300
6	480.00	0.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 6 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	0.000	0.00000	30.00	------	------
2	120.000	0.00000	30.00	------	------
3	120.000	1.04100	0.00	0.02000	0.0
4	240.000	1.04100	0.00	0.02000	0.0
5	240.000	0.00000	32.00	------	------
6	480.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.250 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 2

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 0.500 in
Bending moment at pile head = 0.000 in-lbs
Axial load at pile head = 42000.000 lbs

Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.250 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 0.500 in
Slope at pile head = 0.000 in/in
Axial load at pile head = 42000.000 lbs

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head = 0.250000 in
Specified moment at pile head = 0.000 in-lbs
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	0.0000	6984.3331	-0.0025092	59.4059	0.0000	0.0000
1.800	0.245483	12761.4978	6974.3911	-0.0025091	69.0348	-11.0468	81.0000
3.600	0.240967	25487.1800	6944.9306	-0.0025086	78.6367	-21.6871	162.0000
5.400	0.236452	38142.5475	6896.6833	-0.0025078	88.1855	-31.9211	243.0000
7.200	0.231939	50694.4183	6830.3802	-0.0025067	97.6563	-41.7491	324.0000
9.000	0.227428	63110.9256	6746.7518	-0.0025052	107.0248	-51.1714	405.0000
10.800	0.222920	75361.5177	6646.5278	-0.0025035	116.2683	-60.1885	486.0000
12.600	0.218416	87416.9557	6530.4373	-0.0025015	125.3644	-68.8010	567.0000
14.400	0.213915	99249.3124	6399.2079	-0.0024991	134.2922	-77.0095	648.0000
16.200	0.209419	110832.	6253.5662	-0.0024965	143.0317	-84.8147	729.0000
18.000	0.204928	122140.	6094.2372	-0.0024935	151.5636	-92.2175	810.0000
19.800	0.200442	133148.	5921.9444	-0.0024903	159.8699	-99.2189	891.0000
21.600	0.195963	143835.	5737.4095	-0.0024868	167.9335	-105.8198	972.0000
23.400	0.191490	154179.	5541.3524	-0.0024831	175.7381	-112.0214	1053.0000
25.200	0.187024	164159.	5334.4907	-0.0024791	183.2687	-117.8248	1134.0000
27.000	0.182565	173758.	5117.5402	-0.0024748	190.5110	-123.2313	1215.0000
28.800	0.178114	182957.	4891.2141	-0.0024704	197.4518	-128.2421	1296.0000
30.600	0.173672	191740.	4656.2233	-0.0024656	204.0788	-132.8588	1377.0000
32.400	0.169238	200092.	4413.2761	-0.0024607	210.3808	-137.0826	1458.0000
34.200	0.164813	208000.	4163.0782	-0.0024556	216.3473	-140.9151	1539.0000
36.000	0.160398	215450.	3906.3325	-0.0024503	221.9691	-144.3579	1620.0000
37.800	0.155992	222433.	3643.7391	-0.0024448	227.2376	-147.4125	1701.0000
39.600	0.151597	228937.	3375.9954	-0.0024391	232.1455	-150.0806	1782.0000
41.400	0.147211	234955.	3103.7955	-0.0024332	236.6861	-152.3638	1863.0000
43.200	0.142837	240479.	2827.8307	-0.0024273	240.8539	-154.2638	1944.0000
45.000	0.138473	245503.	2548.7891	-0.0024212	244.6443	-155.7824	2025.0000
46.800	0.134121	250021.	2267.3559	-0.0024149	248.0534	-156.9212	2106.0000
48.600	0.129779	254030.	1984.2130	-0.0024086	251.0786	-157.6821	2187.0000
50.400	0.125450	257528.	1700.0391	-0.0024022	253.7179	-158.0667	2268.0000
52.200	0.121132	260513.	1415.5098	-0.0023956	255.9704	-158.0769	2349.0000
54.000	0.116825	262986.	1131.2976	-0.0023891	257.8362	-157.7144	2430.0000
55.800	0.112531	264947.	848.0718	-0.0023824	259.3159	-156.9809	2511.0000
57.600	0.108249	266399.	566.4985	-0.0023757	260.4116	-155.8783	2592.0000
59.400	0.103979	267346.	287.2408	-0.0023690	261.1258	-154.4081	2673.0000
61.200	0.099720	267792.	10.9586	-0.0023623	261.4621	-152.5721	2754.0000
63.000	0.095474	267743.	-261.6910	-0.0023556	261.4250	-150.3719	2835.0000
64.800	0.091240	267206.	-530.0541	-0.0023488	261.0200	-147.8093	2916.0000
66.600	0.087018	266190.	-793.4796	-0.0023421	260.2532	-144.8857	2997.0000
68.400	0.082809	264703.	-1051.3194	-0.0023354	259.1318	-141.6028	3078.0000
70.200	0.078611	262758.	-1302.9278	-0.0023288	257.6639	-137.9621	3159.0000
72.000	0.074425	260365.	-1547.6620	-0.0023222	255.8584	-133.9649	3240.0000
73.800	0.070251	257537.	-1784.8819	-0.0023157	253.7250	-129.6128	3321.0000
75.600	0.066088	254290.	-2013.9497	-0.0023093	251.2743	-124.9070	3402.0000
77.400	0.061937	250636.	-2234.2299	-0.0023029	248.5179	-119.8489	3483.0000
79.200	0.057798	246595.	-2445.0895	-0.0022967	245.4682	-114.4396	3564.0000
81.000	0.053669	242181.	-2645.8975	-0.0022905	242.1384	-108.6804	3645.0000
82.800	0.049552	237416.	-2836.0250	-0.0022845	238.5425	-102.5723	3726.0000
84.600	0.045445	232317.	-3014.8449	-0.0022786	234.6955	-96.1164	3807.0000

86.400	0.041349	226907.	-3181.7319	-0.0022728	230.6132	-89.3136	3888.0000
88.200	0.037263	221206.	-3336.0625	-0.0022672	226.3123	-82.1648	3969.0000
90.000	0.033187	215240.	-3477.2146	-0.0022617	221.8101	-74.6708	4050.0000
91.800	0.029121	209030.	-3604.5674	-0.0022564	217.1251	-66.8323	4131.0000
93.600	0.025064	202604.	-3717.5015	-0.0022512	212.2765	-58.6500	4212.0000
95.400	0.021017	195988.	-3815.3986	-0.0022462	207.2841	-50.1245	4293.0000
97.200	0.016978	189209.	-3897.6413	-0.0022413	202.1689	-41.2563	4374.0000
99.000	0.012948	182295.	-3963.6131	-0.0022367	196.9527	-32.0457	4455.0000
100.800	0.008926	175278.	-4012.6983	-0.0022322	191.6578	-22.4933	4536.0000
102.600	0.004912	168187.	-4044.2816	-0.0022278	186.3076	-12.5993	4617.0000
104.400	0.000906	161055.	-4057.7484	-0.0022237	180.9265	-2.3638	4698.0000
106.200	-0.003093	153915.	-4052.4843	-0.0022197	175.5393	8.2128	4779.0000
108.000	-0.007085	146802.	-4027.8753	-0.0022160	170.1719	19.1305	4860.0000
109.800	-0.011071	139750.	-3983.3074	-0.0022124	164.8512	30.3893	4941.0000
111.600	-0.015050	132796.	-3918.1668	-0.0022089	159.6045	41.9891	5022.0000
113.400	-0.019023	125979.	-3831.8396	-0.0022057	154.4603	53.9300	5103.0000
115.200	-0.022990	119335.	-3723.7117	-0.0022026	149.4477	66.2121	5184.0000
117.000	-0.026952	112906.	-3593.1690	-0.0021997	144.5968	78.8354	5265.0000
118.800	-0.030909	106733.	-3439.5971	-0.0021969	139.9385	91.8001	5346.0000
120.600	-0.034861	100856.	-3320.8797	-0.0021943	135.5045	40.1082	2070.9256
122.400	-0.038809	95109.1371	-3247.3711	-0.0021918	131.1684	41.5680	1927.9875
124.200	-0.042752	89496.8215	-3171.3224	-0.0021895	126.9337	42.9305	1807.5267
126.000	-0.046691	84023.4305	-3092.8957	-0.0021873	122.8039	44.2103	1704.3717
127.800	-0.050626	78693.1210	-3012.2295	-0.0021853	118.7820	45.4188	1614.8569
129.600	-0.054558	73509.8190	-2929.4438	-0.0021834	114.8711	46.5653	1536.3058
131.400	-0.058486	68477.2487	-2844.6437	-0.0021816	111.0739	47.6570	1466.7142
133.200	-0.062412	63598.9569	-2757.9224	-0.0021799	107.3931	48.7000	1404.5494
135.000	-0.066334	58878.3323	-2669.3628	-0.0021784	103.8312	49.6995	1348.6175
136.800	-0.070254	54318.6222	-2579.0395	-0.0021770	100.3908	50.6597	1297.9733
138.600	-0.074171	49922.9461	-2487.0200	-0.0021756	97.0742	51.5842	1251.8582
140.400	-0.078086	45694.3080	-2393.3656	-0.0021744	93.8835	52.4762	1209.6554
142.200	-0.081999	41635.6060	-2298.1324	-0.0021733	90.8211	53.3384	1170.8582
144.000	-0.085910	37749.6413	-2201.3719	-0.0021723	87.8891	54.1733	1135.0459
145.800	-0.089819	34039.1263	-2103.1314	-0.0021714	85.0894	54.9828	1101.8659
147.600	-0.093727	30506.6908	-2003.4550	-0.0021706	82.4241	55.7688	1071.0208
149.400	-0.097634	27154.8882	-1902.3833	-0.0021699	79.8950	56.5330	1042.2573
151.200	-0.101539	23986.2011	-1799.9544	-0.0021693	77.5042	57.2769	1015.3584
153.000	-0.105443	21003.0456	-1696.2036	-0.0021687	75.2533	58.0017	990.1373
154.800	-0.109346	18207.7757	-1591.1641	-0.0021682	73.1442	58.7087	966.4318
156.600	-0.113249	15602.6876	-1484.8672	-0.0021678	71.1786	59.3989	944.1006
158.400	-0.117150	13190.0224	-1377.3421	-0.0021674	69.3582	60.0734	923.0199
160.200	-0.121051	10971.9698	-1268.6165	-0.0021671	67.6846	60.7329	903.0809
162.000	-0.124952	8950.6708	-1158.7165	-0.0021669	66.1595	61.3783	884.1872
163.800	-0.128852	7128.2204	-1047.6668	-0.0021667	64.7844	62.0103	866.2535
165.600	-0.132752	5506.6699	-935.4908	-0.0021665	63.5609	62.6297	849.2038
167.400	-0.136651	4088.0290	-822.2108	-0.0021664	62.4905	63.2370	832.9699
169.200	-0.140551	2874.2682	-707.8480	-0.0021663	61.5747	63.8328	817.4910
171.000	-0.144450	1867.3202	-592.4225	-0.0021662	60.8149	64.4177	802.7122
172.800	-0.148349	1069.0821	-475.9536	-0.0021662	60.2126	64.9922	788.5840
174.600	-0.152248	481.4166	-358.4597	-0.0021662	59.7692	65.5566	775.0616
176.400	-0.156148	106.1537	-239.9583	-0.0021662	59.4860	66.1115	762.1045
178.200	-0.160047	-54.9080	-120.4664	-0.0021662	59.4474	66.6573	749.6757
180.000	-0.163946	0.0000	0.0000	-0.0021662	59.4059	67.1942	368.8708

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =    -0.00250924
Maximum bending moment            =   267791.72488 lbs-in
Maximum shear force               =     6984.33314 lbs
Depth of maximum bending moment   =    61.20000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             11
```

88.200	0.051955	340329.	-6778.3476	-0.0048385	316.1933	-114.5601	3969.0000
90.000	0.043253	328308.	-6969.0391	-0.0048301	307.1231	-97.3193	4050.0000
91.800	0.034566	315971.	-7128.0230	-0.0048220	297.8144	-79.3295	4131.0000
93.600	0.025894	303376.	-7253.9517	-0.0048142	288.3113	-60.5913	4212.0000
95.400	0.017235	290584.	-7345.4788	-0.0048068	278.6597	-41.1054	4293.0000
97.200	0.008589	277659.	-7401.2586	-0.0047996	268.9072	-20.8722	4374.0000
99.000	-4.37E-05	264666.	-7419.9462	-0.0047928	259.1033	0.1080959	4455.0000
100.800	-0.008665	251672.	-7400.1973	-0.0047863	249.2992	21.8351	4536.0000
102.600	-0.017274	238749.	-7340.6678	-0.0047801	239.5482	44.3088	4617.0000
104.400	-0.025873	225968.	-7240.0136	-0.0047743	229.9051	67.5292	4698.0000
106.200	-0.034462	213406.	-7096.8907	-0.0047688	220.4268	91.4963	4779.0000
108.000	-0.043041	201140.	-6909.9549	-0.0047636	211.1719	116.2102	4860.0000
109.800	-0.051611	189251.	-6677.8614	-0.0047587	202.2008	141.6713	4941.0000
111.600	-0.060172	177820.	-6399.2654	-0.0047540	193.5757	167.8798	5022.0000
113.400	-0.068725	166932.	-6072.8212	-0.0047497	185.3608	194.8360	5103.0000
115.200	-0.077271	156676.	-5697.1826	-0.0047456	177.6220	222.5402	5184.0000
117.000	-0.085809	147140.	-5271.0030	-0.0047418	170.4270	250.9927	5265.0000
118.800	-0.094341	138417.	-4792.9350	-0.0047382	163.8453	280.1940	5346.0000
120.600	-0.102867	130602.	-4488.9884	-0.0047348	157.9485	57.5245	1006.5808
122.400	-0.111387	122973.	-4384.0528	-0.0047316	152.1921	59.0706	954.5748
124.200	-0.119901	115535.	-4276.4044	-0.0047286	146.5799	60.5388	908.8321
126.000	-0.128410	108292.	-4166.1750	-0.0047258	141.1156	61.9383	868.2260
127.800	-0.136914	101251.	-4053.4818	-0.0047232	135.8025	63.2764	831.8910
129.600	-0.145413	94414.1058	-3938.4295	-0.0047207	130.6439	64.5595	799.1501
131.400	-0.153909	87786.3172	-3821.1122	-0.0047184	125.6431	65.7930	769.4657
133.200	-0.162400	81371.5310	-3701.6152	-0.0047163	120.8030	66.9813	742.4046
135.000	-0.170887	75173.6097	-3580.0164	-0.0047143	116.1265	68.1284	717.6140
136.800	-0.179372	69196.2815	-3456.3869	-0.0047125	111.6164	69.2377	694.8032
138.600	-0.187853	63443.1521	-3330.7920	-0.0047109	107.2755	70.3122	673.7302
140.400	-0.196331	57917.7134	-3203.2921	-0.0047093	103.1064	71.3544	654.1919
142.200	-0.204806	52623.3528	-3073.9431	-0.0047080	99.1117	72.3667	636.0166
144.000	-0.213279	47563.3604	-2942.7969	-0.0047067	95.2938	73.3512	619.0579
145.800	-0.221750	42740.9356	-2809.9020	-0.0047056	91.6551	74.3097	603.1901
147.600	-0.230219	38159.1931	-2675.3037	-0.0047045	88.1981	75.2439	588.3048
149.400	-0.238687	33821.1684	-2539.0443	-0.0047036	84.9249	76.1553	574.3079
151.200	-0.247152	29729.8227	-2401.1638	-0.0047028	81.8379	77.0452	561.1172
153.000	-0.255617	25888.0470	-2261.6997	-0.0047021	78.9392	77.9149	548.6606
154.800	-0.264080	22298.6663	-2120.6873	-0.0047015	76.2309	78.7655	536.8746
156.600	-0.272542	18964.4435	-1978.1602	-0.0047010	73.7151	79.5980	525.7032
158.400	-0.281004	15888.0820	-1834.1501	-0.0047006	71.3939	80.4133	515.0964
160.200	-0.289464	13072.2294	-1688.6870	-0.0047002	69.2693	81.2124	505.0097
162.000	-0.297924	10519.4801	-1541.7994	-0.0046999	67.3432	81.9960	495.4034
163.800	-0.306384	8232.3778	-1393.5147	-0.0046997	65.6175	82.7648	486.2418
165.600	-0.314843	6213.4179	-1243.8587	-0.0046995	64.0941	83.5196	477.4927
167.400	-0.323302	4465.0498	-1092.8561	-0.0046994	62.7749	84.2610	469.1271
169.200	-0.331761	2989.6788	-940.5306	-0.0046993	61.6617	84.9895	461.1187
171.000	-0.340220	1789.6683	-786.9049	-0.0046992	60.7563	85.7058	453.4437
172.800	-0.348678	867.3410	-632.0004	-0.0046992	60.0604	86.4102	446.0803
174.600	-0.357137	224.9812	-475.8382	-0.0046992	59.5757	87.1034	439.0088
176.400	-0.365595	-135.1640	-318.4380	-0.0046992	59.5079	87.7857	432.2111
178.200	-0.374053	-210.8834	-159.8192	-0.0046992	59.5651	88.4575	425.6705
180.000	-0.382512	0.0000	0.0000	-0.0046992	59.4059	89.1193	209.6859

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00524840
Maximum bending moment            =   451667.95718 lbs-in
Maximum shear force               =    12456.04032 lbs
Depth of maximum bending moment   =    57.60000000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             10
Number of zero deflection points  =              1
```

```
Number of zero deflection points =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

```
Pile-head boundary conditions are Displacement and Moment (Pile-head Condition Type 4)
Specified deflection at pile head   =        0.500000 in
Specified moment at pile head       =           0.000 in-lbs
Specified axial load at pile head   =       42000.000 lbs
```

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	0.0000	12456.0403	-0.0052484	59.4059	0.0000	0.0000
1.800	0.490553	22817.6516	12436.5247	-0.0052481	76.6225	-21.6840	79.5658
3.600	0.481107	45565.0036	12378.0394	-0.0052473	93.7860	-43.2996	162.0000
5.400	0.471663	68171.9782	12281.7628	-0.0052458	110.8435	-63.6745	243.0000
7.200	0.462222	90572.5179	12149.5758	-0.0052438	127.7454	-83.1999	324.0000
9.000	0.452785	112703.	11983.0069	-0.0052413	144.4437	-101.8766	405.0000
10.800	0.443353	134504.	11783.5831	-0.0052382	160.8927	-119.7054	486.0000
12.600	0.433928	155916.	11552.8298	-0.0052345	177.0490	-136.6872	567.0000
14.400	0.424509	176885.	11292.2704	-0.0052303	192.8708	-152.8232	648.0000
16.200	0.415098	197359.	11003.4261	-0.0052256	208.3188	-168.1149	729.0000
18.000	0.405697	217288.	10687.8155	-0.0052204	223.3556	-182.5636	810.0000
19.800	0.396305	236625.	10346.9544	-0.0052147	237.9457	-196.1710	891.0000
21.600	0.386924	255325.	9982.3555	-0.0052085	252.0559	-208.9389	972.0000
23.400	0.377554	273349.	9595.5281	-0.0052019	265.6550	-220.8693	1053.0000
25.200	0.368197	290656.	9187.9779	-0.0051948	278.7137	-231.9642	1134.0000
27.000	0.358853	307211.	8761.2068	-0.0051872	291.2049	-242.2259	1215.0000
28.800	0.349523	322980.	8316.7125	-0.0051793	303.1035	-251.6566	1296.0000
30.600	0.340208	337934.	7855.9886	-0.0051710	314.3864	-260.2588	1377.0000
32.400	0.330907	352044.	7380.5241	-0.0051623	325.0326	-268.0350	1458.0000
34.200	0.321623	365285.	6891.8035	-0.0051533	335.0231	-274.9879	1539.0000
36.000	0.312356	377634.	6391.3065	-0.0051440	344.3407	-281.1200	1620.0000
37.800	0.303105	389071.	5880.5078	-0.0051343	352.9706	-286.4341	1701.0000
39.600	0.293872	399580.	5360.8771	-0.0051244	360.8997	-290.9332	1782.0000
41.400	0.284657	409145.	4833.8792	-0.0051142	368.1170	-294.6200	1863.0000
43.200	0.275461	417755.	4300.9735	-0.0051038	374.6134	-297.4975	1944.0000
45.000	0.266283	425400.	3763.6140	-0.0050932	380.3820	-299.5686	2025.0000
46.800	0.257125	432074.	3223.2497	-0.0050825	385.4176	-300.8362	2106.0000
48.600	0.247986	437772.	2681.3240	-0.0050715	389.7171	-301.3034	2187.0000
50.400	0.238868	442494.	2139.2752	-0.0050605	393.2794	-300.9731	2268.0000
52.200	0.229769	446239.	1598.5361	-0.0050493	396.1053	-299.8482	2349.0000
54.000	0.220690	449012.	1060.5343	-0.0050380	398.1976	-297.9317	2430.0000
55.800	0.211632	450819.	526.6920	-0.0050267	399.5608	-295.2264	2511.0000
57.600	0.202594	451668.	-1.5736	-0.0050154	400.2017	-291.7354	2592.0000
59.400	0.193577	451571.	-522.8505	-0.0050040	400.1287	-287.4612	2673.0000
61.200	0.184580	450542.	-1035.7318	-0.0049926	399.3523	-282.4068	2754.0000
63.000	0.175603	448597.	-1538.8153	-0.0049813	397.8849	-276.5748	2835.0000
64.800	0.166647	445756.	-2030.7036	-0.0049701	395.7408	-269.9678	2916.0000
66.600	0.157711	442038.	-2510.0042	-0.0049589	392.9360	-262.5883	2997.0000
68.400	0.148795	437470.	-2975.3286	-0.0049479	389.4886	-254.4389	3078.0000
70.200	0.139898	432075.	-3425.2931	-0.0049369	385.4186	-245.5217	3159.0000
72.000	0.131022	425885.	-3858.5177	-0.0049261	380.7477	-235.8390	3240.0000
73.800	0.122164	418930.	-4273.6266	-0.0049155	375.4997	-225.3931	3321.0000
75.600	0.113326	411243.	-4669.2476	-0.0049051	369.7000	-214.1858	3402.0000
77.400	0.104506	402862.	-5044.0119	-0.0048948	363.3762	-202.2191	3483.0000
79.200	0.095704	393825.	-5396.5543	-0.0048848	356.5574	-189.4947	3564.0000
81.000	0.086921	384173.	-5725.5123	-0.0048750	349.2748	-176.0142	3645.0000
82.800	0.078154	373950.	-6029.5264	-0.0048655	341.5614	-161.7792	3726.0000
84.600	0.069405	363202.	-6307.2397	-0.0048562	333.4519	-146.7911	3807.0000
86.400	0.060672	351978.	-6557.2976	-0.0048472	324.9831	-131.0510	3888.0000

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

```
Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head   =        0.250000 in
Specified slope at pile head        =       0.000E+00 in/in
Specified axial load at pile head   =       42000.000 lbs
```

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.250000	-2593778.	32737.1782	0.0000	2016.4821	0.0000	0.0000
1.800	0.249941	-2534867.	32716.9330	-6.4495E-05	1972.0320	-11.2474	81.0000
3.600	0.249768	-2475988.	32686.5792	-0.0001275	1927.6058	-22.4791	162.0000
5.400	0.249482	-2417176.	32636.0359	-0.0001890	1883.2310	-33.6801	243.0000
7.200	0.249087	-2358469.	32565.3716	-0.0002491	1838.9351	-44.8357	324.0000
9.000	0.248586	-2299903.	32474.6809	-0.0003077	1794.7454	-55.9317	405.0000
10.800	0.247980	-2241514.	32364.0833	-0.0003648	1750.6891	-66.9545	486.0000
12.600	0.247272	-2183337.	32233.7226	-0.0004204	1706.7932	-77.8908	567.0000
14.400	0.246466	-2125409.	32083.7659	-0.0004746	1663.0847	-88.7278	648.0000
16.200	0.245564	-2067764.	31914.4030	-0.0005273	1619.5900	-99.4533	729.0000
18.000	0.244568	-2010437.	31725.8451	-0.0005786	1576.3355	-110.0554	810.0000
19.800	0.243481	-1953463.	31518.3247	-0.0006285	1533.3472	-120.5229	891.0000
21.600	0.242305	-1896876.	31292.0939	-0.0006769	1490.6507	-130.8447	972.0000
23.400	0.241044	-1840710.	31047.4241	-0.0007239	1448.2713	-141.0106	1053.0000
25.200	0.239699	-1784996.	30784.6053	-0.0007695	1406.2340	-151.0104	1134.0000
27.000	0.238273	-1729769.	30503.9448	-0.0008137	1364.5634	-160.8346	1215.0000
28.800	0.236770	-1675059.	30205.7669	-0.0008565	1323.2834	-170.4742	1296.0000
30.600	0.235190	-1620898.	29890.4118	-0.0008980	1282.4178	-179.9204	1377.0000
32.400	0.233537	-1567318.	29558.2350	-0.0009381	1241.9897	-189.1650	1458.0000
34.200	0.231813	-1514347.	29209.6064	-0.0009768	1202.0218	-198.2001	1539.0000
36.000	0.230020	-1462015.	28844.9096	-0.0010142	1162.5363	-207.0184	1620.0000
37.800	0.228162	-1410352.	28464.5415	-0.0010504	1123.5547	-215.6129	1701.0000
39.600	0.226239	-1359384.	28068.9108	-0.0010852	1085.0983	-223.9768	1782.0000
41.400	0.224255	-1309140.	27658.4381	-0.0011188	1047.1874	-232.1040	1863.0000
43.200	0.222212	-1259645.	27233.5547	-0.0011511	1009.8421	-239.9886	1944.0000
45.000	0.220111	-1210925.	26794.7023	-0.0011821	973.0817	-247.6252	2025.0000
46.800	0.217956	-1163005.	26342.3319	-0.0012120	936.9248	-255.0086	2106.0000
48.600	0.215748	-1115909.	25876.9036	-0.0012406	901.3898	-262.1340	2187.0000
50.400	0.213490	-1069661.	25398.8856	-0.0012681	866.4939	-268.9971	2268.0000
52.200	0.211183	-1024282.	24908.7538	-0.0012945	832.2542	-275.5937	2349.0000
54.000	0.208830	-979793.	24406.9913	-0.0013197	798.6867	-281.9201	2430.0000
55.800	0.206432	-936217.	23894.0876	-0.0013437	765.8070	-287.9729	2511.0000
57.600	0.203992	-893571.	23370.5380	-0.0013668	733.6299	-293.7488	2592.0000
59.400	0.201512	-851876.	22836.8435	-0.0013887	702.1697	-299.2451	2673.0000
61.200	0.198993	-811149.	22293.5097	-0.0014096	671.4398	-304.4591	2754.0000
63.000	0.196437	-771406.	21741.0467	-0.0014295	641.4531	-309.3886	2835.0000
64.800	0.193847	-732665.	21179.9686	-0.0014484	612.2216	-314.0315	2916.0000
66.600	0.191223	-694940.	20610.7928	-0.0014664	583.7567	-318.3860	2997.0000
68.400	0.188568	-658244.	20034.0398	-0.0014834	556.0692	-322.4506	3078.0000
70.200	0.185883	-622593.	19450.2327	-0.0014995	529.1691	-326.2239	3159.0000
72.000	0.183169	-587997.	18859.8968	-0.0015147	503.0655	-329.7049	3240.0000
73.800	0.180430	-554468.	18263.5592	-0.0015291	477.7672	-332.8925	3321.0000
75.600	0.177665	-522017.	17661.7485	-0.0015426	453.2818	-335.7861	3402.0000
77.400	0.174876	-490653.	17054.9945	-0.0015554	429.6166	-338.3851	3483.0000
79.200	0.172065	-460384.	16443.8276	-0.0015673	406.7779	-340.6892	3564.0000
81.000	0.169234	-431218.	15828.7791	-0.0015785	384.7715	-342.6981	3645.0000
82.800	0.166382	-403161.	15210.3804	-0.0015890	363.6022	-344.4117	3726.0000
84.600	0.163513	-376220.	14589.1628	-0.0015988	343.2742	-345.8301	3807.0000
86.400	0.160627	-350399.	13965.6575	-0.0016080	323.7912	-346.9535	3888.0000
88.200	0.157724	-325701.	13340.3954	-0.0016165	305.1559	-347.7821	3969.0000

90.000	0.154807	-302129.	12713.9067	-0.0016244	287.3703	-348.3164	4050.0000
91.800	0.151877	-279685.	12086.7209	-0.0016317	270.4358	-348.5567	4131.0000
93.600	0.148933	-258370.	11459.3665	-0.0016385	254.3531	-348.5037	4212.0000
95.400	0.145978	-238184.	10832.3712	-0.0016447	239.1219	-348.1578	4293.0000
97.200	0.143012	-219125.	10206.2614	-0.0016505	224.7415	-347.5198	4374.0000
99.000	0.140036	-201191.	9581.5623	-0.0016557	211.2103	-346.5903	4455.0000
100.800	0.137052	-184381.	8958.7981	-0.0016606	198.5262	-345.3700	4536.0000
102.600	0.134058	-168689.	8338.4914	-0.0016650	186.6861	-343.8597	4617.0000
104.400	0.131057	-154110.	7721.1636	-0.0016691	175.6864	-342.0600	4698.0000
106.200	0.128050	-140640.	7107.3350	-0.0016728	165.5227	-339.9718	4779.0000
108.000	0.125035	-128271.	6497.5244	-0.0016762	156.1899	-337.5956	4860.0000
109.800	0.122015	-116996.	5892.2493	-0.0016793	147.6823	-334.9323	4941.0000
111.600	0.118990	-106805.	5292.0262	-0.0016821	139.9933	-331.9823	5022.0000
113.400	0.115960	-97689.9594	4697.3704	-0.0016846	133.1157	-328.7464	5103.0000
115.200	0.112925	-89639.8096	4108.7962	-0.0016870	127.0416	-325.2250	5184.0000
117.000	0.109887	-82643.2182	3526.8170	-0.0016892	121.7625	-321.4186	5265.0000
118.800	0.106844	-76687.8660	2951.9453	-0.0016912	117.2690	-317.3277	5346.0000
120.600	0.103798	-71760.5096	2614.4225	-0.0016930	113.5512	-57.6977	1000.5523
122.400	0.100749	-67019.9572	2511.0802	-0.0016948	109.9743	-57.1271	1020.6401
124.200	0.097697	-62464.3693	2408.7758	-0.0016964	106.5370	-56.5444	1041.7890
126.000	0.094642	-58091.8664	2307.5319	-0.0016979	103.2378	-55.9488	1064.0899
127.800	0.091585	-53900.5274	2207.3721	-0.0016993	100.0754	-55.3398	1087.6447
129.600	0.088525	-49888.3868	2108.3215	-0.0017006	97.0481	-54.7165	1112.5683
131.400	0.085462	-46053.4328	2010.4062	-0.0017019	94.1545	-54.0783	1138.9906
133.200	0.082398	-42393.6049	1913.6540	-0.0017030	91.3931	-53.4241	1167.0594
135.000	0.079332	-38906.7904	1818.0946	-0.0017040	88.7622	-52.7531	1196.9433
136.800	0.076264	-35590.8219	1723.7590	-0.0017049	86.2602	-52.0642	1228.8356
138.600	0.073194	-32443.4737	1630.6808	-0.0017058	83.8854	-51.3561	1262.9594
140.400	0.070123	-29462.4576	1538.8953	-0.0017066	81.6362	-50.6277	1299.5734
142.200	0.067050	-26645.4192	1448.4409	-0.0017073	79.5106	-49.8773	1338.9797
144.000	0.063977	-23989.9326	1359.3583	-0.0017079	77.5070	-49.1033	1381.5331
145.800	0.060902	-21493.4951	1271.6919	-0.0017085	75.6234	-48.3038	1427.6539
147.600	0.057826	-19153.5212	1185.4893	-0.0017090	73.8578	-47.4767	1477.8437
149.400	0.054750	-16967.3355	1100.8027	-0.0017094	72.2083	-46.6195	1532.7068
151.200	0.051672	-14932.1648	1017.6887	-0.0017098	70.6727	-45.7293	1592.9782
153.000	0.048594	-13045.1287	936.2098	-0.0017102	69.2488	-44.8029	1659.5624
154.800	0.045516	-11303.2291	856.4346	-0.0017105	67.9345	-43.8362	1733.5857
156.600	0.042436	-9703.3373	778.4398	-0.0017108	66.7274	-42.8248	1816.4711
158.400	0.039357	-8242.1792	702.3108	-0.0017110	65.6249	-41.7630	1910.0451
160.200	0.036277	-6916.3176	628.1444	-0.0017112	64.6245	-40.6441	2016.6957
162.000	0.033197	-5722.1298	556.0507	-0.0017113	63.7234	-39.4599	2139.6118
163.800	0.030116	-4655.7814	486.1568	-0.0017115	62.9189	-38.1999	2283.1606
165.600	0.027035	-3713.1918	418.6112	-0.0017116	62.2076	-36.8507	2453.5026
167.400	0.023954	-2889.9916	353.5904	-0.0017117	61.5865	-35.3947	2659.6488
169.200	0.020873	-2181.4646	291.3082	-0.0017117	61.0519	-33.8077	2915.3816
171.000	0.017792	-1582.4705	232.0309	-0.0017118	60.6000	-32.0559	3243.0168
172.800	0.014711	-1087.3345	176.1013	-0.0017118	60.2264	-30.0882	3681.5027
174.600	0.011630	-689.6822	123.9814	-0.0017118	59.9263	-27.8227	4306.2571
176.400	0.008548	-382.1742	76.3400	-0.0017118	59.6943	-25.1122	5287.7110
178.200	0.005467	-156.0290	34.2622	-0.0017118	59.5237	-21.6409	7124.9787
180.000	0.002386	0.0000	0.0000	-0.0017118	59.4059	-16.4282	6197.0555

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection              =     0.25000000 in
Computed slope at pile head       =  -7.408346E-07
Maximum bending moment            =      -2593778. lbs-in
Maximum shear force               =    32737.17822 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =             11
Number of zero deflection points  =              1
```

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 4

Pile-head boundary conditions are Displacement and Slope (Pile-head Condition Type 5)
Specified deflection at pile head = 0.500000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 42000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	0.500000	-5043281.	64851.4077	0.0000	3864.6987	0.0000	0.0000
1.800	0.499886	-4926579.	64812.1842	-0.0001254	3776.6439	-21.7908	78.4649
3.600	0.499549	-4809939.	64752.4611	-0.0002478	3688.6352	-44.5682	160.5904
5.400	0.498994	-4693433.	64651.7220	-0.0003673	3600.7286	-67.3641	243.0000
7.200	0.498226	-4577137.	64510.3816	-0.0004839	3512.9800	-89.6807	324.0000
9.000	0.497252	-4461122.	64328.9755	-0.0005976	3425.4440	-111.8816	405.0000
10.800	0.496075	-4345462.	64107.7358	-0.0007083	3338.1752	-133.9403	486.0000
12.600	0.494702	-4230228.	63846.9416	-0.0008162	3251.2275	-155.8310	567.0000
14.400	0.493137	-4115490.	63546.9174	-0.0009211	3164.6547	-177.5293	648.0000
16.200	0.491386	-4001319.	63208.0309	-0.0010232	3078.5101	-199.0112	729.0000
18.000	0.489453	-3887786.	62830.6922	-0.0011224	2992.8462	-220.2540	810.0000
19.800	0.487345	-3774959.	62415.3513	-0.0012188	2907.7151	-241.2358	891.0000
21.600	0.485066	-3662907.	61962.4971	-0.0013123	2823.1684	-261.9356	972.0000
23.400	0.482621	-3551696.	61472.6551	-0.0014030	2739.2568	-282.3332	1053.0000
25.200	0.480015	-3441393.	60946.3867	-0.0014910	2656.0304	-302.4095	1134.0000
27.000	0.477253	-3332063.	60384.2867	-0.0015761	2573.5382	-322.1461	1215.0000
28.800	0.474341	-3223771.	59786.9823	-0.0016586	2491.8288	-341.5255	1296.0000
30.600	0.471283	-3116579.	59155.1313	-0.0017383	2410.9497	-360.5312	1377.0000
32.400	0.468083	-3010550.	58489.4208	-0.0018154	2330.9476	-379.1473	1458.0000
34.200	0.464747	-2905743.	57790.5652	-0.0018898	2251.8680	-397.3589	1539.0000
36.000	0.461280	-2802218.	57059.3055	-0.0019615	2173.7556	-415.1519	1620.0000
37.800	0.457686	-2700033.	56296.4071	-0.0020307	2096.6541	-432.5130	1701.0000
39.600	0.453969	-2599244.	55502.6588	-0.0020974	2020.6061	-449.4296	1782.0000
41.400	0.450135	-2499906.	54678.8713	-0.0021615	1945.6531	-465.8899	1863.0000
43.200	0.446188	-2402073.	53825.8758	-0.0022231	1871.8354	-481.8829	1944.0000
45.000	0.442132	-2305797.	52944.5227	-0.0022823	1799.1924	-497.3983	2025.0000
46.800	0.437971	-2211128.	52035.6804	-0.0023392	1727.7619	-512.4265	2106.0000
48.600	0.433711	-2118115.	51100.2336	-0.0023936	1657.5811	-526.9587	2187.0000
50.400	0.429354	-2026805.	50139.0828	-0.0024457	1588.6854	-540.9866	2268.0000
52.200	0.424906	-1937244.	49153.1424	-0.0024956	1521.1094	-554.5027	2349.0000
54.000	0.420370	-1849476.	48143.3399	-0.0025432	1454.8861	-567.5001	2430.0000
55.800	0.415751	-1763544.	47110.6146	-0.0025886	1390.0476	-579.9724	2511.0000
57.600	0.411051	-1679487.	46055.9169	-0.0026319	1326.6244	-591.9140	2592.0000
59.400	0.406276	-1597345.	44980.2065	-0.0026731	1264.6458	-603.3197	2673.0000
61.200	0.401428	-1517154.	43884.4522	-0.0027123	1204.1398	-614.1850	2754.0000
63.000	0.396512	-1438950.	42769.6304	-0.0027495	1145.1331	-624.5059	2835.0000
64.800	0.391530	-1362768.	41636.7243	-0.0027847	1087.6510	-634.2787	2916.0000
66.600	0.386487	-1288637.	40486.7231	-0.0028180	1031.7177	-643.5004	2997.0000
68.400	0.381385	-1216589.	39320.6210	-0.0028495	977.3556	-652.1685	3078.0000
70.200	0.376228	-1146652.	38139.4167	-0.0028793	924.5860	-660.2808	3159.0000
72.000	0.371020	-1078852.	36944.1120	-0.0029073	873.4291	-667.8355	3240.0000
73.800	0.365762	-1013214.	35735.7118	-0.0029336	823.9032	-674.8314	3321.0000
75.600	0.360459	-949760.	34515.2230	-0.0029582	776.0256	-681.2673	3402.0000
77.400	0.355113	-888512.	33283.6538	-0.0029814	729.8121	-687.1428	3483.0000
79.200	0.349726	-829488.	32042.0136	-0.0030030	685.2771	-692.4575	3564.0000
81.000	0.344302	-772706.	30791.3117	-0.0030231	642.4338	-697.2113	3645.0000
82.800	0.338843	-718182.	29532.5574	-0.0030419	601.2938	-701.4045	3726.0000
84.600	0.333351	-665929.	28266.7594	-0.0030593	561.8676	-705.0377	3807.0000
86.400	0.327829	-615959.	26994.9251	-0.0030754	524.1639	-708.1115	3888.0000
88.200	0.322280	-568282.	25718.0606	-0.0030903	488.1904	-710.6269	3969.0000
90.000	0.316704	-522907.	24437.1701	-0.0031040	453.9534	-712.5848	4050.0000

91.800	0.311105	-479839.	23153.2556	-0.0031166	421.4577	-713.9867	4131.0000
93.600	0.305485	-439084.	21867.3171	-0.0031282	390.7067	-714.8339	4212.0000
95.400	0.299844	-400644.	20580.3517	-0.0031387	361.7027	-715.1277	4293.0000
97.200	0.294185	-364520.	19293.3539	-0.0031484	334.4463	-714.8698	4374.0000
99.000	0.288510	-330712.	18007.3154	-0.0031571	308.9370	-714.0618	4455.0000
100.800	0.282820	-299216.	16723.2250	-0.0031650	285.1729	-712.7053	4536.0000
102.600	0.277116	-270030.	15442.0684	-0.0031722	263.1507	-710.8019	4617.0000
104.400	0.271400	-243145.	14164.8287	-0.0031786	242.8657	-708.3533	4698.0000
106.200	0.265673	-218556.	12892.4859	-0.0031844	224.3121	-705.3610	4779.0000
108.000	0.259936	-196251.	11626.0171	-0.0031897	207.4826	-701.8265	4860.0000
109.800	0.254190	-176220.	10366.3970	-0.0031943	192.3685	-697.7514	4941.0000
111.600	0.248436	-158449.	9114.5976	-0.0031985	178.9600	-693.1368	5022.0000
113.400	0.242675	-142924.	7871.5888	-0.0032023	167.2457	-687.9841	5103.0000
115.200	0.236908	-129627.	6638.3382	-0.0032058	157.2130	-682.2943	5184.0000
117.000	0.231134	-118541.	5415.8120	-0.0032089	148.8482	-676.0682	5265.0000
118.800	0.225356	-109645.	4204.9747	-0.0032118	142.1360	-669.3066	5346.0000
120.600	0.219572	-102917.	3535.9396	-0.0032144	137.0599	-74.0658	607.1740
122.400	0.213784	-96429.5048	3403.2120	-0.0032169	132.1646	-73.4092	618.0852
124.200	0.207991	-90179.3542	3271.6776	-0.0032193	127.4487	-72.7402	629.5090
126.000	0.202194	-84164.7103	3141.3592	-0.0032215	122.9105	-72.0581	641.4843
127.800	0.196394	-78383.3745	3012.2808	-0.0032235	118.5483	-71.3624	654.0544
129.600	0.190590	-72833.1037	2884.4675	-0.0032254	114.3605	-70.6524	667.2672
131.400	0.184782	-67511.6081	2757.9457	-0.0032272	110.3453	-69.9274	681.1762
133.200	0.178972	-62416.5490	2632.7430	-0.0032288	106.5009	-69.1867	695.8414
135.000	0.173159	-57545.5360	2508.8885	-0.0032303	102.8256	-68.4294	711.3301
136.800	0.167343	-52896.1249	2386.4129	-0.0032317	99.3175	-67.6546	727.7180
138.600	0.161524	-48465.8142	2265.3486	-0.0032330	95.9747	-66.8613	745.0910
140.400	0.155704	-44252.0420	2145.7298	-0.0032342	92.7953	-66.0485	763.5466
142.200	0.149881	-40252.1827	2027.5929	-0.0032352	89.7773	-65.2148	783.1961
144.000	0.144057	-36463.5426	1910.9766	-0.0032362	86.9187	-64.3589	804.1675
145.800	0.138231	-32883.3562	1795.9220	-0.0032371	84.2173	-63.4795	826.6081
147.600	0.132404	-29508.7807	1682.4733	-0.0032378	81.6711	-62.5747	850.6890
149.400	0.126575	-26336.8911	1570.6776	-0.0032385	79.2778	-61.6427	876.6103
151.200	0.120745	-23364.6738	1460.5858	-0.0032392	77.0352	-60.6815	904.6068
153.000	0.114914	-20589.0203	1352.2526	-0.0032397	74.9409	-59.6887	934.9570
154.800	0.109082	-18006.7190	1245.7374	-0.0032402	72.9925	-58.6615	967.9935
156.600	0.103249	-15614.4467	1141.1049	-0.0032406	71.1875	-57.5969	1004.1172
158.400	0.097416	-13408.7584	1038.4256	-0.0032410	69.5232	-56.4912	1043.8164
160.200	0.091582	-11386.0762	937.7772	-0.0032413	67.9970	-55.3404	1087.6921
162.000	0.085747	-9542.6752	839.2454	-0.0032416	66.6061	-54.1395	1136.4940
163.800	0.079912	-7874.6678	742.9255	-0.0032418	65.3476	-52.8827	1191.1700
165.600	0.074077	-6377.9853	648.9243	-0.0032420	64.2183	-51.5630	1252.9387
167.400	0.068241	-5048.3549	557.3627	-0.0032421	63.2151	-50.1721	1323.3959
169.200	0.062405	-3881.2725	468.3784	-0.0032422	62.3345	-48.6994	1404.6766
171.000	0.056569	-2871.9687	382.1304	-0.0032423	61.5729	-47.1317	1499.7112
172.800	0.050733	-2015.3663	298.8049	-0.0032424	60.9266	-45.4521	1612.6445
174.600	0.044896	-1306.0249	218.6235	-0.0032424	60.3914	-43.6383	1749.5588
176.400	0.039060	-738.0691	141.8554	-0.0032424	59.9628	-41.6596	1919.7958
178.200	0.033224	-305.0891	68.8363	-0.0032424	59.6361	-39.4727	2138.5618
180.000	0.027387	0.0000	0.0000	-0.0032425	59.4059	-37.0121	1216.2939

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection              =     0.50000000 in
Computed slope at pile head       =    -0.00000147
Maximum bending moment            =      -5043281. lbs-in
Maximum shear force               =    64851.40769 lbs
Depth of maximum bending moment   =        0.00000 in
Depth of maximum shear force      =        0.00000 in
Number of iterations              =              9
Number of zero deflection points  =              0
```

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

```
Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad
```

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 0.250000	M= 0.000	42000.0000	0.2500000	267792.	6984.3331
4	y= 0.500000	M= 0.000	42000.0000	0.5000000	451668.	12456.0403
5	y= 0.250000	S= 0.000	42000.0000	0.2500000	-2593778.	32737.1782
5	y= 0.500000	S= 0.000	42000.0000	0.5000000	-5043281.	64851.4077

The analysis ended normally.