KLEINFELDER
An employee owned company

September 26, 2007
Project No. 75010

STV Incorporated
100 Pacifica, Suite 140
Irvine, CA 92618

Attention: Mr. Tim J. McGrady, P.E.
Project Manager

Subject: Final Foundation Report
Proposed Reyes Adobe Road Bridge Widening
Over U.S. Highway 101
Bridge No. 53-1726
Agoura Hills, California

Dear Mr. McGrady:

Kleinfelder West, Inc. (Kleinfelder) is pleased to submit this Final Foundation Report for the proposed Reyes Adobe Road Bridge Widening over U.S. Highway 101, Bridge Number 53-1726, Agoura Hills, California. Our services have been performed in accordance with our agreed-upon scope of work. The authorized scope of work included field exploration, laboratory testing, geotechnical engineering analyses, and report preparation. This report provides geotechnical evaluation and recommendations for the proposed bridge. A limited Aerially Deposited Lead (ADL) study is also included in our scope and a stand-alone technical memo for this study is provided in Appendix D of this report. Review comments by Caltrans dated July 3, 2007 have been incorporated into this Final Foundation Report.

We appreciate the opportunity to provide geotechnical and environmental services to you on this project and trust the information in this report meets the current project needs. If there are any questions, please contact the undersigned.

Respectfully submitted,

KLEINFELDER

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1.0 INTRODUCTION

1.1 General

The City of Agoura Hills, proposes to widen the existing two-lane Reyes Adobe Road Bridge over the U.S. Highway 101 (Bridge No. 53-1726) located in the City of Agoura Hills, California. The location of the site is shown in Figure 1, Site Location Map and the proposed layout is shown in Figure 2, General Plan. The proposed widening will be designed generally in accordance with current Caltrans standards.

Our services have been performed in accordance with our agreed-upon scope of work. The authorized scope of work included field exploration, laboratory testing, geotechnical engineering analyses, and report preparation. This report provides geotechnical evaluation and recommendations for the proposed bridge structure. A limited Aerially Deposited Lead (ADL) study is also included in our scope and a stand-alone technical memo for this study is provided in Appendix D of this report.

Caltrans review comments dated July 3, 2007 on the Draft Foundation Report have been incorporated in this Final Foundation Report. Our Response Letter to Caltrans Comments is included in Appendix E.

1.2 Project Description

The existing Reyes Adobe Road Bridge over the U.S Highway 101 (Bridge No. 53-1726) was constructed in 1950 between Canwood Drive and Agoura Road in Agoura Hills, California. The existing Reyes Adobe Road Overcrossing (OC) supports one northbound lane and one southbound lane across US 101 Freeway. Currently, the Reyes Adobe Road OC is a four-span, with precast prestressed girders in spans 2 and 3, and cast-in-place / precast girders in spans 1 and 4. The length and width are 221 feet and 37.8 feet, respectively. The proposed widening will be on the west side and will consist of four-span, precast prestressed girder with intermediate and end diaphragms. The width for the widening portion will be 58.8 feet.

Based on the general plan and topographic information, the approach embankments beneath the widening near abutments 1 and 5 will require up to approximately 12 feet of fill from the existing grade, with embankment slope gradients that will match the existing gradients of approximately 1.5H:1V slope in the longitudinal direction (beneath the structure). Earthwork at the bent locations is anticipated to be nominal and limited to excavation and backfill associated with pile cap construction.

1.3 Purpose and Scope of Work

The purpose of our investigation was to evaluate subsurface conditions and engineering properties of the subsurface soils encountered, and provide geotechnical recommendations to aid in the design and preparation of the proposed bridge widening plans and specifications. The scope of work included the following tasks:

- Review of existing geotechnical and geologic data within and adjacent to the project site.
- Drilling, sampling and logging of three (3) hollow stem auger borings. Two of the borings (B-1 and B-2) were drilled at the location of the proposed bridge widening and one boring (B-3) was drilled at the locations of the Northbound on-ramp and planned fill for the widening.
- Laboratory testing of selected samples to characterize the subsurface conditions.
- Geotechnical engineering analyses.
- Preparation of this foundation report.

A limited Aerially Deposited Lead (ADL) study is also included in our scope and a stand-alone technical memo for this study is provided in Appendix D of this report.

1.4 Limitations

This report has been prepared for STV and The City of Agoura Hills. It is intended solely for their use in the design and construction of the project as described herein. It may not contain sufficient information for other uses or purposes of other parties.

The findings, conclusions and recommendations presented in this report were prepared in accordance with generally accepted geotechnical engineering practice. No other warranty, direct or implied, is made. Field exploration program was based on the project plans

provided to us by STV at the time of our investigation.

The scope of our geotechnical services did not include any environmental site assessment for the presence or absence of hazardous/toxic materials in the soil, surface water, ground water or atmosphere, or the presence of wetlands. A limited ADL study was conducted and the results are provided in Appendix D.

Our evaluation of subsurface conditions at the site has considered subgrade soil and groundwater conditions present at the time of our investigation. The influence(s) of post-construction changes to these conditions such as introduction of water into the subsurface will likely influence future performance of the proposed project.

The client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. This report contains information, which may be useful in the preparation of contract specifications. However, the report is not designed as a specification document and may not contain sufficient information for this use without proper modification.

This report may be used only by the client and only for the purposes stated within a reasonable time from its issuance, but in no event later than three years from the date of the report. Land or facility use, on and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify, and hold Kleinfelder harmless from any claim or liability associated with such unauthorized use or non-compliance.

2.0 SITE DESCRIPTION

Existing Reyes Adobe Road within the project limits is a north-south four lane arterial street that narrows to two lanes at the bridge structure. Existing topographic relief generally descends from North to South. The existing grade elevations at Abutment 1 and Abutment 5 are 940 feet and 930 feet respectively. Bents 2, 3 and 4 are within the depressed portion of U.S. Highway 101 and the ground surface elevations at these locations are approximately 918 feet, 916 feet, and 916 feet (above mean sea level), respectively. The existing embankment fill slopes beneath the existing bridge are moderately steep with average inclinations of approximately 1.5H:1V. The existing slopes have a flatter gradient further away from the existing bridge.

3.0 PREVIOUS STUDIES

The following previous data were reviewed:

- Preliminary Foundation Report, Proposed West Side Widening, Reyes Adobe Overcrossing (Bridge No. 53-1726), Agoura Hills, California, by Kleinfelder, Inc., Kleinfelder Project No. 75010, dated August 8, 2006.
- Preliminary Foundation Report (PRF), Reyes Adobe Overcrossing at US 101, Bridge No. 53-1726, Agoura Hills, California, by Group Delta Consultants (GDC), GDC Project No. I-430, dated April 2, 2004.
- As-built drawings (Including Log of Test Borings), by Caltrans, Approved April 13, 1964.

Other available maps and reports reviewed include United States Geological Survey (USGS) Quad maps and geologic data from in-house files.

4.0 GEOTECHNICAL INVESTIGATION PROGRAM

The geotechnical investigation program consisted of field exploration and laboratory testing as discussed below.

4.1 Field Exploration

The subsurface conditions at the location of the proposed widening were investigated by Kleinfelder on January 3, 2007 by drilling three hollow stem auger borings (B-1, B-2, and B-3). Borings B-1 and B-2 were drilled near the locations of Bents 2 and 4, respectively. One boring (B-3) was also drilled on the northbound ramp paving area. Borings B-1 through B-3 were drilled using a 8-inch diameter hollow- stem auger drilling system by Jet Drilling to depths ranging from approximately 31 to 46.5 feet. The boring logs are presented in Appendix A. The approximate boring locations are shown in Figure 3, Plot Plan. Borings B-1 and B-2 which were used for bridge foundation design are included on the logs of test borings (LOTB) plan, Figure 4.

In the borings, soil samples were taken at approximately 5-foot intervals, to the maximum depth explored, with either a Standard Penetration Test (SPT) sampler or a California Modified split spoon sampler. All samples were stored and transported to our laboratory for testing. The soils from the test borings were visually classified in the field by a Kleinfelder staff engineer in general accordance with the Unified Soil Classification System per ASTM D-2488. Field classifications and boring logs were revised as necessary based on laboratory test results and the review of a registered Geotechnical Engineer. At the conclusion of drilling, the borings were abandoned by backfilling with cement-bentonite grout.

Three shallow hand auger borings (Borings HB-1 through HB-3) were also excavated to obtain samples for analytical testing which is included in Appendix D of this report.

4.2 Laboratory Testing

Laboratory tests were performed on selected samples to characterize the soils and to develop index and engineering properties of the soils. The tests performed are indicated on

the Logs of Borings, which are presented in Appendix A. A detailed description of the laboratory testing program and test results are presented in Appendix B. Laboratory tests performed consisted of:

- In situ moisture content and dry density, ASTM D-2937
- Atterberg limits (liquid limit and plastic limit), ASTM D-4318
- Grain size distribution test, ASTM D-422-63/CT-202/203
- Wash analysis (fines content or % passing #200 sieve), ASTM D-1140
- Direct shear test, ASTM D-3080
- Consolidation test, ASTM D-2435/CT-219
- Corrosivity tests (pH, sulfates, chlorides and electrical resistivity), CT-532/643/417/422

5.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Geologic Conditions

The project site is located in the city of Agoura Hills in the western portion of Los Angeles County, and within the southwestern portion of the Transverse Ranges Geomorphic province of California. The Transverse Ranges consist of generally east-west trending mountains and valleys, which contrast with the overall north-northwest structural trend elsewhere in the state. The anomalous structure of the Transverse Ranges is attributed to the effects of compressive deformation (crustal shortening), generated by north-south convergence along the big bend of the San Andreas fault (Yerkes, 1987) north of the San Gabriel Mountains and the motion of the Pacific Plate. The valleys and mountains of the Transverse Ranges are typically bounded by a series of east-west trending, generally north dipping reverse faults with left-lateral, oblique movement.

The Reyes Adobe Road OC over US Highway 101 is located in a pass within Lindero Canyon. The site is located in the Santa Monica Mountains of the Transverse Range Geomorphic Province of California. At the interchange of the Reyes Adobe Road with US 101 Freeway, the surficial materials consist of younger alluvium (silts and clays). An outcrop of basalt that correlates to the Conejo Volcanics of the Santa Monica Mountains is observed on the southern side of the Reyes Adobe Road OC. Outcrops of shaley claystones and siltstones, of the Topanga Formation, are exposed on the north side of the bridge. At depth, basalt and/or sedimentary units of the Conejo Volcanics or the Topanga Formation may be encountered.

5.2 Subsurface Conditions

The subsurface conditions were evaluated based on the field investigation and laboratory testing data obtained for this project and review of the as-built LOTBs for the existing bridge. Generally, the subsurface materials encountered consisted of compacted fill underlain by alluvium and bedrock. Bedrock was encountered at depths of approximately 19 feet and 22 feet in Borings B-1 and B-2 (drilled Near Bents 2 and 4) corresponding to elevations 897 feet and 894 feet, respectively. The top of bedrock appears to descend from Abutment 1 location towards the Abutment 5 location. Past grading at this location appeared to involve excavations, fills and cut slopes to achieve existing grades.

5.2.1 Earth Materials

The earth materials encountered in the current borings are comparable to the materials reported on the as-built LOTBs for the existing bridge. The materials encountered are summarized below.

The materials encountered across the site generally consist of previously placed compacted fill material (Qf), underlain by alluvium, and by bedrock. The compacted fill consists generally of silty sand and silty clay. The Alluvium (Qa) generally consists of stiff to very stiff sandy clay and dense silty sand with some gravel. The bedrock consists of claystone and siltstone of the Upper Topanga Formation Bedrock. The bedrock is thinly bedded. The alluvium/bedrock contact appears to deepen abruptly between Abutment 1 and Bent 2. Near and between Bents 2 through 4 and Abutment 5, alluvium/bedrock contact deepens gently.

At Abutment 1, the bedrock contact is anticipated to be at approximate elevation 910 feet (approximately 26 feet below ground surface). At Bents 2 through 4 and at Abutment 5, the bedrock contact appears to deepen gently from approximate elevation 897 at Bent 2 to approximate elevation 894 near Abutment 5. The bedrock is anticipated to be approximately 26 feet below ground surface at Bents 2 through 4 and approximately 35 feet below ground surface at Abutment 5. A generalized cross section is presented in Figure 5.

5.2.2 Groundwater Conditions

Groundwater was encountered in Boring B-2 at a depth of approximately 19 feet below grade (or approximate elevation 897 feet). Groundwater was not encountered within borings B-1 and B-3 to a maximum depth of approximately 36.5 and 46.5 below the ground surface, respectively. The groundwater was encountered approximately 3 feet above bedrock within the silty sand alluvium material. The as-built LOTBs with borings from June 1962 reported groundwater approximately at elevations 891 feet to 894 feet. For our design, we used a groundwater level at an elevation of 897 feet at each support location.

Groundwater may fluctuate due to seasonal variation, nearby construction, irrigation, and numerous other man-made and natural influences.

5.3 Subsurface Profile and Engineering Parameters

Design parameters summarized in Tables 1 and 2 for new embankment fill, existing compacted fill, alluvium, weathered and competent formational materials were developed based on the results of our field investigations, laboratory testing, previous investigations, and our experience with similar materials.

The new compacted fill and existing compacted fill strength parameters were selected based on review of the test results for materials encountered as well as similar materials in the general vicinity of the site. Sufficient tests should be performed for the proposed fill materials to achieve the minimum shear strength parameters for abutment slope stability. Our recommendations for the fill materials provided in Section 7.5.1 Approach Fill Requirements of this report shall be followed.

The foundation design soil profiles used at each support location are illustrated in Figure 5. Strength parameters assigned for alluvium and bedrock are based on direct shear testing results as shown in Appendix B. The laboratory direct shear testing results for similar soils were combined and the upper and lower bound values were reviewed. The recommended values for design tend to be conservative in our opinion.

Table 1 Summary of Design Parameters for Slope Stability Analysis

Layer No.	Material Type	Angle of Internal Friction (deg)		Cohesion (psf)	
		Static	Pseudo-static	Static	Pseudo-static
1	New Fill	30	30	200	200
2	Old Fill	30	30	200	200
3	Alluvium (Silty and Sandy Clays)	24	24	600	900
4	Alluvium (Silty Sand with gravel)	35	35	100	100
5	Bedrock (Highly Weathered)	21	25	450	800
6	Bedrock	32	32	500	500

Note: see soil profile in Figure 5.

Table 2 Summary of Design Parameters for Foundation Design

Layer No.	Material Type	Angle of Internal Friction (deg)	Cohesion (psf)
1	New Fill	30	-
2	Old Fill	30	-
3	Alluvium (Silty and Sandy Clays)	-	900
4	Alluvium (Silty Sand with gravel)	30	-
5	Bedrock (Highly Weathered)	25	800
6	Bedrock	32	500

Note: see soil profile in Figure 5.

6.0 SEISMIC DESIGN CONSIDERATION

6.1 Ground Surface Rupture

The project site is not located within one of the Fault-Rupture Hazard Zones in California designated by the California Geological Survey. No faults are mapped as crossing the site or projecting towards the site in the geologic literature reviewed. Therefore, the potential for ground surface fault rupture at the site is considered low.

6.2 Seismic Shaking and Design ARS Curves

Based on the Caltrans latest Seismic Hazard Map (1996), the controlling fault for the Reyes Adobe Road OC is the Malibu Coast-Santa Monica-Hollywood-Raymond (MMR) fault, with a closest distance of approximately 11 km. The MMR is a reverse/oblique (RO) fault and could generate a moment magnitude of 7.5 for the maximum credible earthquake (MCE). The Chatworth/S (CWS) and Chatworth/N (CWN) Faults, with a MCE magnitude of 6.25 and 6.5, are located with a closest distance of about 8 and 10 km, respectively; their type of faulting is unknown as defined in the technical report to accompany the Caltrans 1996 Seismic Hazard Map. According to the latest Caltrans Seismic Hazard Map (1996), the peak bedrock acceleration (PBA) at the site is within the contour zone of 0.4g and 0.5g. According to Caltrans Practice, a PBA value of 0.5g should be used. Based on the Caltrans Guidelines for Structures Foundations (2006), the PBA value ascertained from the Seismic Hazard Map shall be verified with Sadigh et al. (1997) attenuation relationship. Calculations using the Sadigh et al. (1997) attenuation relationship for the controlling fault MMR indicated a PBA of 0.49g.

The recommended seismic design parameters are provided in Table 3 below:

Table 3 Summary of Seismic Design Parameters

Seismic Parameters	Design Recommendation and Reference
Controlling Fault	MMR (Mualchin, 1996a)
Type of Fault	Reverse/Oblique(Mualchin, 1996b)
Site Distance from the Fault	11 km (Mualchin, 1996a)
Earthquake Magnitude (MCE)	7.5 (Mualchin, 1996a,b)
Peak Acceleration	0.5g
Soil Profile Type	S_D (Table B.1, 2004 Caltrans Seismic Design Criteria)
Standard ARS Curve (Modified)	Figure B.8 (2004 Caltrans SDC) modified for directivity

The standard ARS Curve presented in Figure B.8 of Caltrans Seismic Design Criteria (SDC) for 0.5g was modified to account for near source fault rupture directivity effect as follows:

- 20% increase in spectral values for periods equal to or greater than 1.0 second;
- No change for periods less than 0.5 seconds; and
- Spectral ordinates for periods between 0.5 and 1 second shall be determined by linear interpolation

The standard ARS curve, modified standard ARS curve and their ordinate values are presented in Figure 6.

6.3 Liquefaction Potential

When a loose, saturated granular deposit is subjected to seismic loading without substantial dissipation of excess pore water pressure, the deposit may liquefy and lose its shear strength.

Based upon groundwater condition encountered and the presence of stiff to very stiff, and dense very dense alluvial soils, and formational subsurface materials, the potential for

liquefaction at the site is considered low. Liquefaction induced ground settlements are expected to be negligible.

6.4 Seismic Compaction

Seismic compaction is a phenomenon in which loose, dry or partly saturated sands tend to settle or densify during strong earthquake shaking. A procedure for estimating the probable settlement of dry sands during earthquakes was developed by Tokimatsu and Seed (1987). Based on these procedures, site-specific data, we estimate that the seismic compaction during the design earthquake will be negligible.

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 Scour

Scour is not applicable at this site because the bridge does not traverse a water crossing.

7.2 Corrosion

Caltrans Corrosion Guidelines Section 5.5 states that the Department considers a site to be corrosive to foundation elements, at bridge structures, if one or more of the following conditions exist for the soil and/or water samples taken at the site (Caltrans, 2003):

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- pH is 5.5 or less

A representative sample of the site soils was tested for pH, sulfate content, chloride content, and minimum resistivity. The results of these tests are presented in Table 4.

Based on the results of the corrosion analyses, the tested material is considered non-corrosive based on the above criteria. However, due to low resistivity, on-site soil may have corrosion potential for buried metal. This should be considered in the design of buried metal structures.

Table 4 Summary of Corrosion Laboratory Tests

Boring	Sample Depth (ft, bgs)	USCS Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B-3	2.5-5	Silty Clay (CL)	1100	7.8	14	63
Notes: ohm-cm = ohm-centimeter; ppm = parts per million; USCS = Unified Soil Classification System						

7.3 Slope Stability

Based on the general plan and topographic information, the approach embankments beneath the widening between Abutment 1 and Bent 2 and between Bent 4 and Abutment 5 will require up to approximately 12 feet of fill from the existing grade. The embankment slope gradients are planned to match the existing gradients of approximately 1.5H:1V slope in the longitudinal direction (beneath the structure). Our recommendations for the new embankment fill are provided in Section 7.5.1 Approach Fill Requirements of this report.

Overall (global) slope stability of the two slopes discussed was analyzed using the strength parameters as summarized in Table 1. Both Modified Bishop's Method for circular slip surfaces and the Modified Janbu Method for slip surfaces of noncircular shape were applied using the computer program SLIDE V5.0 (Rocscience, 2005). The design criteria utilized are as follows: permanent abutment slopes are required to have a minimum factor of safety of 1.5 for the static condition; and a minimum factor of safety of 1.1 for the pseudostatic condition using the Caltrans recommended horizontal earthquake loading coefficient equal to 1/3 of the horizontal peak acceleration. A horizontal earthquake loading coefficient of 0.17 g was used.

Results of the slope stability analyses of the proposed bridge abutment slopes indicate that the required minimum static and pseudostatic factors of safety are satisfied provided the abutment slopes are paved. A summary of the slope stability analysis results are presented in Table 5 below. The slope stability analysis results are included in Appendix C.

Table 5 Summary of Slope Stability Analysis

Slope Location	Factor of Safety			
	Circular (Bishop Simplified)		Non-Circular (Janbu Corrected)	
	Static	Pseudo-Static	Static	Pseudo-Static
Slope Between Abutment 1 and Bent 2	1.60	1.24	1.58	1.22
Slope Between Bent 4 and Abutment 5	1.72	1.35	2.85	1.41

Although the approach abutment slopes are expected to be grossly stable, erosion and surficial instability may be a concern during periods of heavy or intense rainfall. Any existing erosion should be properly repaired. Any deep erosion gullies will require removal by adequate benching into the slope and replacing the eroded material with compacted fill. Slope paving is required for the 1.5H:1V or steeper abutment slopes.

Erosion control and highway planting should be performed in accordance with Section 20 of Caltrans Standard Specifications. Excessive irrigation of slopes should be avoided. Appropriate drainage devices should be placed at the top of all slopes such that water does not flow over slope faces in an uncontrolled manner.

7.4 Bridge Foundation Recommendations

7.4.1 Foundation Type

Foundation types that are similar to those supporting the existing overcrossing were considered for support of the proposed widening. Based on the as-built plans, Abutments 1 and 5 are each supported on 5 vertical Class I (now Class 90) driven concrete piles with a design loading of 90 kips. Bents 2 through 4 are each supported on 16 vertical Class II (now Class 90) concrete piles with a design loading of 90 kips.

Factors considered included compatibility, constructability, subsurface materials, differential settlement between supports, structure demands, soil capacity and corrosion and economy.

Based on our analyses, we recommend using Caltrans Standard 15-inch driven concrete piles to support the proposed structure at all supports.

7.4.2 Axial Pile Capacity

The axial capacity of the proposed piles was estimated using the computer program APILE Version 4.0 (Ensoft, 2004). Axial capacity for the 15-inch concrete piles includes skin friction and tip resistance. Skin friction in the new fill is ignored. To calculate the allowable geotechnical capacity in compression, a factor of safety of 2.0 was applied. The axial pile capacity calculations are provided in Appendix C. The recommended tip elevations are summarized in Table 6.

Table 6 Pile Data Table

Location	Pile Type	Bottom of Pile Cap Ele. (ft, MSL)	Design Loading (service) (kips)	Nominal Resistance (kips)		Design Tip Ele. (ft, MSL)[1]	Specified Tip Elevation (ft, MSL)
				Compression	Tension		
Abut 1	15" Concrete Driven	929.64	90	180	-	904.0(1) 912.6(3)	904.0
Bent 2	15" Concrete Driven	907.75	90	180	-	879.0(1) 892.2(3)	879.0
Bent 3	15" Concrete Driven	907.75	90	180	-	879.0(1) 892.2(3)	879.0
Bent 4	15" Concrete Driven	907.75	90	180	-	879.0(1) 892.1(3)	879.0
Abut 5	15" Concrete Driven	924.82	90	180	-	889.0(1) 908.8(3)	889.0

Notes:

[1] Design tip elevation is controlled by the following demands: (1) Compression, (2) Tension, and (3) Lateral.

[2].The proposed piles should be spaced at a minimum of 3 pile diameters (center-to-center).

Pile settlements were evaluated using the load transfer method implemented in the APILE program. The estimated settlement of proposed 15-inch piles under the nominal compression loads is less than ½ inch. The calculations are included in Appendix C.

7.4.3 Lateral Pile Capacity

Lateral loads may be resisted by the piles and the passive resistance of the soils. The capacities presented below are based on the strength of the soils. The pile sections should be checked to verify the structural capacity of the piles. For service condition, we assumed a ¼-inch deflection at pile head with gross moment of inertia (I_g). For seismic condition, we

used cracked moment of inertia (I_c) (assumed I_c=0.5 x I_g) and assumed 1-inch deflection at pile head. The lateral pile capacity was evaluated using the computer program LPILE Plus Version 5.0 for Windows (Ensoft, 1985-2006). The lateral pile capacity calculations are included in Appendix C. The results are summarized in Tables 7A (pinned-head condition) and 7B (fixed-head condition). Note that for the fixed-head condition, the transfer moment capacity of the pile head will control the maximum lateral capacity.

The lateral pile capacities shown in Tables 7A and 7B are for single piles. Piles in groups may be considered to act individually when the center-to-center spacing is greater than 3 pile diameters in the direction normal to loading and 8 pile diameters in the direction parallel to loading. Based on pile layout (see Figure 7), the abutment piles may be considered to act individually. To account for bent piles group action in the direction parallel to loading, the lateral capacities listed in Tables 7A and 7B should be multiplied by an appropriate lateral group reduction factor as follows:

- For spacing of 8 pile diameters or greater, no reduction in lateral capacity is necessary.
- For spacing of 5 pile diameters, a lateral group reduction factor of 0.9 should be applied.
- For spacing of 3 pile diameters, a lateral group reduction factor of 0.7 should be applied.
- For spacing in between those provided below, a linear interpolation may be utilized to calculate the reduction factor.

Table 7A Summary of Lateral Pile Capacity Analysis (Pinned Head Condition)

Location	Pile Type	Bottom of Pile Cap Ele. (ft, MSL)	Pile Deflection (in)	Maximum Lateral Shear Force (kips)	Maximum Moment (kips-ft)	Depth to Max. Moment from Pile Cap (ft)
Abut 1	15" Concrete Driven	929.64	0.25	19	41	4.4
			1.0	42	96	4.2
Bent 2	15" Concrete Driven	907.75	0.25	17	41	4.7
			1.0	26	70	5.2
Bent 3	15" Concrete Driven	907.75	0.25	17	41	4.7
			1.0	26	70	5.2
Bent 4	15" Concrete Driven	907.75	0.25	23	42	4.1
			1.0	66	113	3.4
Abut 5	15" Concrete Driven	924.82	0.25	16	38	4.5
			1.0	36	88	4.4

Table 7B Summary of Lateral Pile Capacity Analysis (Fixed Head Condition)

Location	Pile Type	Bottom of Pile Cap Ele. (ft, MSL)	Pile Deflection (in)	Maximum Lateral Shear Force (kips)	Maximum Moment (kips-ft)	Depth to Max. Moment from Pile Cap (ft)
Abut 1	15" Concrete Driven	929.64	0.25	42	123	0
			1.0	89	268	0
Bent 2	15" Concrete Driven	907.75	0.25	32	104	0
			1.0	49	176	0
Bent 3	15" Concrete Driven	907.75	0.25	32	104	0
			1.0	49	176	0
Bent 4	15" Concrete Driven	907.75	0.25	48	130	0
			1.0	137	337	0
Abut 5	15" Concrete Driven	924.82	0.25	36	113	0
			1.0	78	250	0

7.5 Bridge Approach Embankments

Based on the general plan and topographic information, the approach embankments beneath the widening between Abutment 1 and Bent 2 and between Bent 4 and Abutment 5 will require up to approximately 12 feet of fill from the existing grade. The embankment slope gradients are planned to match the existing gradients of approximately 1.5H:1V slope in the longitudinal direction (beneath the structure).

7.5.1 Approach Fill Requirements

Areas to receive fill should be cleared of all existing vegetation, debris, and other deleterious materials in accordance with Section 16 of Caltrans Standard Specifications.

Fills placed within bridge approach zone should be compacted to 95 percent relative compaction per latest ASTM D-1557. The limits of bridge approach zone are considered to extend longitudinally 150 feet measured horizontally from the bridge abutment and either parallel or concentric with the roadway centerline, and transversely the full width of embankment except the outer 5 feet measured horizontally from the embankment side slopes.

Earthwork should be performed in accordance with Section 19 of Caltrans Standard Specifications. Abutment backfill will be structural backfill according to Caltrans standard specifications. Expansive soils, defined as soils with Expansion Index (EI) greater than 50 and/or soils with Sand Equivalent (SE) less than 20, should be excluded from the bridge abutments as required by Caltrans guidelines and shown in Figure 8.

7.5.2 Settlement and Waiting Period

Fill-induced settlement is expected and a waiting period is required. The settlement magnitude and the required waiting period are dependent on the new fill type and amount of new fill material placed. Caltrans requires that the remaining total settlement of the bridge approach embankments should not exceed 0.5 inches.

Piles should not be constructed prior to completion of embankment settlement. We estimated that total settlement up to 2 inches may occur within approximately 3 months at the maximum new fill area. Due to presence of existing pile foundation at the site, we

recommend a settlement monitoring program should be performed. Protection or retrofit measures should be taken if excessive settlement occurs at the existing pile foundation locations. Actual settlement and waiting period of embankment fill will be based on monitoring as discussed in Section 8.3 of this report.

7.6 Lateral Earth Pressures

For walls backfilled with structure backfill in accordance with Caltrans Standard Specifications, the following lateral earth pressures may be used for design:

Slope Above the Wall	Active Equivalent Fluid Pressure (pcf)	At-Rest Equivalent Fluid Pressure (pcf)
Level	36	55
2H:1V	50	70

For 2H:1V sloping backfill, the resultant of the fluid pressure may be inclined at 26 degrees to the horizontal. Active pressures may be used for walls able to displace at the top 0.2 percent of the wall height, or ¼ inch for each 10-feet of wall height. Walls unable to displace this amount must be designed for at-rest pressures.

The above values assume that backfill materials are free-draining and, therefore, do not include hydrostatic pressures. Surcharge loading on walls with level backfill may be taken as a uniform lateral pressure equal to 30 percent of the vertical surcharge. For normal roadway traffic, the vertical surcharge can be taken as equivalent to 2-feet of soil, or 240 psf.

Walls designed for static pressures only have generally performed well in past earthquakes. If desired by the designers, the wall design may also consider dynamic earth pressures. If seismic pressures are desired for design, we recommend that the additional lateral pressure during seismic shaking be taken as an equivalent fluid pressure of 20 pcf. If used, the resultant of this force should be applied at 60% of the wall height, and added to the static earth pressures.

According to Caltrans SDC (Caltrans, 2006), when abutments tend to push into the backfill under seismic loading conditions, the abutment structural backfill will provide an ultimate passive resistance of 5.0 ksf multiplied by a height proportionality factor of H/5.5, where H

is the abutment wall height in feet. The structure designer should follow Caltrans SDC Section 7.8 for seismic response of abutments.

7.7 Wingwalls

No wingwalls are planned at this time.

7.8 Wall Drainage

Our recommendations for the lateral earth pressures assumes that walls have adequate drainage provisions to prevent the buildup of hydrostatic pressures in the soil backfill. The drainage system may be designed in accordance with Caltrans Standard Plan BO-3, Detail 3-1. Pervious backfill material shall consist of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations thereof. Pervious backfill (other than sacked material at wall drain outlets) shall conform to the grading requirements in Section 19-3.065 of the Caltrans Standard Specifications. Sacked pervious backfill at wall drain outlets shall conform to the grading for 1½" x ¾" primary aggregate size specified in Section 90-3.02 of Caltrans Standard Specifications. As an alternate, geocomposite drain in Bridge Design Details, page 6-22, may be used in lieu of the pervious backfill.

8.0 CONSTRUCTION CONSIDERATIONS

Based on the subsurface soil investigation and laboratory test results, the subsurface conditions are expected to satisfactorily support the proposed structure, provided the geotechnical recommendations presented in this report are implemented.

8.1 Site Preparation

Site preparation should be performed in accordance with Section 16 and 19 of Caltrans Standard Specifications.

8.2 Earthwork and Backfill

After clearing and stripping, the surface should be excavated to a minimum depth of 2 feet before placement of new fill. Compressible soils shall be removed and replaced with compacted structural backfill in accordance with Caltrans Standard Specifications Section 19-3.06. The exposed surface should be proof-rolled with loaded heavy equipment. Any areas of loose or yielding soils should be overexcavated and recompacted. Any soils that cannot be compacted, or are otherwise unsuitable for the planned use, should be excavated and disposed of from the project site. The exposed surface should then be scarified and compacted to the specified density before placement of new fill. New fill placed on or adjacent to the existing slopes should be properly benched into the existing fill in accordance with Caltrans Standard Specifications Section 19-6.01.

All earthwork should be performed in accordance with Caltrans Standard Specification Section 19 (2006). All materials to be placed as fill should be free of vegetation, organics, debris, and other deleterious materials. All fill placed around foundations and behind walls should be placed in thin loose lifts, moisture-conditioned, and compacted to Caltrans Standard Specification.

Abutment backfill shall be structural backfill according to Caltrans standard specifications. Expansive soils, defined as soils with Expansion Index (EI) greater than 50 and/or soils with Sand Equivalent (SE) less than 20, should be excluded from the bridge abutments as required by Caltrans guidelines and shown in Figure 8. Expansion Index should be determined in accordance with ASTM D4829. Sand Equivalent should be determined in

accordance with California Test Method 217. Fills placed within 150 feet of abutments should be compacted to 95 percent relative compaction per ASTM D-1557.

The specimens selected for consolidation testing (see Appendix B) showed up to about 2% swelling after inundation. Some of the subsurface soils may be expansive. Sufficient tests should be performed to assure that the new fill materials, either derived from the on-site soils or borrowed from off-site, meet the requirements stated in this report.

8.3 Settlement Monitoring

A settlement monitoring program is recommended to evaluate the rate and magnitude of actual settlement in the field for the proposed embankment areas. Surface monuments, constructed in accordance with Caltrans Standard Plan A74 or equivalent, should be installed in a timely manner upon completion of fill placement. Surface monuments should be placed at both abutment locations. The actual location of surface monuments will be determined during grading under the direction of the Geotechnical Engineer.

Settlements should be monitored at the time of installation, every other day for the first week, and every week thereafter till the settlement criteria is satisfied. Pile construction may begin when an extrapolation of the settlement plot shows that the residual (remaining) total settlement of the foundation soil projected over a period of 20 years is less than or equal to ½ inch. All settlement monitoring devices should be protected from damage throughout the construction and monitoring periods.

8.4 Temporary Excavations and Shoring

Any temporary sheeting or shoring should be in accordance with CALOSHA standards and should be made the contractor's responsibility. Appropriate measures should be taken to prevent damage to adjacent utilities and improvements, if any. A shoring design and safety plan should be required from the contractor and submitted to the Engineer for review and approval. Likewise, measures to control impact of both ground and surface water on the stability of temporary excavations should be employed and should remain the sole responsibility of the contractor.

8.5 Pile Installation

Construction of pile foundations should be performed in accordance with Section 49 of the Caltrans Standard Specifications (Caltrans, 2006).

Proper installation of the piles at this site requires careful consideration of several issues and qualified contractors with prior experience in constructing piles of similar size and type, and in similar subsurface conditions.

Installation of the precast concrete driven piles shall be observed by a qualified representative of the Geotechnical Engineer. Hard driving condition should be anticipated in the lower portion of bedrock.

8.6 Surface Water Control

Ponding of water adjacent to the structure should be avoided. During and after construction, positive drainage should be provided to direct surface water away from structures and all excavations toward suitable, nonerosive drainage devices.

8.7 Geotechnical Observation

It is recommended that observation and testing be performed by the geotechnical engineer's representative during the following stages of construction:

- Grading operations, including excavations, remedial removals and fill placement
- Monitoring device installation
- Pile installation
- When any unusual conditions are encountered

9.0 REFERENCES

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Seed, H.B. and Whitman, R., Design of Earth Retaining Structures for Dynamic Loads, ASCE Specialty Conference on Lateral Stresses in the Ground and Design of Earth Retaining Structures. 1970.

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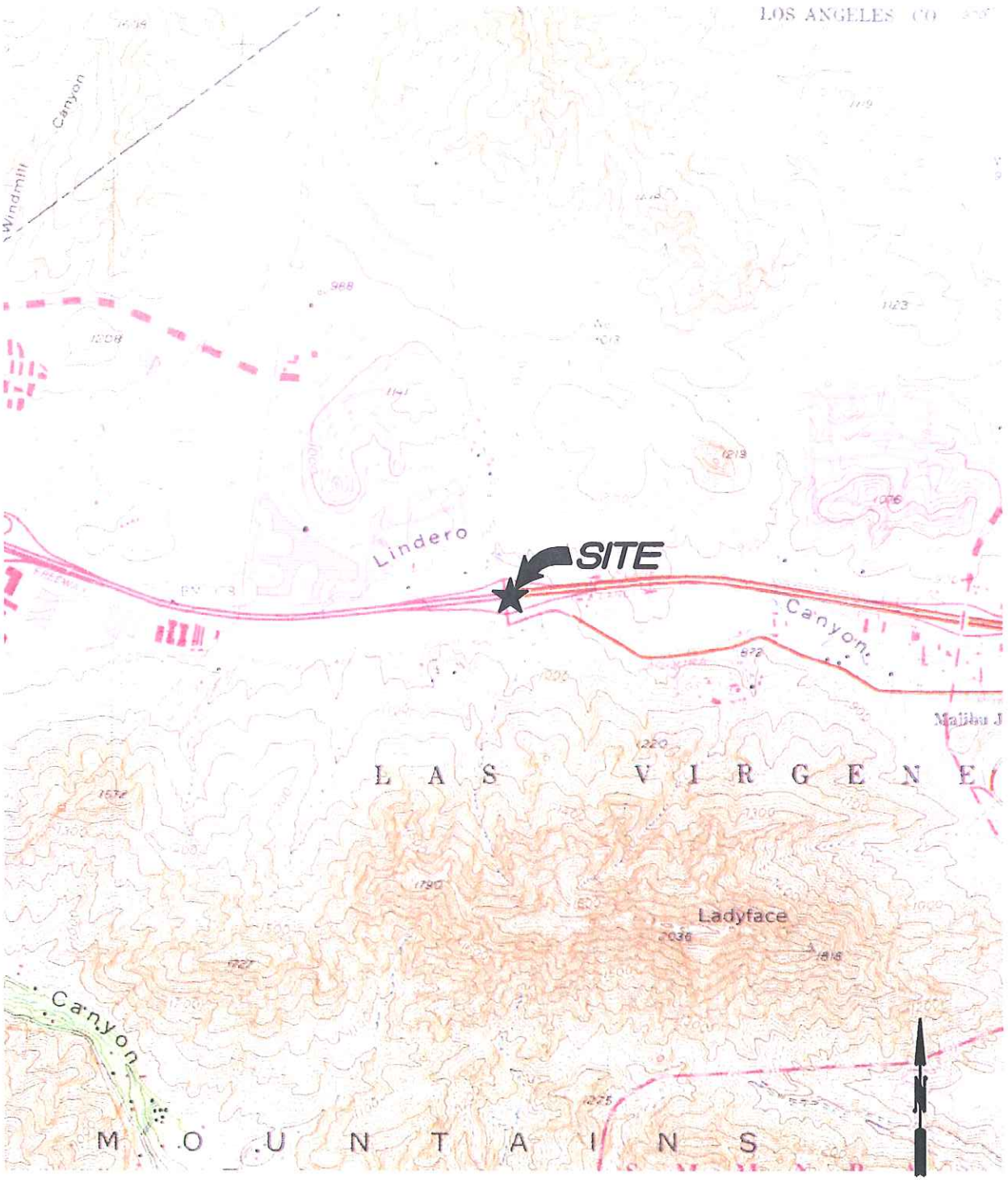
Tokimatsu, K. and H.B. Seed, Evaluation of Settlements in Sands Due to Earthquake Shaking, Journal of Geotechnical Engineering, Vol. 113, No. 8, pp. 861-878. 1987.

FIGURES



SOURCE: U.S.G.S. 7.5' topographic series, Agoura Hills, California quadrangle dated 1950, photorevised 1981.

ATTACHED IMAGES: Images: 75010p1.jpg
ATTACHED XREFS:
DB-L:\2007\CADD CAD FILE: L:\2007\CADD\75010\ LAYOUT: Layout2

KLEINFELDER
6430 Variel Avenue, Suite 103
Woodland Hills, CA. 91367
PH. (818) 226-6900 FAX. (818) 226-6910
www.kleinfelder.com

SITE LOCATION MAP

REYES ADOBE ROAD
101 FREEWAY AND REYES ADOBE INTERCHANGE
AGOURA HILLS, CALIFORNIA

DRAWN BY:	D. FAHRNEY
REVISED BY:	D. FAHRNEY
CHECKED BY:	J. KEMPTON
FIGURE	1

DRAWN: 05/29/07	APPROVED BY:	PROJECT NO. 70510	FILE NAME: 75010p1.dwg

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	36.1/36.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Timothy J. McGrody — No. 45968 — Exp. 12-31-08 — CIVIL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

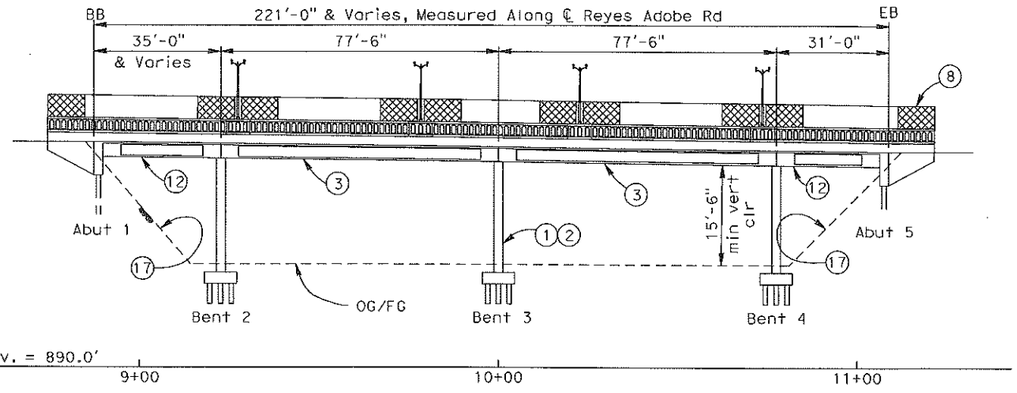
CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CALIFORNIA 91301

STV INCORPORATED
1055 WEST 7TH STREET, SUITE 3150
LOS ANGELES, CALIFORNIA 90017

Sta. 8+49.67± PVC
Elev. 939.13±
-0.376%
350' VC R/C = -1.230% ± per Sta.
Sta. 11+99.67± PVT
Elev. 930.28±
-4.68%

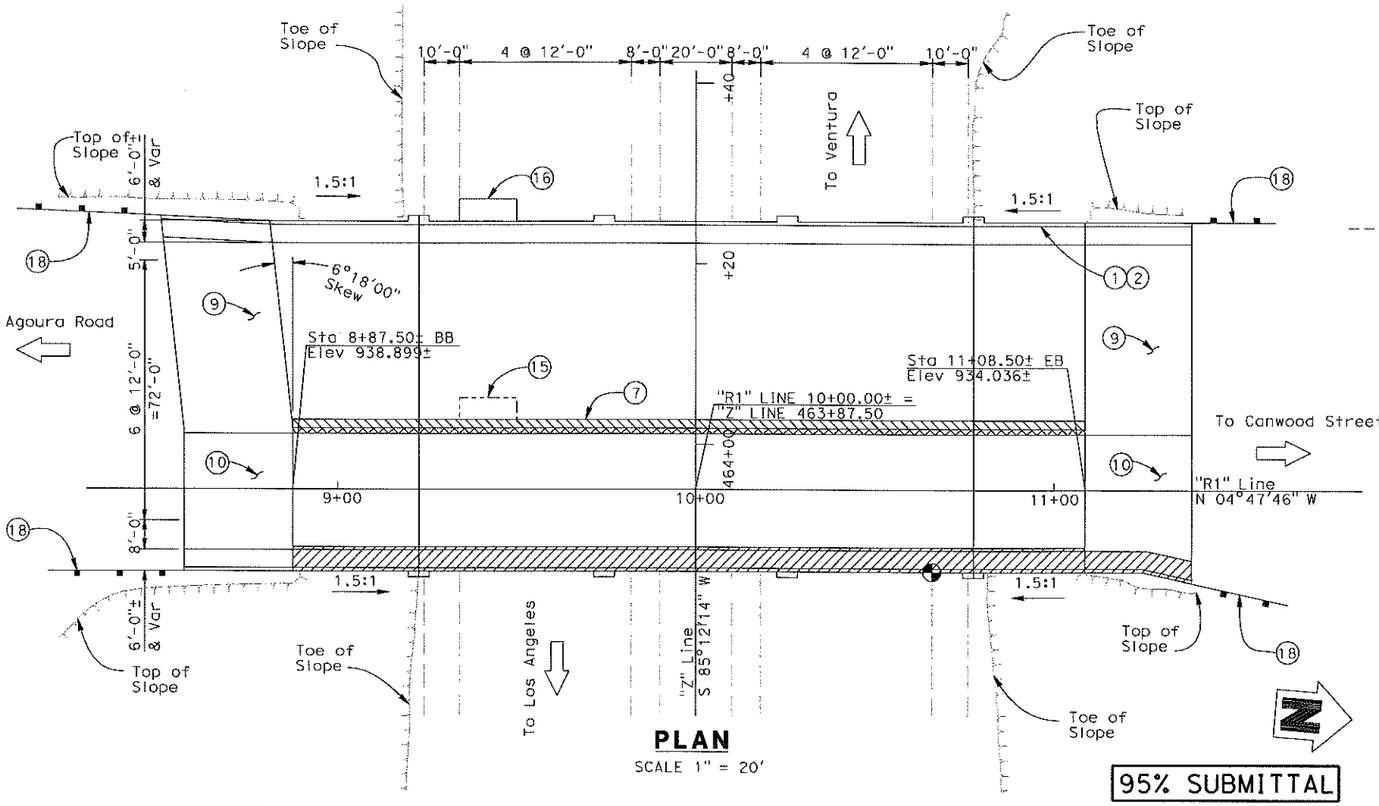
EXISTING PROFILE GRADE

No Scale



MIRRORED ELEVATION

SCALE 1" = 20'



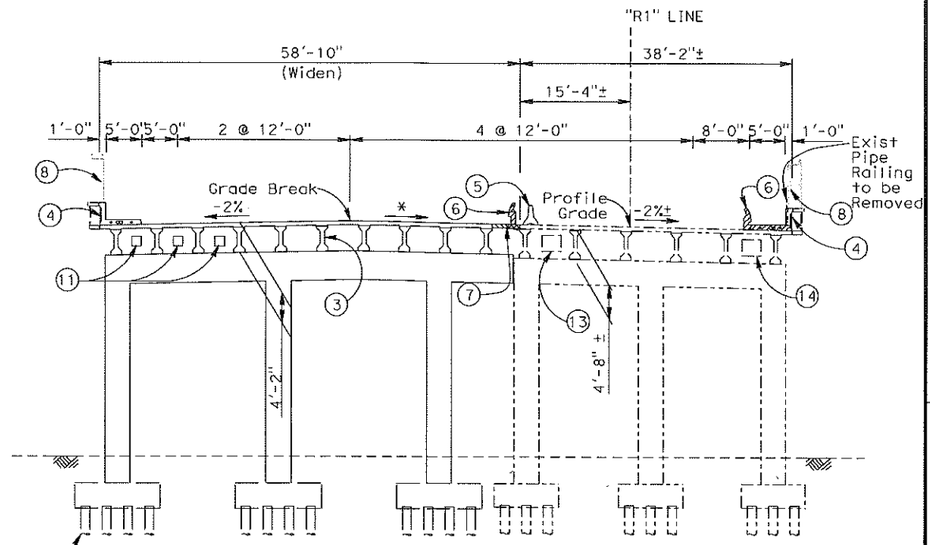
PLAN

SCALE 1" = 20'

95% SUBMITTAL

LEGEND:

- INDICATES LIMITS OF CONCRETE & RAILING REMOVAL
- INDICATES CLOSURE POUR
- INDICATES EXISTING STRUCTURE
- INDICATES NEW STRUCTURE



TYPICAL SECTION

SCALE 1" = 10'
(Typical for Span 2 & 3, See Note 3)
(For Spans 1 & 4, See Note 12)

NOTES

1. PAINT "REYES ADOBE RD. OC (Widen)"
2. PAINT "BRIDGE NO. 53-1726"
3. PC/PS GIRDER WITH INTERMEDIATE AND END DIAPHRAGMS. TYPICAL FOR SPANS 2 AND 3. SEE "TYPICAL SECTION No. 2" FOR DETAILS
4. CONCRETE BARRIER TYPE 26 MOD
5. TEMPORARY RAILING TYPE K. FOR LOCATIONS, SEE "STAGE CONSTRUCTION DETAILS" SHEET AND "ROAD PLANS"
6. EXISTING TYPE 1 BARRIER RAILING TO BE REMOVED
7. CLOSURE POUR (3'-11")
8. CHAIN LINK RAILING TYPE 7 MOD
9. STRUCTURE APPROACH SLAB TYPE N (30D)
10. STRUCTURE APPROACH SLAB TYPE R (30D)
11. FUTURE UTILITY OPENING
12. CAST-IN-PLACE CONCRETE RECTANGULAR T-BEAM. TYPICAL FOR SPAN 1 AND 4. SEE "TYPICAL SECTION No. 1" SHEET FOR DETAILS.
13. EXISTING RECLAIMED WATERLINE
14. EXISTING PACIFIC TELEPHONE AND TELEGRAPH CO. UTILITY
15. REMOVE EXISTING BRIDGE MOUNTED SIGN
16. BRIDGE MOUNTED SIGN
17. SLOPE PAVING (FULL SLOPE)
18. METAL BEAM GUARD RAIL, SEE "ROAD PLANS"

◔ INDICATES POINT OF MINIMUM VERTICAL CLEARANCE

* MATCH EXISTING GRADE

Figure 2

Lily Sun DESIGN OVERSIGHT X SIGN OFF DATE	DESIGN	BY Susan Michalski	CHECKED Wellington Chu	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Wellington H. Chu PROJECT ENGINEER	BRIDGE NO. 53-1726 POST MILES 36.1/36.3	REYES ADOBE ROAD OC (WIDENING) GENERAL PLAN
	DETAILS	BY Wellington Chu	CHECKED Susan Michalski	LAYOUT	BY Susan Michalski	CHECKED Wellington Chu					
	QUANTITIES	BY Susan Michalski	CHECKED Wellington Chu	SPECIFICATIONS	BY Susan Michalski	PLANS AND SPECS COMPARED W. Chu					

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 07-274
EA 240201

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 05/31/01 09/25/01

SHEET 1 OF 25

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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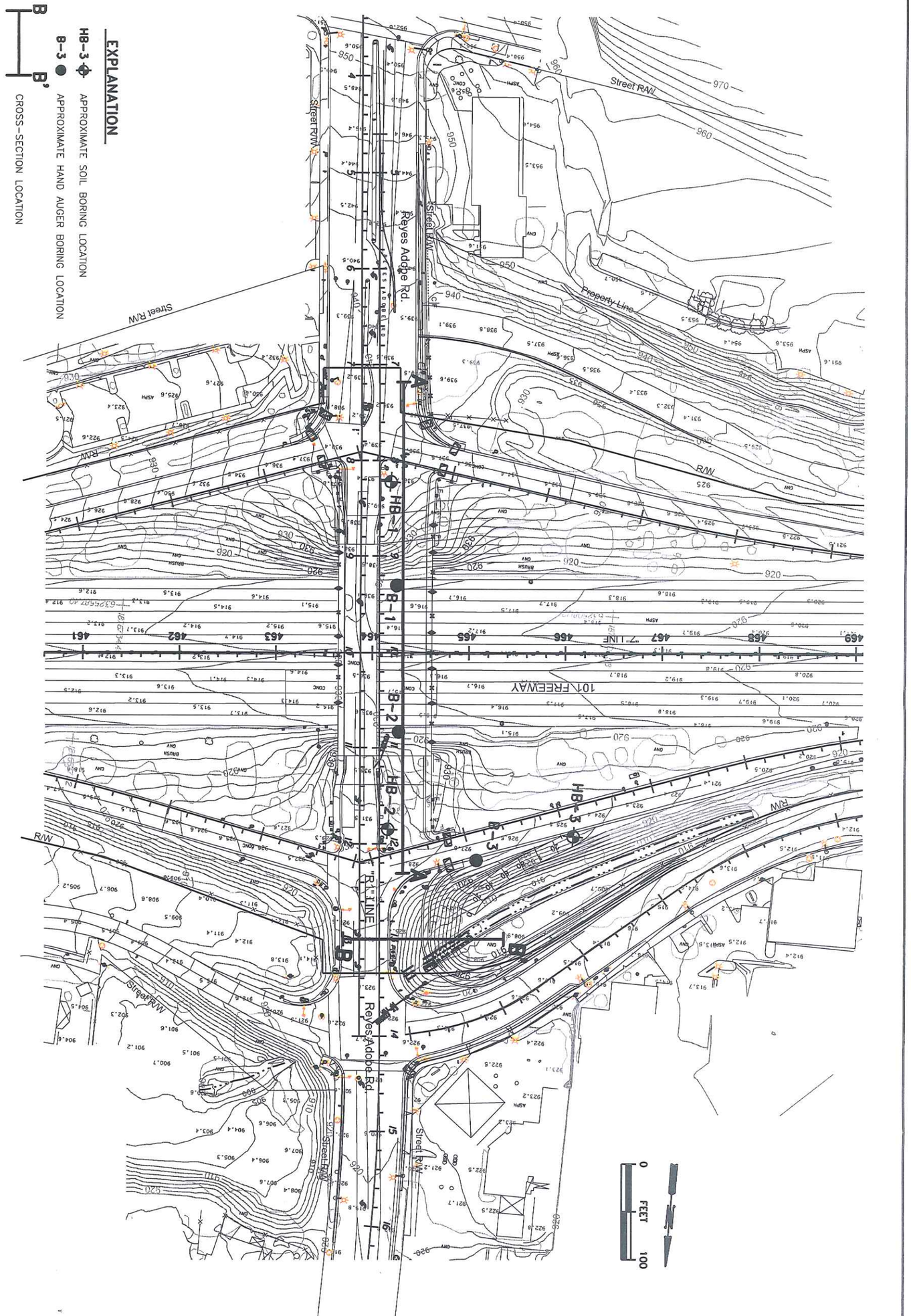
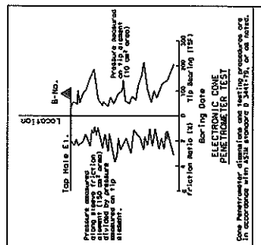
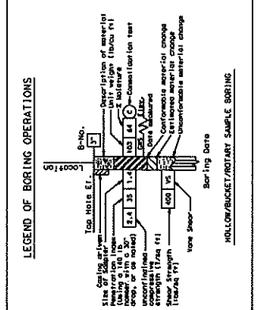


DRAWN BY: D. FAHRNEY	**PLOT PLAN**	KLEINFELDER	FIGURE
REVISED BY: D. FAHRNEY			
CHECKED BY: J. KEMPTON	REYES ADOBE ROAD 101 FREEWAY AND REYES ADOBE INTERCHANGE AGOURA HILLS, CALIFORNIA	6430 Variel Avenue, Suite 103 Woodland Hills, CA 91367 PH. (818) 226-6900 FAX. (818) 226-6910 www.kleinfelder.com	3
DATE: 05/10/07 APPROVED BY: _____	PROJECT NO. 75010 FILE NAME: 75010p3.dwg		

PLOTTED: 29 May 2007, 1:34pm, dfahrney





NOTES:

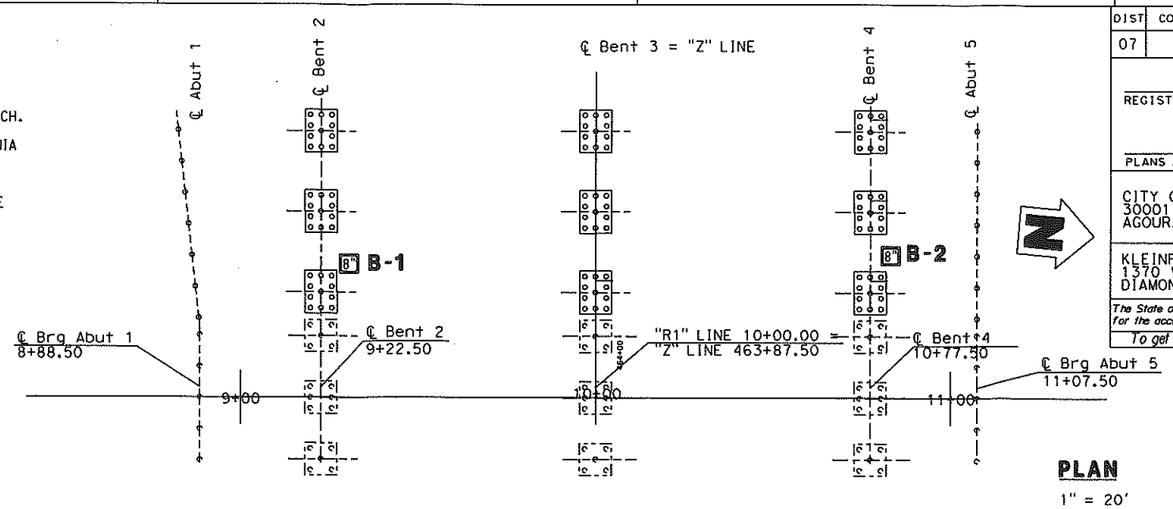
1. 1.4 INCH DIAMETER SAMPLES WERE TAKEN USING A STANDARD PENETRATION TEST (SPT) SPLIT BARREL SAMPLER WITH AN INSIDE DIAMETER (ID) OF 1.4 INCH AND AN OUTSIDE DIAMETER (OD) OF 2 INCH.

2. 2.4 INCH DIAMETER RING SAMPLES WERE TAKEN USING A CALIFORNIA (MODIFIED) SPLIT BARREL SAMPLER WITH AN ID OF 2.4 INCH AND AN OD OF 3.27 INCH.

3. AN ABOVE-HOLE AUTOMATIC HAMMER SYSTEM WAS USED TO ADVANCE THE DRIVE SAMPLERS. (140 LB HAMMER, 30-INCH DROP)

BENCHMARK:

LA County BM ID#11278 Cal-Trans Disc in SE
Corner Bridge over 101 Freeway 24 inches E/O CF
23 feet E/O Reyes Adobe MKD (101-005 1994)
Elev. 939.056



PLAN

1" = 20'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
07	LA	101	36.1		

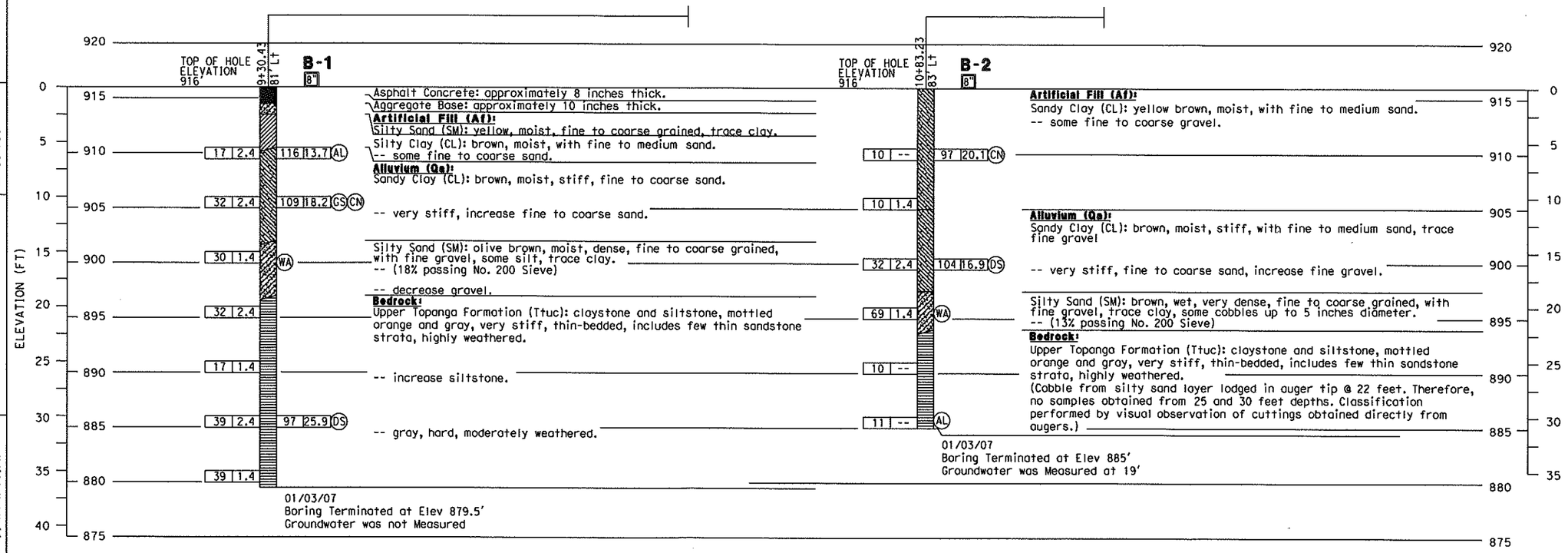
5/24/07
REGISTERED CIVIL ENGINEER DATE

JUSTIN J. KEMPTON No. GE2385 Exp. 09/30/07 REGISTERED GEOTECHNICAL ENGINEER STATE OF CALIFORNIA

PLANS APPROVAL DATE

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CALIFORNIA 91301

KLEINFELDER INC.
1370 VALLEY VISTA DRIVE, SUITE 150
DIAMOND BAR, CALIFORNIA 91765



PROFILE

Horiz 1:20
Vert 1:5

NOTES: TYPES OF BORINGS
2-1/2" O.D. CONE PENETROMETER
BUCKET AUGER BORING
ROTARY SAMPLE BORING (WET)
ROTARY BORING (DRY)
TEST PIT
DIAMOND CORE BORING
JET BORING
ELECTRONIC CONE PENETROMETER

NOTES: SOIL TEST DESIGNATIONS
(A) ATTERBERG LIMITS
(C) CHEMICAL ANALYSIS
(CU) CONSOLIDATED UNDRAINED TRIAXIAL
(CR) CORROSION
(CO) COLLAPSE POTENTIAL
(CD) CONSOLIDATED DRAINED TRIAXIAL
(DS) DIRECT SHEAR
(E) EXPANSION INDEX
(G) GRAIN SIZE ANALYSIS
(H) HYDROMETER ANALYSIS
(M) MAX. DRY DENSITY
(R) R-VALUE
(SE) SAND EQUIVALENT
(UC) UNCONFINED COMPRESSION
(UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
(WA) WASH ANALYSIS

LEGEND OF EARTH MATERIALS
GRAVEL
SAND
SILT
CLAY/ SANDY CLAY
FAT CLAY
PEAT, ORGANIC MATTER
FILL MATERIAL
CLAYEY SAND
SILTSTONE
SILTY SAND/ SANDY SILT
SANDSTONE
CLAYSTONE
SHALE
CLASTIC SILT

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

	SPT N-Value (Blows/ foot)	
Cohesive	0-2	Very Soft
	2-4	Soft
	5-8	Firm
	9-15	Stiff
	16-30	Very Stiff
	31	Hard
Granular	0-4	Very Loose
	5-10	Loose
	11-30	Medium Dense
	31-50	Dense
	>50	Very Dense

PRELIMINARY - NOT FOR CONSTRUCTION, SUBJECT TO INDEPENDENT VERIFICATION PRIOR TO FINAL DESIGN

FIGURE 4

X DESIGN OVERSIGHT	DRAWN BY	D. FAHRNEY	M. JANOUSEK STAFF ENGINEER	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	JUSTIN J. KEMPTON PROJECT ENGINEER	BRIDGE NO. 53-X726	REYES ADOBE ROAD OC (WIDENING)
X SIGN OFF DATE	CHECKED BY	J. KEMPTON	FIELD INVESTIGATION BY: DATE: 01/03/07		CU 07 EA 240204	POST MILE 36K.1	LOG OF TEST BORINGS

OSF GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

FILE => @REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET X | OF X

DATE PLOTTED => $DATE
TIME PLOTTED => $TIME
USERNAME => $USER

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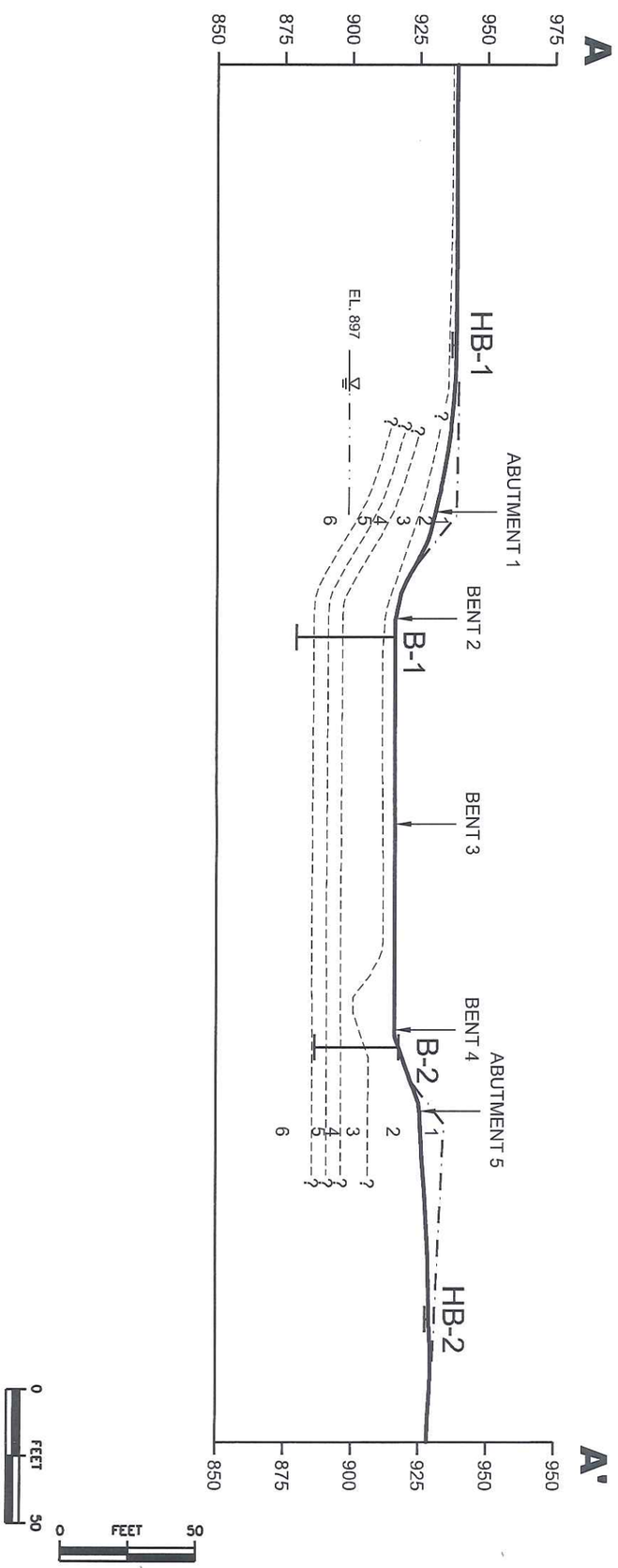


LAYER NO.	MATERIAL NAME
1	NEW FILL
2	OLD FILL
3	ALLUVIUM (CL)
4	ALLUVIUM (SM/SC)
5	BEDROCK (HIGHLY WEATHERED)
6	BEDROCK

DRAWN BY: D. FAHRNEY	**CROSS-SECTION A-A'**	KLEINFELDER	FIGURE
REVISED BY: D. FAHRNEY			
CHECKED BY: J. KEMPTON	REYES ADOBE ROAD 101 FREEWAY AND REYES ADOBE INTERCHANGE AGOURA HILLS, CALIFORNIA	6430 Variel Avenue, Suite 103 Woodland Hills, CA 91367 PH. (818) 226-6900 FAX. (818) 226-6910 www.kleinfelder.com	5
DATE: 05/10/07 APPROVED BY:	PROJECT NO. 75010 FILE NAME: 75010p3.dwg		

PLOTTED: 29 May 2007, 3:31pm, dfahrney

CALTRANS BRIDGE DESIGN ARS CURVE

ARS v3.0, 2001-2006, Spreadsheet revised by: EZ)

PROJECT INFORMATION	
Project Name	Reyes Adobe Rd OC
Project No.	
Location	Los Angeles County, California

INPUT PARAMETERS	
Controlling Fault Name	Malibu Coast-Santa Monica-Hollywood-Raymond
Fault Type	Reverse/Thrust
MCE Moment Magnitude	7.50
Distance to Fault	11.00 km
Peak Bedrock Acceleration Based on 1996 Seismic Hazard Map	0.5 g
Soil Profile Type	D

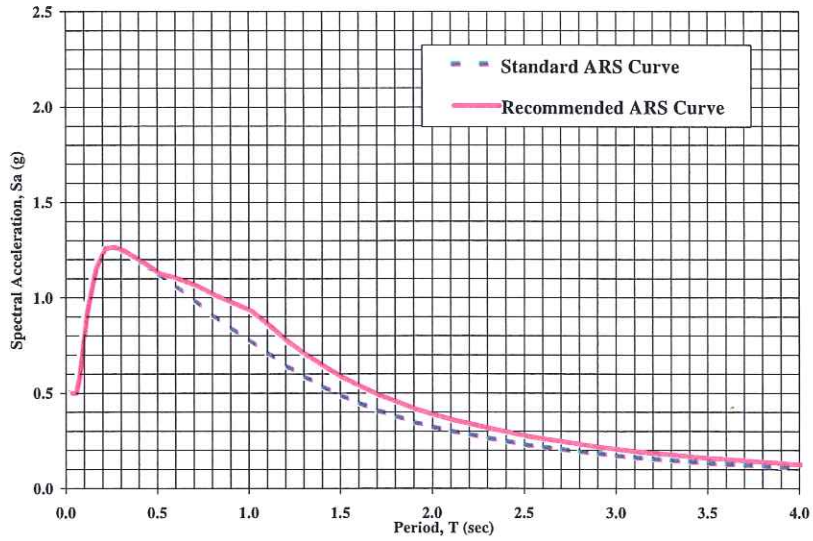
COMPUTED RESULTS	
Peak Bedrock Acceleration Based on Sadigh et al. (1997)[1]	0.49 g
Design Peak Bedrock Acceleration (g)	0.5 g

NOTES:

[1]Peak Bedrock Acceleration (PBA):
Determined using attenuation relationship by Sadigh et al. (1997) for rock site.
Sadigh recommended no increase for Strike-Slip Fault, 10% increase for Oblique Fault;
and 20% increase for Reverse/Thrust Fault.

[2]Standard SDC ARS Curve:
Based on Caltrans Standard SDC (2004) ARS Curve
for the given Magnitude, Peak Bedrock Acceleration, and Soil Profile Type.

[3]recommended ARS Curve:
When the bridge is located within 15 km of the controlling fault, the standard SDC ARS Curve was modified as follows to account for fault rupture directivity effect:
- For Periods < 0.5 sec, no increase in Standard SDC spectral acceleration values.
- For Periods > 1.0 sec, Standard SDC spectral acceleration values were increased by 20%.
- For Periods between 0.5 sec and 1.0 sec, spectral acceleration values were linearly interpolated.



COMPUTED ARS CURVES		
Period T (sec)	Standard SDC ARS Curve[2] Sa (g)	Recommended ARS Curve[3] Sa (g)
0.02	0.500	0.500
0.04	0.500	0.500
0.06	0.587	0.587
0.08	0.759	0.759
0.10	0.917	0.917
0.15	1.154	1.154
0.20	1.259	1.259
0.25	1.265	1.265
0.30	1.247	1.247
0.35	1.219	1.219
0.40	1.191	1.191
0.45	1.158	1.158
0.50	1.126	1.126
0.60	1.058	1.100
0.70	0.986	1.065
0.80	0.907	1.016
0.90	0.840	0.974
1.00	0.776	0.931
1.10	0.711	0.853
1.20	0.642	0.770
1.30	0.585	0.702
1.40	0.533	0.640
1.50	0.485	0.582
1.60	0.446	0.535
1.70	0.408	0.490
1.80	0.378	0.454
1.90	0.347	0.416
2.00	0.322	0.386
2.10	0.300	0.360
2.20	0.282	0.338
2.30	0.264	0.317
2.40	0.247	0.296
2.50	0.229	0.275
2.60	0.216	0.259
2.70	0.205	0.246
2.80	0.193	0.232
2.90	0.182	0.218
3.00	0.171	0.205
3.10	0.162	0.194
3.20	0.155	0.186
3.30	0.147	0.176
3.40	0.140	0.168
3.50	0.133	0.160
3.60	0.128	0.154
3.70	0.122	0.146
3.80	0.117	0.140
3.90	0.112	0.134
4.00	0.106	0.127

PILE DATA TABLE

Location	Pile Type	Design Loading (kips)	Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
			Compression (kips)	Tension (kips)		
Abut 1	15" Concrete Driven	90	180	-	904.1(1) 912.6(3)	904.0
Bent 2	15" Concrete Driven	90	180	-	879.0(1) 892.2(3)	879.0
Bent 3	15" Concrete Driven	90	180	-	879.0(1) 892.2(3)	879.0
Bent 4	15" Concrete Driven	90	180	-	879.0(1) 892.2(3)	879.0
Abut 5	15" Concrete Driven	90	180	-	889.0(1) 908.8(3)	889.0

Note: Design tip elevation is controlled by the following demands:
(1) Compression, (2) Tension, (3) Lateral Loads.

BENCHMARK

LA County BM ID#11278 Cal-Trans Disc in SE Corner Bridge over 101 Freeway 24 inches E/O CF 23 feet E/O Reyes Adobe MKD (101-005 1994)
Elev. 939.056

LEGEND

XXX.XXX	Indicates bottom of footing elevation
XXX.XXX	Indicates existing bottom of footing elevation
----------	Indicates existing structure
————	Indicates new construction
○	Indicates existing piling
○	Indicates new piling

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL
07	LA	101	36.1/36.3		

REGISTERED CIVIL ENGINEER DATE

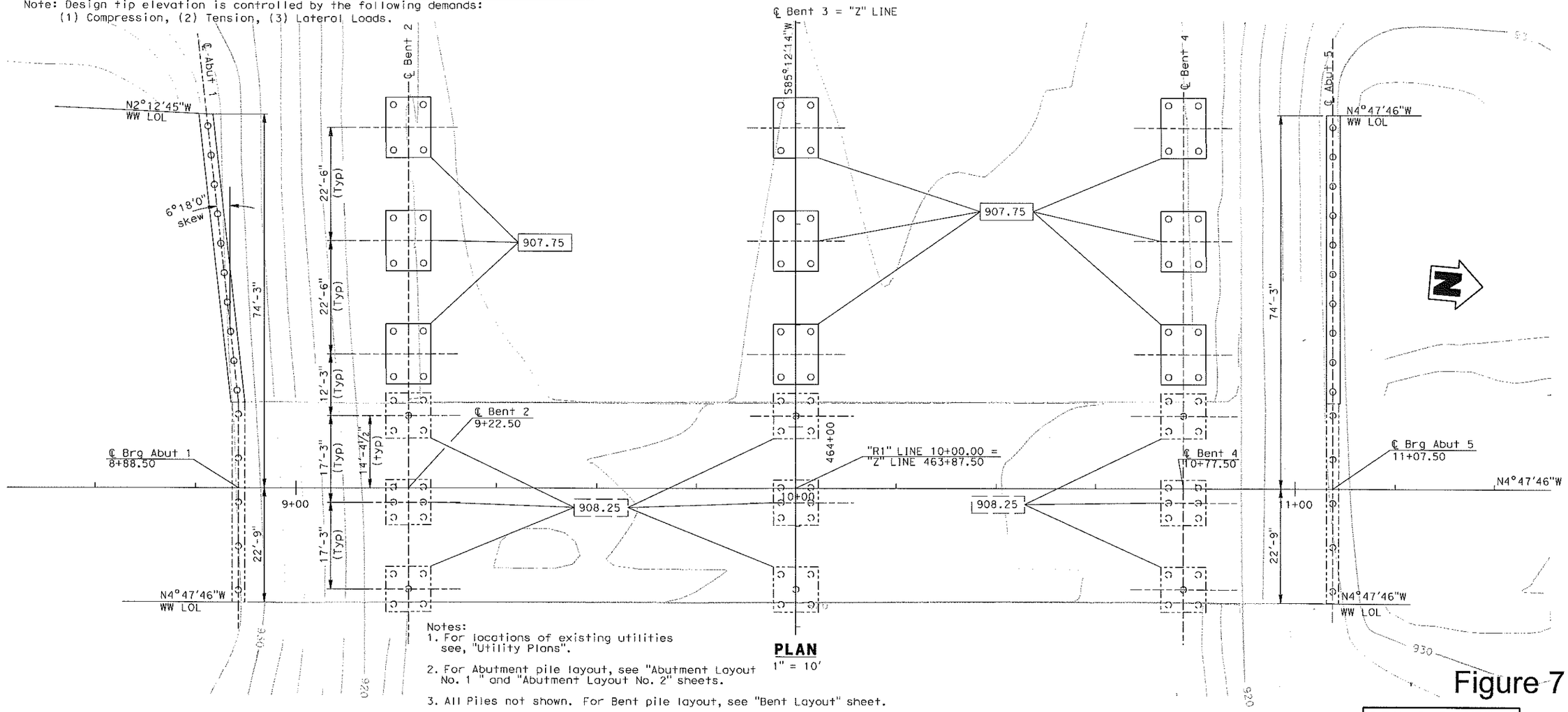
PLANS APPROVAL DATE

Timothy J. McGrody, No. 45968, Exp. 12-31-08, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CALIFORNIA 91301

STV INCORPORATED
1055 WEST 7TH STREET, SUITE 3150
LOS ANGELES, CALIFORNIA 90017



Notes:
1. For locations of existing utilities see, "Utility Plans".
2. For Abutment pile layout, see "Abutment Layout No. 1 " and "Abutment Layout No. 2" sheets.
3. All Piles not shown. For Bent pile layout, see "Bent Layout" sheet.

PLAN
1" = 10'

Figure 7

95% SUBMITTAL

GEOTECHNICAL PROFESSIONAL APPROVAL DATE

Lily Sun DESIGN OVERSIGHT X . SIGN OFF DATE	SCALE: 1" = 10'	VERT.DATUM NAVD 88	HORZ.DATUM NAD 83	DESIGN	BY Susan Michalski	CHECKED Wellington Chu	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Wellington H. Chu PROJECT ENGINEER	BRIDGE NO. 53-1726 POST MILE 36.1/36.3	REYES ADOBE ROAD OC (WIDENING) FOUNDATION PLAN
	PHOTOGRAMMETRY AS OF: 8-11-06	ALIGNMENT TIES		DETAILS	BY Wellington Chu	CHECKED Susan Michalski				
	SURVEYED BY Clinton Anderson	DRAFTED BY Diana Knezevic		QUANTITIES	BY Susan Michalski	CHECKED Wellington Chu				
	FIELD CHECKED BY Larry Carlson	CHECKED BY Cecilia Aued-Mellon						CU 07-274 EA 240201		

FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-25-05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

FILE => $REQUEST

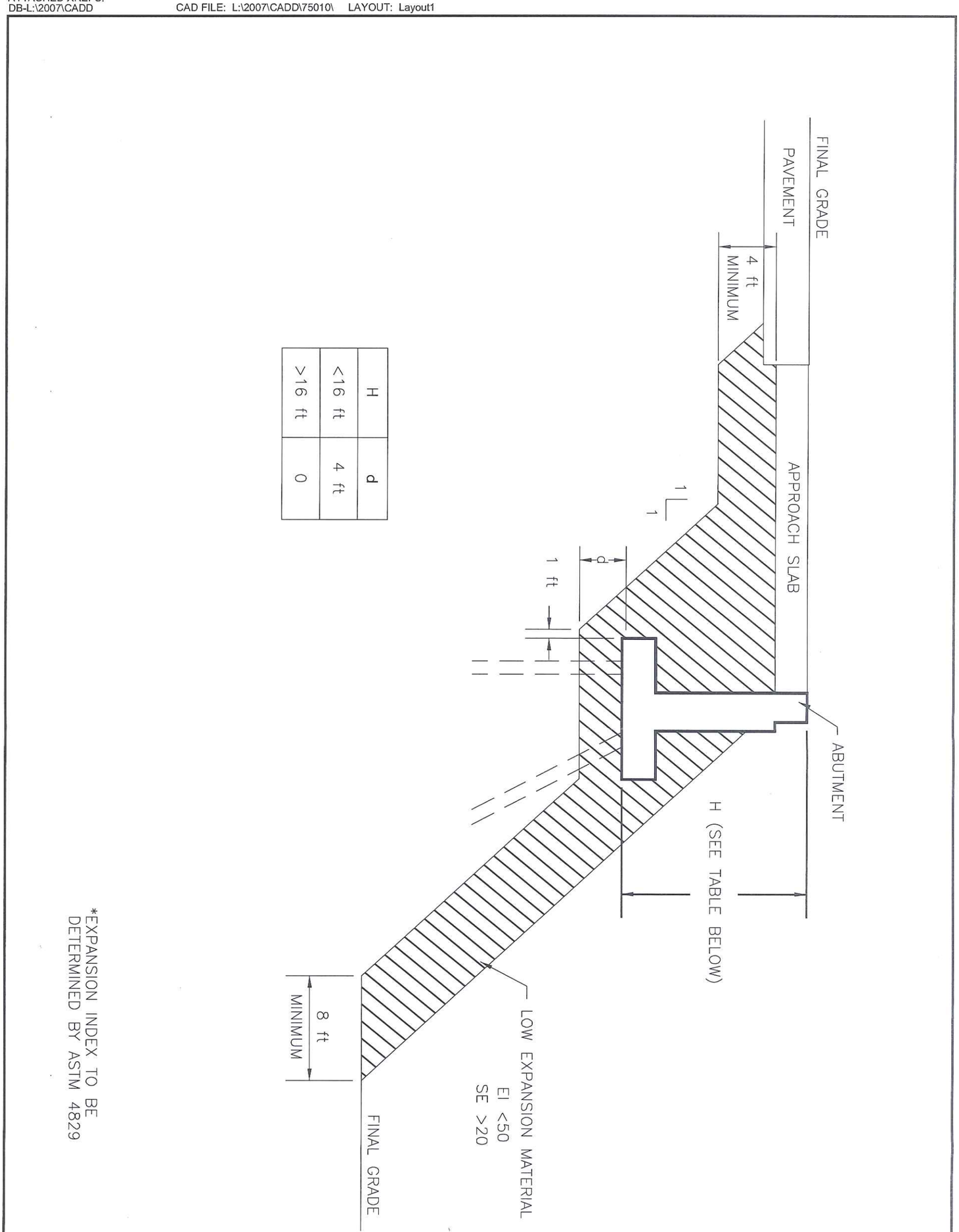
DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 05/01/07 05/05/07

SHEET 4 OF 25

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

ATTACHED IMAGES: Images: gdc20.bmp
ATTACHED XREFS:
DB-L:\2007\CADD CAD FILE: L:\2007\CADD\75010\ LAYOUT: Layout1



H	d
<16 ft	4 ft
>16 ft	0

DRAWN BY: D. FAHRNEY	**EXPANSIVE SOIL EXCLUSION ZONE**	KLEINFELDER	FIGURE
REVISED BY: D. FAHRNEY			
CHECKED BY: J. KEMPTON	REYES ADOBE ROAD 101 FREEWAY AND REYES ADOBE INTERCHANGE AGOURA HILLS, CALIFORNIA	6430 Variel Avenue, Suite 103 Woodland Hills, CA 91367 PH. (818) 226-6900 FAX. (818) 226-6910 www.kleinfelder.com	8
DATE: 05/10/07 APPROVED BY: _____	PROJECT NO. 75010 FILE NAME: 75010p8.dwg		

PLOTTED: 29 May 2007, 11:08am, dfahrney

APPENDIX A
FIELD EXPLORATION

APPENDIX A
FIELD EXPLORATION

The subsurface exploration program for the proposed bridge consisted of drilling and logging a total of 3 hollow-stem auger borings and 3 hand-auger borings. The hollow-stem borings were drilled with a CME-75, truck-mounted drill rig furnished by Jet Drilling of Signal Hill, California. Borings B-1 to B-3 were advanced to depths ranging from approximately 31 feet to 46.5 feet below existing grade on January 3, 2007. The borings were drilled through asphalt; rapid-set concrete was used to patch the holes. Borings HB-1 to HB-3 were advanced to depths ranging from approximately 1.5 to 3 feet below existing grade on January 4, 2007. All borings were backfilled with the soil cuttings when the drilling and excavating was completed. The approximate locations of the borings are shown on Plate 2.

The Logs of Borings are presented as Figures A-2 through A-7. An explanation to the logs is presented as Figure A-1. The Logs of Borings describe the earth materials encountered, samples obtained, and show field and laboratory tests performed. The logs also show the boring number, drilling date and the name of the logger and drilling subcontractor. The borings were logged by a Kleinfelder staff engineer using the Unified Soil Classification System. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual. Bulk and intact samples of representative earth materials were obtained from the borings.

A Modified California Sampler was used to obtain relatively undisturbed samples of the soil encountered. This sampler consists of a 3-inch O.D., 2.4-inch I.D. split barrel shaft that is driven a total of 18-inches into the soil at the bottom of the boring. The soil was retained in one inch brass rings for laboratory testing. An additional two inches of soil from each drive remained in the cutting shoe and was usually discarded after visually classifying the soil. The number of blows required to drive the sampler the final 12 inches is presented on the boring logs. The California sampler was driven by a 140-pound hammer with a drop height of 30 inches.

Disturbed samples were obtained using a Standard Penetration Sampler (SPT). This sampler consists of a 2-inch O.D., 1.4-inch I.D. split barrel shaft that is advanced into the soils at the bottom of the drill hole a total of 18-inches. The number of blows required to drive the sampler for final 12 inches is presented on the Logs of Borings. The SPT sampler was driven by a 140-pound hammer with a drop height of 30 inches. Soil samples obtained by the SPT were stored in plastic ziplock bags. Bulk samples of the sub-surface soils were retrieved directly from the soil cuttings.

Date Drilled:	Water Depth:
Drilled By:	Date Measured:
Drilling Method:	Reference Elevation:
Logged By:	Datum:

Elevation (feet) Depth	Sample	Sample No.	Blow Count (Blows/ft.)	Graphic Log	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
		1	6			108	10	DS, SE
		2	12					GS
5								
	(1)	(2)	(3)	(4)	(5)	(6)	(6)	(7)
10								

NOTES ON FIELD INVESTIGATION

1. SAMPLE – Graphical representation of sample type as shown below.
   - Split Spoon – Standard Penetration Test Sample (SPT)
   - Drive Sample – California Sample (Cal)
   - Bulk Sample – Obtained by collecting cuttings in a plastic bag
   - Tube Sample – Shelby/Pitcher Tube Sample

2. SAMPLE NO. – Sample Number

3. BLOWS/FT – Number of blows required to advance sampler 1 foot (unless a lesser distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a standard (140 lb) hammer dropping a standard 30 inches. Drive samples collected in bucket auger borings may be obtained by dropping non-standard weight from variable heights. When a SPT sampler is used the blow count conforms to ASTM D-1586.

   SCR/RQD – Sample Core Recovery (SCR) in percent (%) and Rock Quality Designation (RQD) in percent (%). RQD is defined as the percentage of core in each run which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.

4. GRAPHIC LOG – Standard symbols for soil and rock types, as shown on plate B-1b.

5. GEOTECHNICAL DESCRIPTION

   Soil – Soil classifications are based on the Unified Soil Classification System per ASTM D-2487, and designations include consistency, moisture, color and other modifiers. Field descriptions have been modified to reflect results of laboratory analyses where deemed appropriate.

   Rock – Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration, and the mechanical properties of the rock. Fabric, lineations, bedding spacing, foliations, and degree of cementation are also presented where appropriate.

   Description of soil origin or rock formation is placed in brackets at the beginning of the description where applicable, for example, Residual Soil.

6. DRY DENSITY, MOISTURE CONTENT: As estimated by laboratory or field testing.

7. ADDITIONAL TESTS – (Indicates sample tested for properties other than the above):

MAX – Maximum Dry Density	SG – Specific Gravity	PP – Pocket Penetrometer
GS – Grain Size Distribution	HA – Hydrometer Analysis	WA – Wash Analysis
SE – Sand Equivalent	AL – Atterberg Limits	DS – Direct Shear
EI – Expansion Index	RV – R-Value	CP – Collapse Potential
CHEM – Sulfate and Chloride Content, pH, Resistivity	CN – Consolidation	UC – Unconfined Compression
PM – Permeability	CU – Consolidation Undrained Triaxial	T – Torvane
UU – Unconsolidated Undrained Triaxial	CD – Consolidated Drained Triaxial	

8. ATTITUDES – Orientation of rock discontinuity observed in bucket auger boring or rock core, expressed in strike/dip and dip angle, respectively, preceeded by a one-letter symbol denoting nature of discontinuity as shown below.

   B: Bedding Plane J: Jointing C: Contact F: Fault S: Shear

KLEINFELDER

EXPLANATION OF LOGS

PLATE A-1a

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS			GROUP SYMBOLS	SECONDARY DIVISIONS
COARSE-GRAINED SOILS — MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN) 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVEL WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN) 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS — MORE THAN HALF OF MATERIALS IS SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS — LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	HIGHLY ORGANIC SOILS		PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS
TYPICAL FORMATIONAL MATERIALS	SANDSTONES		SS	
	SILTSTONES		SH	
	CLAYSTONES		CS	
	LIMESTONES		LS	
	SHALE		SL	

CONSISTENCY CRITERIA BASED ON FIELD TESTS

RELATIVE DENSITY: COARSE-GRAINED SOIL

RELATIVE DENSITY	SPT * (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	<4	0 - 15
Loose	4 - 10	15 - 35
Medium Dense	10 - 30	35 - 65
Dense	30 - 50	65 - 85
Very Dense	>50	85 - 100

CONSISTENCY: FINE-GRAINED SOIL

CONSISTENCY	SPT (# blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET ** PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)
Very Soft	<2	<0.13	<0.25
Soft	2 - 4	0.13 - 0.25	0.25 - 0.5
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0
Hard	>30	>2.0	>4.0

* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM-1586 STANDARD PENETRATION TEST)

** UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ.FT. READ FROM POCKET PENETROMETER

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CEMENTATION

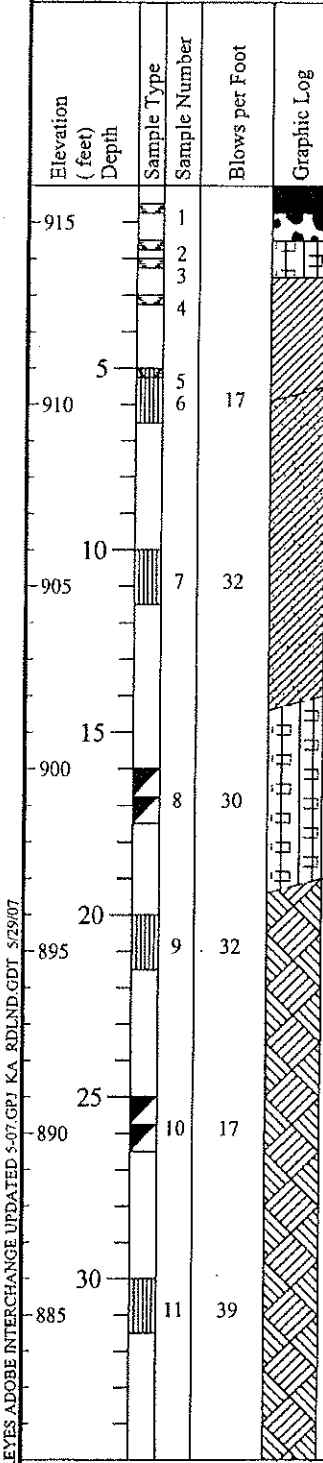
DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

KLEINFELDER

EXPLANATION OF LOGS

PLATE A-1b

Date Drilled:	1/3/07	Water Depth:	>36.5 feet
Drilled By:	Jet Drilling	Date Measured:	1/3/2007
Drilling Method:	8" Hollow Stem Auger	Elevation:	916 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL



SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
Asphalt Concrete: approximately 8 inches thick.			Analytical
Aggregate Base: approximately 10 inches thick.			Analytical
Artificial Fill (Af):			Analytical
Silty Sand (SM): yellow, moist, fine to coarse grained, trace clay.			Analytical
Silty Clay (CL): brown, moist, with fine to medium sand.			
-- some fine to coarse sand.			
Alluvium (Qa):	116	13.7	Analytical AL
Sandy Clay (CL): brown, moist, stiff, fine to coarse sand.			
-- very stiff, increase fine to coarse sand.	109	18.2	GS, CN
Silty Sand (SM): olive brown, moist, dense, fine to coarse grained, with fine gravel, some silt, trace clay.			
-- (18% passing No. 200 Sieve)			WA
-- decrease gravel.			
Bedrock:			
Upper Topanga Formation (Ttuc): claystone and siltstone, mottled orange and gray, very stiff, thin-bedded, includes few thin sandstone strata, highly weathered.			
-- increase siltstone.			
-- gray, hard, moderately weathered.	97	25.9	DS

KLEINFELDER

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

PLATE
A-2a

PROJECT NO. 75010-2

LOG OF BORING B-1

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA_RDLND.GDT 5/29/07

Elevation (feet) Depth	Sample Type	Sample Number	Blows per Foot	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION *(Continued From Previous Page)*	Dry Density (pcf)	Moisture Content (%)	Additional Tests
880		12	39					

Total Depth: 36.5 feet.
Groundwater not encountered.
Boring backfilled with soil cuttings and capped with Quickset Cement.

KLEINFELDER

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

PLATE
A-2b

PROJECT NO. 75010-2

LOG OF BORING B-1

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Date Drilled:	1/3/07	Water Depth:	19 feet
Drilled By:	Jet Drilling	Date Measured:	1/3/2007
Drilling Method:	8" Hollow Stem Auger	Elevation:	916 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL

Elevation (feet) / Depth	Sample Type	Sample Number	Blows per Foot	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
915		1			**Artificial Fill (Af):** **Sandy Clay (CL):** yellow brown, moist, with fine to medium sand.			Analytical
		2						Analytical
		3			-- some fine to coarse gravel.			Analytical
		4						Analytical
5		5						
910		6	20			97	20.1	Analytical CN
10								
905		7	10		**Alluvium (Qa):** **Sandy Clay (CL):** brown, moist, stiff, with fine to medium sand, trace fine gravel.			
15								
900		8	32		-- very stiff, fine to coarse sand, increase fine gravel.	104	16.9	DS
▽								
20					**Silty Sand (SM):** brown, wet, very dense, fine to coarse grained, with fine gravel, trace clay, some cobbles up to 5 inches diameter.			
895		9	69		-- (13% passing No. 200 Sieve)			WA
					Bedrock: **Upper Topanga Formation (Ttuc):** claystone and siltstone, mottled orange and gray, very stiff, thin-bedded, includes few thin sandstone strata, highly weathered. (Cobble from silty sand layer lodged in auger tip @ 22 feet. Therefore, no samples obtained from 25 and 30 feet depths. Classification performed by visual observation of cuttings obtained directly from augers.)			
25		10	N/A					
890								
30		11	N/A					AL
885					Practical refusal @ 31 feet. Groundwater encountered @ 19 feet. Boring backfilled with soil cuttings and capped with Quickset Cement.			

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA_RDLND.GDT 5/29/07

KLEINFELDER

PROJECT NO. 75010-2

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

LOG OF BORING B-2

PLATE A-3

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Date Drilled:	1/3/07	Water Depth:	>46.5 feet
Drilled By:	Jet Drilling	Date Measured:	1/3/2007
Drilling Method:	8" Hollow Stem Auger	Elevation:	924 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL

Elevation (feet) / Depth	Sample Type	Sample Number	Blows per Foot	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
		1			**Asphalt Concrete:** approximately 8 inches thick.			Analytical
		2			**Aggregate Base:** approximately 20 inches thick.			Analytical
		3						Analytical
		4			**Artificial Fill (Af):**			Analytical
		4B			**Silty Clay (CL):** yellow, moist, with fine to medium sand, trace fine gravel.			Analytical, RV, SE, CHEM
920 / 5		5	27		**Silty Sand (SM):** brown, moist, medium dense, fine to coarse grained, some coarse gravel, with clay.	107	11.3	GS
					-- yellow brown, increase gravel.			
915 / 10		6	27		-- trace gravel, decrease clay.	105	17.8	
910 / 15		7	7		**Silty Clay (CH):** mottled yellow and gray, moist, medium stiff, with fine to coarse sand.			
		8	15		-- stiff, decrease sand.			AL
905 / 20		9	14		-- trace coarse gravel.			AL
					Alluvium (Qa):			
900 / 25		10	18		**Clayey Sand (SC):** brown, moist, medium dense, fine to coarse grained, with fine gravel.			
895 / 30		11	28		**Bedrock:** **Upper Topanga Formation (Ttuc):** claystone and siltstone, mottled orange and gray, very stiff, thin-bedded, includes few thin sandstone strata, highly weathered.	95	24.8	DS
890								

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA RDLND.GDT 5/29/07

KLEINFELDER

PROJECT NO. 75010-2

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

LOG OF BORING B-3

PLATE A-4a

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Elevation (feet) Depth	Sample Type	Sample Number	Blows per Foot	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION *(Continued From Previous Page)*	Dry Density (pcf)	Moisture Content (%)	Additional Tests
		12	37		**Bedrock:** **Upper Topanga Formation (Ttuc):** claystone and siltstone, mottled orange and gray, very stiff, thin-bedded, includes few thin sandstone strata, highly weathered. *(continued)* -- hard.			
885 40		13	61		-- gray, slightly weathered, unoxidized.	112	14.1	DS
880 45		14	62					
					Total Depth: 46.5 feet. Groundwater not encountered. Boring backfilled with soil cuttings and capped with Quickset Cement.			

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA_RDLND.GDT 5/29/07

KLEINFELDER

PROJECT NO. 75010-2

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

LOG OF BORING B-3

PLATE

A-4b

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Date Drilled:	1/4/07	Water Depth:	> 1.5 feet
Drilled By:		Date Measured:	1/4/2007
Drilling Method:	Hand-Auger Boring	Elevation:	938 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL

Elevation (feet) Depth	Sample Type	Sample Number	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
		1		**Artificial Fill (Af):** **Silty Sand (SM):** brown, moist, fine to coarse grained, trace clay, with roots and leaves.			Analytical
		2		-- increase clay, with cobbles up to 8 inches diameter.			Analytical
935				Hand-Auger Boring terminated at 1.5 feet. Refusal encountered due to presence of oversize cobbles.			

KLEINFELDER

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

PLATE A-5

PROJECT NO. 75010-2

LOG OF BORING HB-1

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA RDLND.GDT 5/29/07

Date Drilled:	1/4/07	Water Depth:	> 1.5 feet
Drilled By:		Date Measured:	1/4/2007
Drilling Method:	Hand-Auger Boring	Elevation:	926 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL

Elevation (feet) Depth	Sample Type	Sample Number	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
925		1		**Artificial Fill (Af):** **Silty Sand (SM):** brown, moist, fine to coarse grained, with fine gravel, with roots.			Analytical
		2		**Clayey Sand (SC):** yellow brown, moist, fine to coarse grained, with cobbles up to 6 inches diameter. Hand-Auger Boring terminated at 1.5 feet. Refusal encountred due to presence of oversize cobbles.			Analytical

KLEINFELDER

Proposed West Side Widening
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PLATE A-6

PROJECT NO. 75010-2

LOG OF BORING HB-2

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA RDLND.GDT 5/29/07

Date Drilled:	1/4/07	Water Depth:	> 3 feet
Drilled By:		Date Measured:	1/4/2007
Drilling Method:	Hand-Auger Boring	Elevation:	924 feet (approx.)
Logged By:	M. Janousek	Datum:	MSL

Elevation (feet) Depth	Sample Type	Sample Number	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
		1		**Artificial Fill (Af):** **Silty Sand (SM):** brown, moist, fine to medium grained.			Analytical
		2		-- gray brown. -- yellow brown, with fine gravel.			Analytical
		3		**Sandy Clay (CL):** yellow brown, moist, fine to medium sand, some fine gravel.			Analytical
		4					Analytical
920				Total Depth: 3.0 feet. Boring backfilled with soil cuttings.			

GEOTECH DB 75010-2 REYES ADOBE INTERCHANGE UPDATED 5-07.GPJ KA_RDLND.GDT 5/29/07

KLEINFELDER

Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

PLATE A-7

PROJECT NO. 75010-2

LOG OF BORING HB-3

Drafted By: Reviewed By:

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed on representative intact and bulk soil samples to estimate engineering characteristics of the various earth materials encountered. Testing was performed in accordance with one of the following references:

1) ASTM Standards for Soil Testing, latest revisions
2) Caltrans California Testing Methods (CTM), latest revisions

LABORATORY MOISTURE AND UNIT WEIGHT DETERMINATIONS

Natural moisture content and dry unit weight tests were performed on soil samples collected from the borings in accordance with ASTM D2216-92 and D2937-94, respectively. The results are presented on the Logs of Borings and are summarized in Table B-1, Moisture and Unit Weight.

SIEVE ANALYSES

Sieve analyses were performed on two samples of the materials encountered at the site to evaluate the grain size distribution characteristics of the soils and to aid in their classification. Tests were performed in general accordance with ASTM Test Method D 422. Results of these tests are presented as Plate B-1, Grain Size Distribution.

WASH SIEVE

The percent passing #200 sieve of two selected soil samples were performed by wash sieving in accordance with ASTM Standard Test Method D 1140-92. The test results are summarized in Table B-2, Wash Sieve Test Results.

PLASTICITY INDEX

Plasticity index testing was performed on two soil samples to evaluate the plasticity characteristics and to aid in the classification of the soils. The tests were performed in accordance with ASTM Standard Test Method D 4318. The results are presented as Plate B-2, Plasticity Chart.

DIRECT SHEAR

Direct shear tests were conducted on four relatively undisturbed soil samples in accordance with ASTM Standard Test Method D 3080-90 to evaluate the shear strength parameters of the materials. Prior to shearing, the samples were soaked with water to saturation or near saturation moisture contents. The in-situ dry density and moisture content of the sample is presented in Table B-1 and on the boring logs. The test results are presented as Plates B-3 through B-6, Direct Shear Test.

CONSOLIDATION

Consolidation testing was performed on two select, relatively undisturbed samples. The tests were performed in general accordance with ASTM Standard Test Method D 2435. The test results are presented as Plates B-7 and B-8, Consolidation Test. The specimen was inundated at 2.14 ksf which corresponds to approximately 15 to 20 feet of overburden for a finished grade condition.

R-VALUE TEST

R-value testing was performed on one sample of the near-surface soils encountered at the site. The test was performed in general accordance with Caltrans Standard Test Method 301. The test result is presented in Table B-3, R-Value Test Result.

CORROSIVITY TESTS

A series of chemical tests were performed on one selected sample collected from a depth between approximately 2.5 to 5.0 feet below the existing grade to estimate pH, resistivity, and sulfate and chloride contents. The test results may be used by a qualified corrosion engineer to evaluate the general corrosion potential with respect to the construction materials. The results of the tests are presented in Table B-4, Corrosion Test Results.

Table B-1
Moisture and Unit Weight

Boring	Depth (ft)	Dry Unit Weight (pcf)	Moisture Content (%)
B-1	5	116	13.7
B-1	10	109	18.2
B-1	30	97	25.9
B-2	15	104	16.9
B-3	5	107	11.3
B-3	10	105	17.8
B-3	30	95	24.8

Table B-2
Wash Sieve Test Results

Boring	Depth (ft)	Percent Passing No. 200 Sieve
B-1	16	10
B-2	20	13

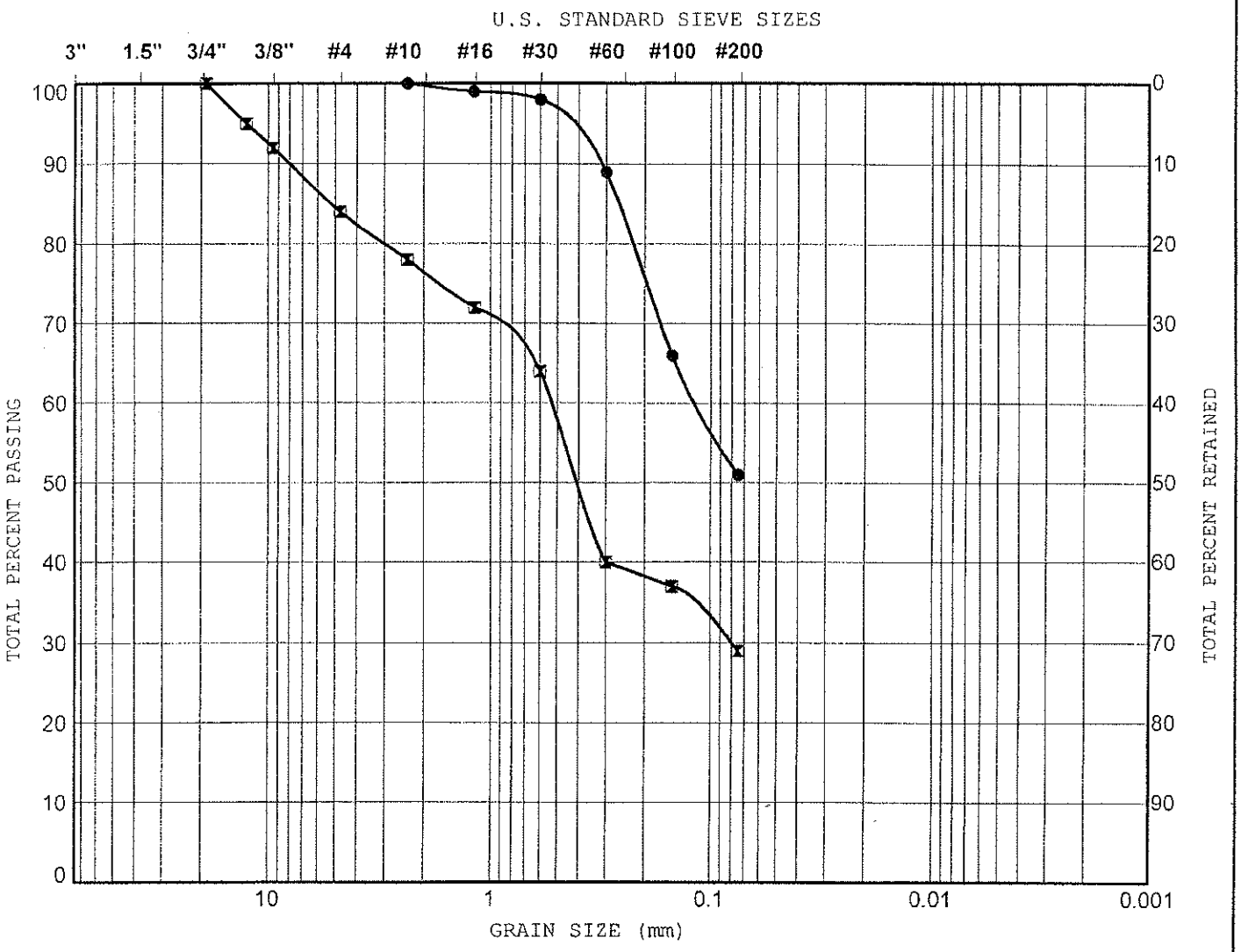
Table B-3
R-Value Test Result

Boring	Depth (ft)	R-Value
B-3	2.5 – 5	20

Table B-4
Corrosion Test Results

Boring	Depth (ft)	PH	Sulfate (ppm)	Chloride (ppm)	Resistivity (Ω-cm)
B-3	2.5 – 5	7.8	14	63	1100

SIEVE ANALYSIS	HYDROMETER



GRAVEL		SAND			SILT	CLAY
coarse	fine	coarse	medium	fine		

Symbol	Sample	Depth (ft)	Description	Classification
●	B-1	10.0	Sandy Clay	CL
⊠	B-3	5.0	Silty Sand	SM

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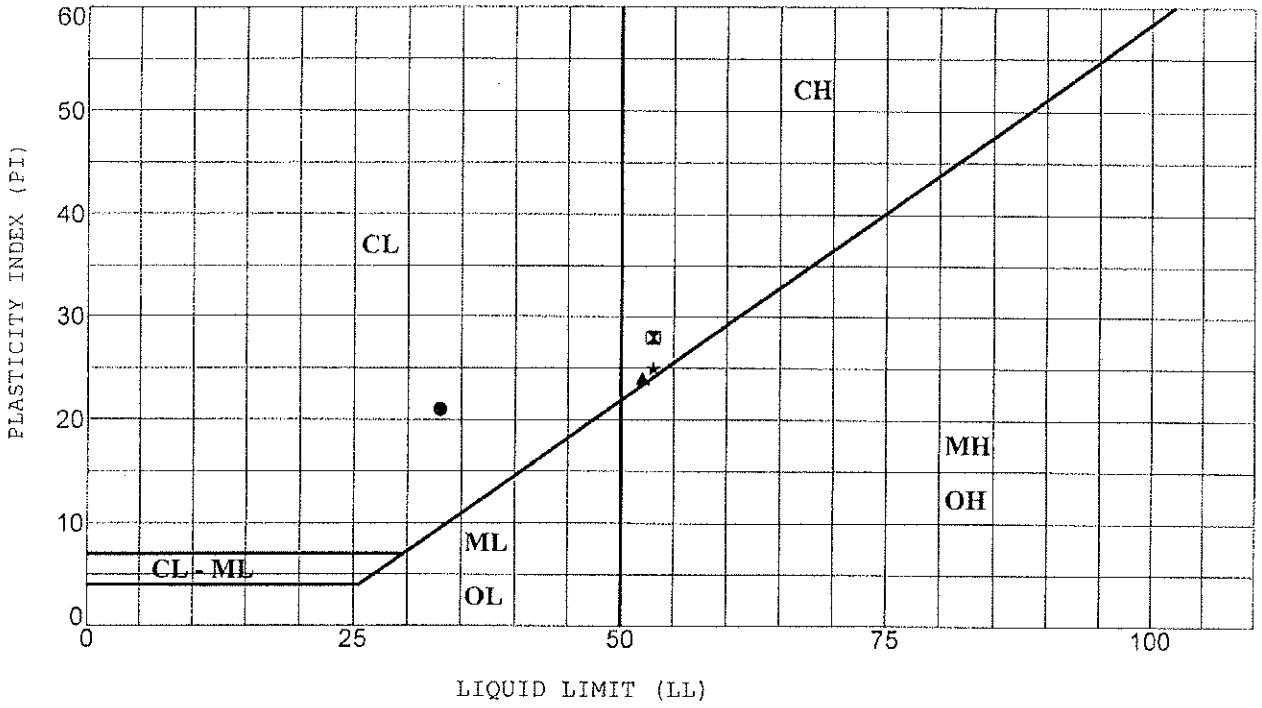
GRAIN SIZE DISTRIBUTION

PLATE

B-1



	Sample	Depth (ft)	LL (%)	PL (%)	PI (%)	LI (-)	Description
●	B-1	6.0	33	12	21		Sandy Clay (CL)
⊠	B-2	30.0	53	25	28		Weathered Bedrock (CH)
▲	B-3	16.5	52	28	24		Silty Clay (CH)
★	B-3	20.0	53	28	25		Silty Clay (CH)

LL - Liquid Limit
PL - Plasticity Limit
PI - Plasticity Index
LI - Liquidity Index

Unified Soil Classification
Fine Grained Soil Groups

	LL < 50
ML	Inorganic clayey silts to very fine sands of slight plasticity
CL	Inorganic clays of low to medium plasticity
OL	Organic silts and organic silty clays of low plasticity

	LL > 50
MH	Inorganic silts and clayey silts of high plasticity
CH	Inorganic clays of high plasticity
OH	Organic clays of medium to high plasticity, organic silts

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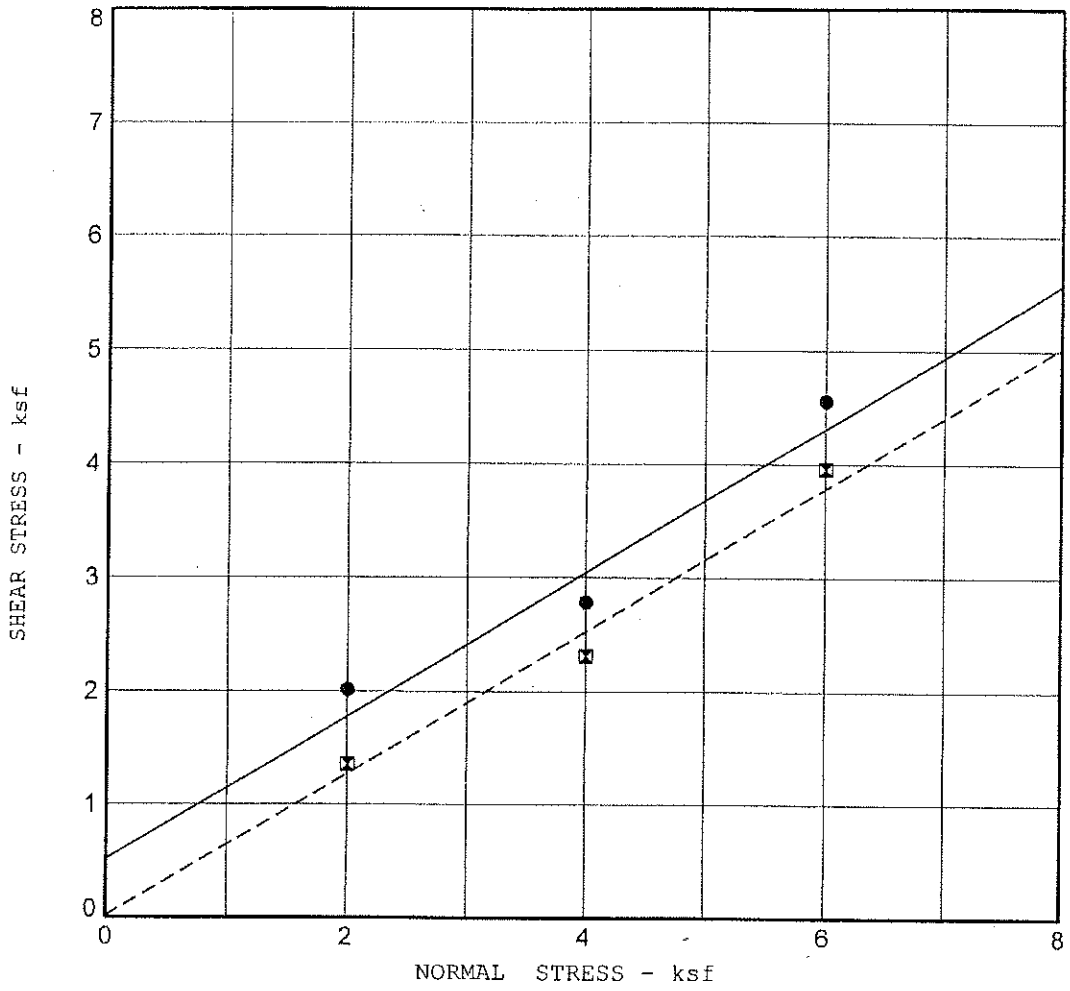
PLASTICITY CHART

PLATE

B-2



Test type	controlled - strain test		
Rate of shear - in/min	0.004		
Normal Stress - psf	2000	4000	6000
Peak Shear - psf	2016	2348	4560
Ultimate Shear - psf	1356	2316	3960

Boring	B-1
Depth - ft	30.0
Description	Weathered Bedrock
Classification	Upper Topanga Formation

	● Peak	⊠ Ultimate
Friction Angle - deg	32	33
Cohesion - ksf	0.500	0.000

Initial Moisture Content : 25.9%

Initial Dry Density : 97 pcf

Final Moisture Content : 28.1 %

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Proposed West Side Widening
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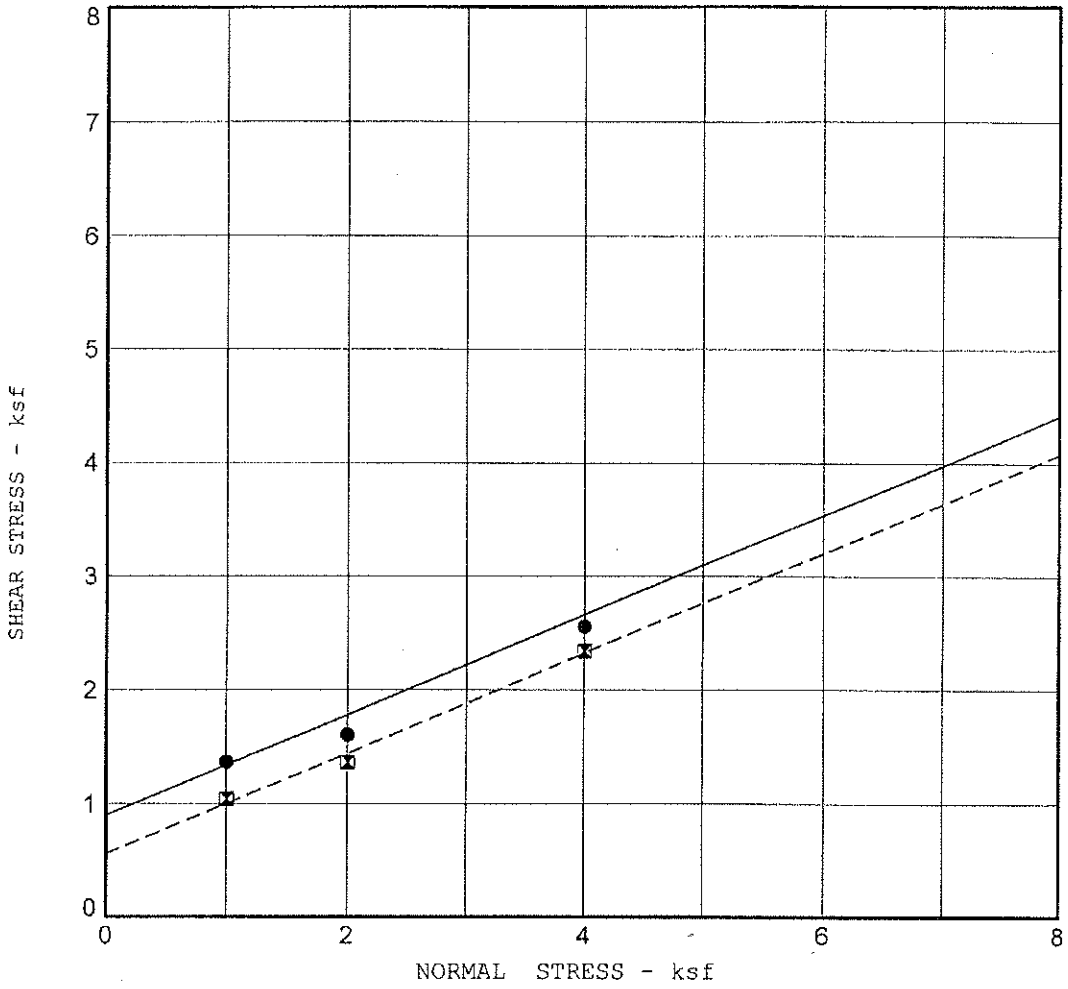
DIRECT SHEAR TEST

PLATE

B-3



Test type	controlled - strain test		
Rate of shear - in/min	0.004		
Normal Stress - psf	1000	2000	4000
Peak Shear - psf	1368	1608	2556
Ultimate Shear - psf	1044	1368	2340

Initial Moisture Content : 16.9%

Initial Dry Density : 107 pcf

Final Moisture Content : 26.6%

Boring	B-2
Depth - ft	15.0
Description	Sandy Clay
Classification	CL

	● Peak	⊠ Ultimate
Friction Angle - deg	24	24
Cohesion - ksf	0.900	0.600

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Proposed West Side Widening
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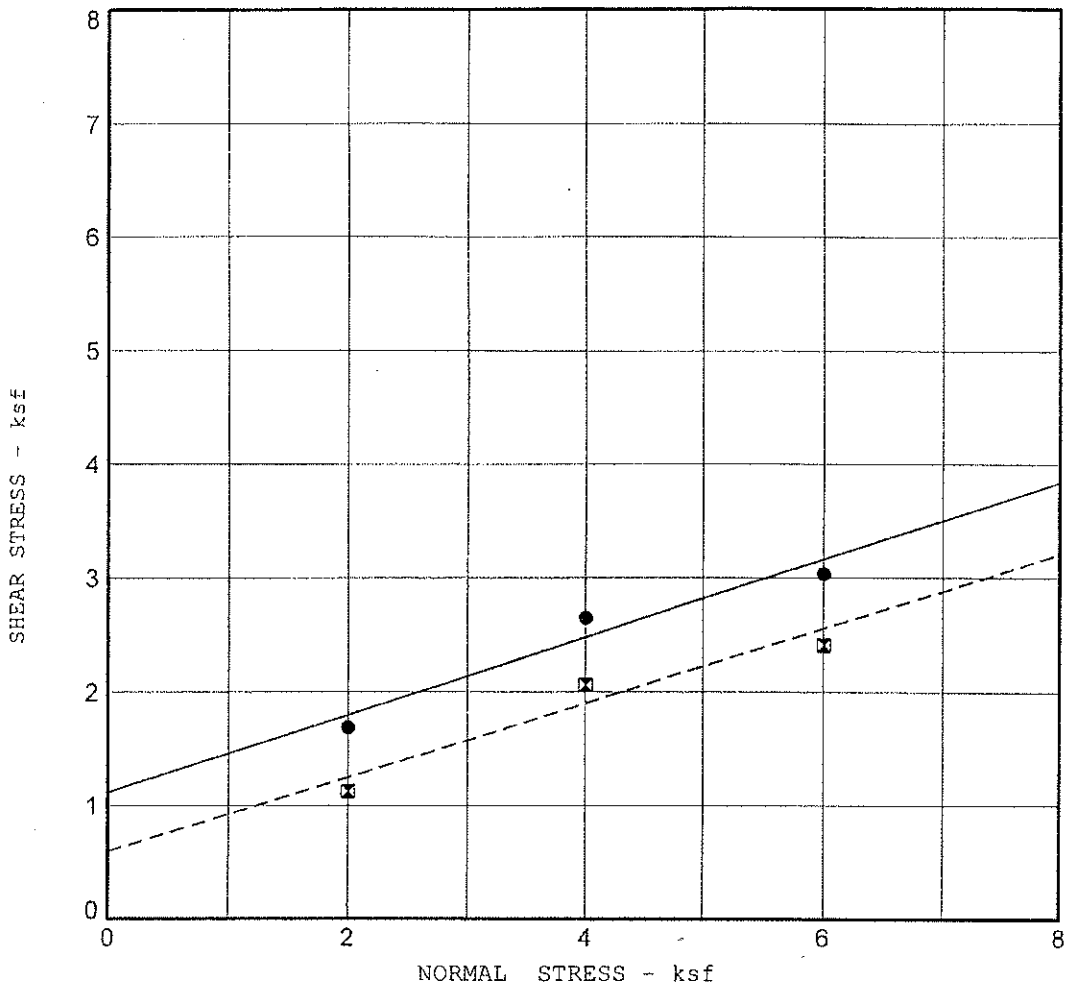
DIRECT SHEAR TEST

PLATE

B-4



Test type	controlled - strain test		
Rate of shear - in/min	0.004		
Normal Stress - psf	2000	4000	6000
Peak Shear - psf	1692	2652	3036
Ultimate Shear - psf	1128	2064	2412

Boring	B-3
Depth - ft	30.0
Description	Weathered Bedrock
Classification	Upper Topanga Formation

	● Peak	⧈ Ultimate
Friction Angle - deg	19	18
Cohesion - ksf	1.120	0.600

Initial Moisture Content : 24.8%

Initial Dry Density : 95 pcf

Final Moisture Content : 28.5 %

KLEINFELDER

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Proposed West Side Widening
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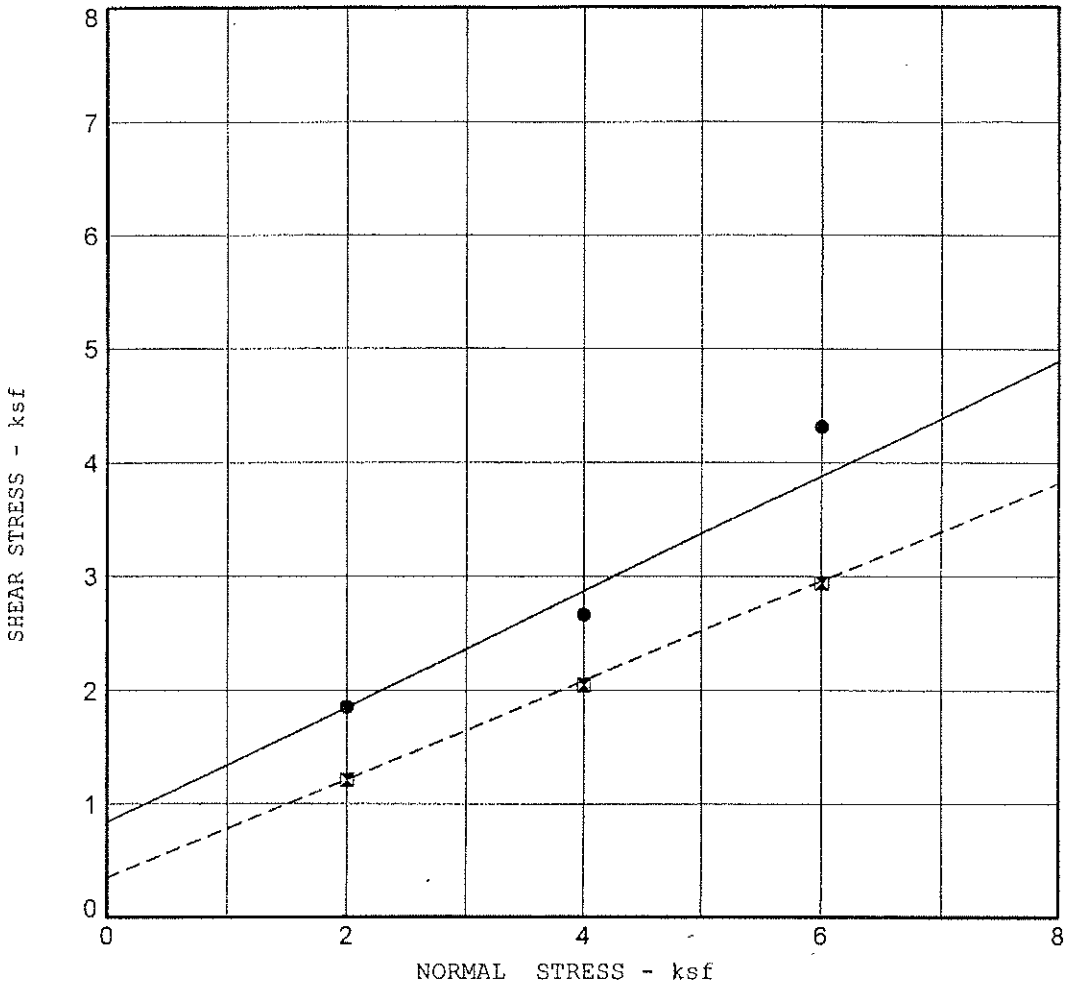
DIRECT SHEAR TEST

PLATE

B-5



Test type	controlled - strain test		
Rate of shear - in/min	0.004		
Normal Stress - psf	2000	4000	6000
Peak Shear - psf	1860	2664	4320
Ultimate Shear - psf	1212	2052	2940

Boring	B-3
Depth - ft	40.0
Description	Weathered Bedrock
Classification	Upper Topanga Formation

	● Peak	⊠ Ultimate
Friction Angle - deg	25	23
Cohesion - ksf	0.840	0.350

Initial Moisture Content : 14.0%

Initial Dry Density : 112 pcf

Final Moisture Content : 29.1 %

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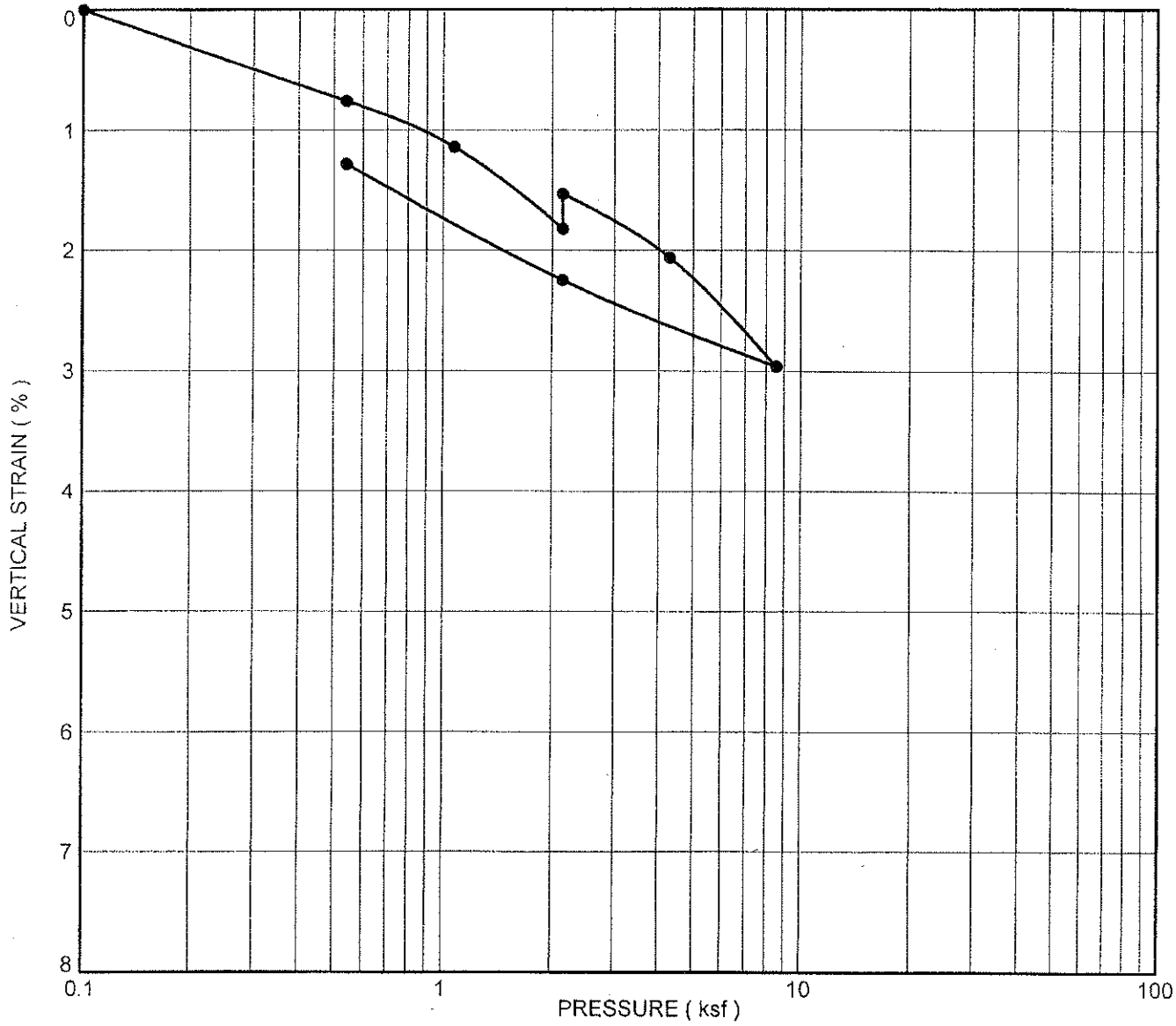
Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

DIRECT SHEAR TEST

PLATE

B-6



*Note: Sample was inudated at 2.14 ksf

Sample	B-1
Depth	10.0
Description	Sandy Clay
Classification	CL

Initial Moisture Content : 18.2 %
Initial Dry Density : 109 pcf
Final Moisture Content : 19.4 %

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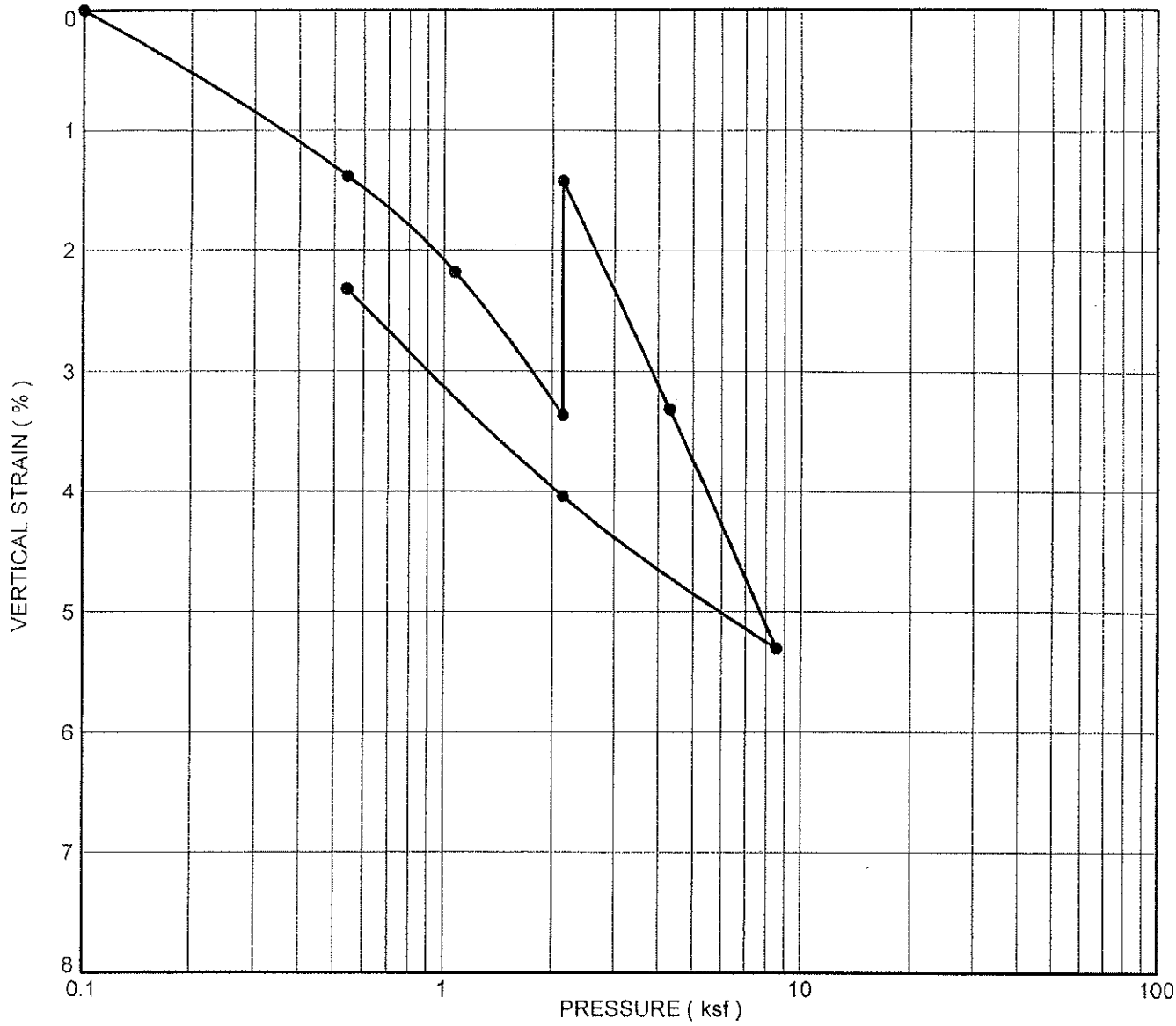
Proposed West Side Widening
Reyes Adobe Road OC
Agoura Hills, CA

CONSOLIDATION TEST

PLATE

B-7



*Note: Sample was inudated at 2.14 ksf

Sample	B-2
Depth	5.0
Description	Sandy Clay
Classification	CL

Initial Moisture Content : 20.1 %
Initial Dry Density : 97 pcf
Final Moisture Content : 19.0 %

KLEINFELDER

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Proposed West Side Widening
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CONSOLIDATION TEST

PLATE

B-8

APPENDIX C
OUTPUTS OF ENGINEERING ANALYSES

Appendix C

Including:

1. Axial Pile Capacity Analysis (APILE)
   Abutment 1, Bents 2 and 3, Bent 4, Abutment 5
2. Lateral Pile Capacity Analysis (LIPLE)
   Abutment 1, Bents 2 and 3, Bent 4, Abutment 5
3. Slope Stability Analysis (SLIDE)
   Cross Section A-A North
   Cross Section A-A South
   Cross Section B-B

Number of iterations = 7
Number of zero deflection points = 5

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 1.000000	M= 0.000	90000.0000	1.0000000	1060195.	35961.6920

Pile-head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

Deflection = 1.00000 in
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
429.800	1.00000000	1060195.	35961.69205
408.310	1.00000000	1059918.	35959.83670
386.820	1.00000000	1060088.	35962.66179
365.330	1.00000000	1059926.	35965.12312
343.840	1.00000000	1060046.	35964.27954
322.350	1.00000000	1060065.	35966.13564
300.860	1.00000000	1060101.	35964.20617
279.370	1.00000000	1059982.	35963.83531
257.880	1.00000000	1059963.	35962.37321
236.390	1.00000000	1059012.	35946.35025

The analysis ended normally.

214.900	-.002831	-43267.6980	736.5144	.0001947	770.5112	21.3074
217.049	-.002431	-41671.7028	779.2113	.0001776	760.9773	18.4292
219.198	-.002067	-39987.3554	815.9723	.0001612	750.7102	15.7830
221.347	-.001738	-38227.0002	847.2901	.0001455	740.0844	13.3635
223.496	-.001442	-36401.9719	873.6454	.0001305	729.0681	11.1644
225.645	-.001177	-34522.5443	895.5042	.0001162	717.7234	9.1789
227.794	-.000943	-32598.0423	913.3172	.0001027	706.1067	7.3991
229.943	-.000736	-30636.8316	927.5177	8.9978E-05	694.2684	5.8168
232.092	-.000556	-28646.3753	938.5206	7.8055E-05	682.2536	4.4231
234.241	-.000400	-26633.2637	946.7206	6.6938E-05	670.1020	3.2084
236.390	-.000268	-24603.2633	952.4916	5.6634E-05	657.8485	2.1626
238.539	-.000157	-22561.3617	956.1856	4.7148E-05	645.5231	1.2753
240.688	-6.55E-05	-20511.8154	958.1311	3.8486E-05	633.1516	.5353696
242.837	8.33E-06	-18458.2010	958.6320	3.0648E-05	620.7556	-.0685169
244.986	6.62E-05	-16403.4670	957.9701	2.3637E-05	608.3528	-.5402356
247.135	.000110	-14349.9888	956.3967	1.7452E-05	595.9575	-.9160157
249.284	.000141	-12299.6246	954.1398	1.2092E-05	583.5811	-1.1845
251.433	.000162	-10253.7737	952.6948	7.5567E-06	571.2319	-37.3869
253.582	.000174	-8379.7854	825.4203	3.8092E-06	559.9201	-40.1137
255.731	.000178	-6690.3985	742.0833	7.7841E-07	549.7226	-41.1678
257.880	.000177	-5190.6123	653.9162	-1.6110E-06	540.6695	-40.8863
260.029	.000171	-3879.2436	567.4672	-3.4351E-06	532.7538	-39.5688
262.178	.000162	-2750.3097	484.6817	-4.7604E-06	525.9393	-37.4768
264.327	.000151	-1794.2314	406.9816	-5.6024E-06	520.1683	-34.8359
266.476	.000138	-998.9046	335.3418	-6.2441E-06	515.3675	-31.8368
268.625	.000124	-350.5228	270.3613	-6.5155E-06	511.4537	-28.6383
270.774	.000110	165.6288	212.3296	-6.5527E-06	510.3376	-25.3698
272.923	9.58E-05	564.6045	161.2863	-6.4058E-06	512.7459	-22.1364
275.072	8.23E-05	861.3151	117.0747	-6.1190E-06	514.5369	-19.0117
277.221	6.95E-05	1070.1567	79.3891	-5.7306E-06	515.7976	-16.0610
279.370	5.77E-05	1204.7462	47.8152	-5.2731E-06	516.6100	-13.3238
281.519	4.69E-05	1277.7080	21.8650	-4.7738E-06	517.0504	-10.8272
283.668	3.72E-05	1300.5684	1.0060	-4.2553E-06	517.1884	-8.5855
285.817	2.86E-05	1283.6779	-15.3147	-3.7356E-06	517.0864	-6.6035
287.966	2.11E-05	1236.1910	-27.6514	-3.2288E-06	516.7998	-4.8778
290.115	1.47E-05	1166.0813	-36.5446	-2.7457E-06	516.3766	-3.3988
292.264	9.32E-06	1080.1845	-42.5095	-2.2939E-06	515.8501	-2.1526
294.413	4.86E-06	984.2626	-46.0281	-1.8787E-06	515.2791	-1.1220
296.562	1.25E-06	883.0826	-47.5429	-1.5032E-06	514.6683	-.2878567
298.711	-1.60E-06	780.5045	-47.4547	-1.1686E-06	514.0492	.3699921
300.860	-3.78E-06	679.5744	-46.1201	-8.7496E-07	513.4399	.8720399
303.009	-5.36E-06	582.6187	-43.8524	-6.2111E-07	512.8547	1.2384
305.158	-6.45E-06	491.3370	-40.9223	-4.0513E-07	512.3037	1.4885
307.307	-7.10E-06	406.8914	-37.5601	-2.2448E-07	511.7939	1.6405
309.456	-7.41E-06	329.9905	-33.9505	-7.6284E-08	511.3298	1.7113
311.605	-7.43E-06	260.9672	-30.2756	4.2566E-08	510.9131	1.7163
313.754	-7.23E-06	199.8496	-26.6380	1.3524E-07	510.5442	1.6691
315.903	-6.85E-06	146.4247	-23.1447	2.0408E-07	510.2217	1.5820
318.052	-6.35E-06	100.2945	-19.8099	2.5450E-07	509.9433	1.4657
320.201	-5.76E-06	60.9256	-16.8665	2.8692E-07	509.7056	1.3294
322.350	-5.11E-06	27.6914	-14.1691	3.0475E-07	509.5050	1.1809
324.499	-4.45E-06	-.0910701	-11.7967	3.1030E-07	509.3384	1.0269
326.648	-3.78E-06	-23.1309	-9.7553	3.0563E-07	509.4775	.8729573
328.797	-3.13E-06	-42.1375	-8.0398	2.9250E-07	509.5922	.7235904
330.946	-2.52E-06	-57.7991	-6.6363	2.7240E-07	509.6867	.5826347
333.095	-1.96E-06	-70.7655	-5.5232	2.4655E-07	509.7650	.4532167
335.244	-1.46E-06	-81.6393	-3.3854	2.1590E-07	509.8306	1.5364
337.393	-1.03E-06	-85.3893	-.9460479	1.8230E-07	509.8533	1.2922
339.542	-6.80E-07	-83.1911	2.1682	1.4840E-07	509.8400	1.0478
341.691	-3.97E-07	-76.1377	4.1547	1.1636E-07	509.7974	.8010171
343.840	-1.80E-07	-65.3791	5.5955	8.7894E-08	509.7325	.5398366
345.989	-1.90E-08	-52.1223	6.2391	6.4263E-08	509.6525	.0591975
348.138	9.65E-08	-38.5881	5.9800	4.6020E-08	509.5708	-.3003743
350.287	1.79E-07	-26.4380	5.0813	3.2943E-08	509.4974	-.5359924
352.436	2.38E-07	-16.7613	3.8401	2.4255E-08	509.4390	-.6191282
354.585	2.83E-07	-9.9425	2.4493	1.8884E-08	509.3979	-.6752666
356.734	3.19E-07	-6.2414	.9528205	1.5629E-08	509.3755	-.7174769
358.883	3.50E-07	-5.8533	.1793746	1.3197E-08	509.3732	-.0023428
361.032	3.76E-07	-5.4755	.1741329	1.0918E-08	509.3709	-.0025358
363.181	3.97E-07	-5.1091	.1685077	8.7898E-09	509.3687	-.0026984
365.330	4.14E-07	-4.7547	.1625610	6.8060E-09	509.3666	-.0028350
367.479	4.26E-07	-4.4130	.1563514	4.9623E-09	509.3645	-.0029490
369.628	4.35E-07	-4.0846	.1499345	3.2533E-09	509.3625	-.0030279
371.777	4.40E-07	-3.7699	.1433631	1.6736E-09	509.3606	-.0030879
373.926	4.42E-07	-3.4691	.1366868	2.1779E-10	509.3588	-.0031255
376.075	4.41E-07	-3.1825	.1299525	-1.1199E-09	509.3571	-.0031419
378.224	4.38E-07	-2.9101	.1232043	-2.3452E-09	509.3554	-.0031385
380.373	4.31E-07	-2.6520	.1164834	-3.4639E-09	509.3539	-.0031165
382.522	4.23E-07	-2.4081	.1098294	-4.4815E-09	509.3524	-.0030771
384.671	4.12E-07	-2.1783	.1032755	-5.4039E-09	509.3510	-.0030215
386.820	3.99E-07	-1.9622	.0968582	-6.2366E-09	509.3497	-.0029509
388.969	3.85E-07	-1.7596	.0906076	-6.9851E-09	509.3485	-.0028663
391.118	3.69E-07	-1.5700	.0845528	-7.6547E-09	509.3473	-.0027688
393.267	3.52E-07	-1.3932	.0787203	-8.2507E-09	509.3463	-.0026593
395.416	3.34E-07	-1.2285	.0731350	-8.7779E-09	509.3453	-.0025388
397.565	3.15E-07	-1.0755	.0678194	-9.2413E-09	509.3444	-.0024082
399.714	2.94E-07	-.9334418	.0627943	-9.6453E-09	509.3435	-.0022684
401.863	2.73E-07	-.8018330	.0580780	-9.9943E-09	509.3427	-.0021202
404.012	2.51E-07	-.6799532	.0536901	-1.0292E-08	509.3420	-.0019642
406.161	2.29E-07	-.5670915	.0496442	-1.0563E-08	509.3413	-.0018013
408.310	2.06E-07	-.4625043	.0459551	-1.0750E-08	509.3407	-.0016320
410.459	1.83E-07	-.3654182	.0426357	-1.0917E-08	509.3401	-.0014572
412.608	1.59E-07	-.2750331	.0396976	-1.1045E-08	509.3395	-.0012772
414.757	1.35E-07	-.1905253	.0371509	-1.1138E-08	509.3390	-.0010929
416.906	1.11E-07	-.1110497	.0350046	-1.1200E-08	509.3385	-.0009046
419.055	8.70E-08	-.0357430	.0256781	-1.1229E-08	509.3381	-.0077753
421.204	6.29E-08	.0036585	.0112478	-1.1236E-08	509.3379	-.0056545
423.353	3.87E-08	.0169463	.0014055	-1.1232E-08	509.3380	-.0035054
425.502	1.46E-08	.0140441	-.0037891	-1.1225E-08	509.3379	-.0013291
427.651	-9.52E-09	.0050028	-.0042775	-1.1222E-08	509.3379	.0008746
429.800	-3.36E-08	0.0000	0.0000	-1.1221E-08	509.3379	.0031064

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.01676385
Maximum bending moment	=	1060195. lbs-in
Maximum shear force	=	35961.69205 lbs
Depth of maximum bending moment	=	53.72506000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = 1.000000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 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
0.000	1.000000	0.0000	35961.6920	-.0167638	509.3379	-483.7210
2.249	.963974	79407.0102	34098.5702	-.0167479	988.6558	-505.6889
4.298	.928018	156472.	33787.7231	-.0167004	1453.8397	-528.1381
6.447	.892196	231007.	32620.1149	-.0166225	1904.2275	-551.0692
8.596	.856574	303138.	31418.7098	-.0165151	2339.1448	-574.4823
10.745	.821214	372513.	30158.4720	-.0163792	2757.9053	-598.3775
12.894	.786176	439095.	28846.3656	-.0162160	3159.8103	-622.7546
15.043	.751518	502767.	27481.3547	-.0160265	3544.1488	-647.6130
17.192	.717294	563409.	26062.4037	-.0158121	3910.1981	-672.9549
19.341	.683550	620900.	24588.4765	-.0155739	4257.2231	-698.7781
21.490	.650358	675115.	23058.5373	-.0153133	4584.4772	-725.0833
23.639	.617741	725929.	21471.5503	-.0150315	4891.2015	-751.8706
25.788	.585752	773214.	19826.4797	-.0147300	5176.6254	-779.1398
27.937	.554432	816841.	18131.9580	-.0144102	5439.9665	-797.8929
30.086	.523817	856719.	16425.2487	-.0140737	5680.6816	-790.4824
32.235	.493943	892881.	14735.6132	-.0137218	5898.9586	-782.0029
34.384	.464841	925361.	13065.2767	-.0133561	6095.0168	-772.5216
36.533	.436538	954201.	11416.3157	-.0129781	6269.1053	-762.1094
38.682	.409061	979448.	9790.6504	-.0125892	6421.5808	-750.8411
40.831	.382430	1001151.	8190.0369	-.0121909	6552.5056	-738.7945
42.980	.356664	1019365.	6616.0610	-.0117845	6662.4452	-726.0504
45.129	.331780	1034146.	5070.1328	-.0113716	6751.6665	-712.6915
47.278	.307789	1045555.	3553.4822	-.0109533	6820.5348	-698.8028
49.427	.284703	1053656.	2067.1553	-.0105311	6869.4320	-684.4703
51.576	.262527	1058513.	612.0124	-.0101063	6898.7538	-669.7809
53.725	.241266	1060195.	-811.1671	-.0096802	6908.9075	-654.7231
55.874	.220921	1058771.	-2200.7421	-.0092541	6900.3119	-638.5064
58.023	.201492	1054316.	-3554.0203	-.0088291	6873.4198	-620.9428
60.172	.182974	1046911.	-4868.1074	-.0084065	6828.7229	-602.0327
62.321	.165360	1036645.	-6140.1073	-.0079875	6766.7529	-581.7787
64.470	.148643	1023611.	-7366.8382	-.0075731	6698.0763	-559.9023
66.619	.132811	1007912.	-8513.6560	-.0071646	6593.3119	-507.4013
68.768	.117850	989791.	-9549.4479	-.0067628	6483.9296	-456.5744
70.917	.103744	969484.	-10477.8964	-.0063688	6361.3548	-407.5005
73.066	.090477	947220.	-11302.8419	-.0059833	6226.9653	-360.2477
75.215	.078028	923219.	-12028.2594	-.0056071	6082.0804	-314.8733
77.364	.066378	897692.	-12658.2362	-.0052409	5928.0004	-271.4244
79.513	.055503	870841.	-13196.9504	-.0048852	5765.9246	-229.9383
81.662	.045381	842861.	-13648.6497	-.0045406	5597.0299	-190.4426
83.811	.035987	813936.	-14017.6314	-.0042074	5422.4306	-152.9559
85.960	.027297	784241.	-14308.2234	-.0038860	5243.1852	-117.4880
88.109	.019285	753942.	-14524.7656	-.0035766	5060.2964	-84.0404
90.258	.011925	723197.	-14671.5929	-.0032796	4874.7107	-52.6068
92.407	.005190	692152.	-14753.0169	-.0029949	4687.3190	-23.1736
94.556	-.000947	660947.	-14773.3204	-.0027228	4498.9563	4.2797
96.705	-.006513	629710.	-14736.7234	-.0024632	4310.4025	29.7799
98.854	-.011534	598561.	-14647.3894	-.0022162	4122.3832	53.3601
101.003	-.016038	567612.	-14509.4039	-.0019817	3935.5702	75.0583
103.152	-.020051	536966.	-14326.7664	-.0017595	3750.5831	94.9179
105.301	-.023600	506717.	-14103.3710	-.0015496	3567.9898	112.9866
107.450	-.026711	476949.	-13843.0165	-.0013518	3388.3083	129.3163
109.599	-.029410	447742.	-13549.3709	-.0011658	3212.0076	143.9621
111.748	-.031722	419165.	-13226.0137	-.0009915	3039.5089	156.9827
113.897	-.033672	391280.	-12876.3478	-.0008285	2871.1914	168.4392
116.046	-.035283	364143.	-12503.6743	-.0006766	2707.3847	178.3951
118.195	-.036579	337801.	-12111.1477	-.0005354	2548.3800	186.9158
120.344	-.037584	312296.	-11701.7806	-.0004046	2394.4272	194.0680
122.493	-.038318	287664.	-11278.4406	-.0002840	2245.7378	199.9198
124.642	-.038804	263932.	-10843.8487	-.0001730	2102.4862	204.5399
126.791	-.039062	241124.	-10400.5774	-7.1469E-05	1964.8126	207.9974
128.940	-.039112	219258.	-9951.0507	2.1120E-05	1832.8241	210.3616
131.089	-.038971	198346.	-9497.5439	.0001051	1706.5966	211.7025
133.238	-.038660	178396.	-9042.1843	.0001809	1586.1776	212.0859
135.387	-.038194	159413.	-8586.9527	.0002488	1471.5869	211.5825
137.536	-.037590	141393.	-8133.6848	.0003093	1362.8196	210.2583
139.685	-.036865	124339.	-7684.0737	.0003627	1259.8472	208.1791
141.834	-.036031	108227.	-7239.6730	.0004095	1162.6196	205.4092
143.983	-.035105	93059.8406	-6801.8995	.0004500	1071.0673	202.0115
146.132	-.034097	78818.3768	-6372.0367	.0004846	985.1027	198.0469
148.281	-.033022	65485.3939	-5951.2392	.0005136	904.6219	193.5748
150.430	-.031890	53041.2836	-5540.5364	.0005374	829.5066	188.6522
152.579	-.030712	41464.2808	-5140.8369	.0005564	759.6253	183.3343
154.728	-.029498	30730.7267	-4752.9336	.0005710	694.8352	177.6739
156.877	-.028258	20815.3158	-4377.5080	.0005813	634.9836	171.7217
159.026	-.027000	11691.3311	-4015.1353	.0005879	579.9093	165.5260
161.175	-.025731	3330.8693	-3666.2897	.0005909	529.4437	159.1325
163.324	-.024460	-4294.9456	-3331.3493	.0005907	535.2631	152.5849
165.473	-.023193	-11215.7589	-3010.6016	.0005876	577.0386	145.9239
167.622	-.021935	-17461.7936	-2704.2485	.0005818	614.7430	139.1883
169.771	-.020692	-23063.6702	-2412.4117	.0005736	648.5552	132.4141
171.920	-.019469	-28052.2374	-2135.1378	.0005634	678.6673	125.6352
174.069	-.018271	-32458.4142	-1872.4037	.0005512	705.2639	118.8824
176.218	-.017100	-36313.0431	-1624.1217	.0005374	728.5333	112.1850
178.367	-.015961	-39646.7540	-1390.1445	.0005221	748.6543	105.5695
180.516	-.014856	-42489.8395	-1170.2701	.0005056	765.8158	99.0600
182.665	-.013788	-44872.1405	-964.2488	.0004880	780.1959	92.6787
184.814	-.012759	-46822.9415	-771.7779	.0004696	791.9713	86.4455
186.963	-.011770	-48370.8774	-592.5260	.0004504	801.3150	80.3780
189.112	-.010823	-49543.8485	-426.1101	.0004307	808.3953	74.4921
191.261	-.009919	-50368.9459	-272.1493	.0004106	813.3758	68.8014
193.410	-.009058	-50872.3061	-130.1870	.0003903	816.4146	63.3180
195.559	-.008241	-51079.4536	.2240236	.0003698	817.6645	58.0518
197.708	-.007469	-51014.4526	119.5620	.0003492	817.2722	53.0112
199.857	-.006740	-50700.6666	228.3167	.0003288	815.3781	48.2030
202.006	-.006056	-50160.3252	326.9936	.0003085	812.1165	43.6323
204.155	-.005414	-49414.5791	416.2072	.0002885	807.6150	39.3027
206.304	-.004816	-48483.4810	496.1781	.0002688	801.9947	35.2166
208.453	-.004259	-47385.9741	567.7306	.0002495	795.3699	31.3748
210.602	-.003744	-46139.8655	631.2895	.0002307	787.8482	27.7772
212.751	-.003268	-44761.9267	687.3778	.0002124	779.5306	24.4223

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 357.800 in
Distance from top of pile to bottom of layer = 417.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 417.800 in
Distance from top of pile to bottom of layer = 477.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 477.800 in
Distance from top of pile to bottom of layer = 600.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 170.20 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-86.20	.07234
2	249.80	.07234
3	249.80	.07234
4	333.80	.07234
5	333.80	.03623
6	357.80	.03623
7	357.80	.03623
8	417.80	.03623
9	417.80	.03333
10	477.80	.03333
11	477.80	.03623
12	600.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-86.200	.00000	30.00	------	------
2	249.800	.00000	30.00	------	------
3	249.800	6.25000	.00	------	------
4	333.800	6.25000	.00	------	------
5	333.800	6.25000	.00	------	------
6	357.800	6.25000	.00	------	------
7	357.800	.00000	30.00	------	------
8	417.800	.00000	30.00	------	------
9	417.800	5.56000	25.00	------	------
10	477.800	5.56000	25.00	------	------
11	477.800	3.47000	32.00	------	------
12	600.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 1.000 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleinfelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A5\
Name of input data file: A5p25mm.lpd
Name of output file: A5p25mm.lpo
Name of plot output file: A5p25mm.lpp
Name of runtime file: A5p25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:29:41

Problem Title

A5, pinned head, 1.0 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 429.80 in
Depth of ground surface below top of pile = -86.20 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -86.200 in
Distance from top of pile to bottom of layer = 249.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 249.800 in
Distance from top of pile to bottom of layer = 333.800 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 333.800 in
Distance from top of pile to bottom of layer = 357.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Number of iterations = 5
Number of zero deflection points = 4

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= .250000	M= 0.000	90000.0000	.2500000	451550.	16409.0641

Pile-head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

Deflection = .25000 in
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
429.000	.25000000	451550.17358	16409.06409
408.310	.25000000	451475.23290	16409.19244
386.820	.25000000	451537.38803	16409.06146
365.330	.25000000	451452.09435	16409.29340
343.840	.25000000	451531.28136	16410.11709
322.350	.25000000	451499.94432	16409.61582
300.860	.25000000	451540.78084	16409.54861
279.370	.25000000	451454.36845	16408.82171
257.880	.25000000	451179.83504	16403.71831
236.390	.25000000	450778.79227	16394.75533

The analysis ended normally.

214.900	-.002655	-21868.7790	-134.7326	.0001031	575.3402	19.9865
217.069	-.002438	-22131.6835	-93.3947	9.8674E-05	576.1337	18.4653
219.198	-.002231	-22308.3584	-55.2294	9.4205E-05	576.6669	17.0338
221.347	-.002033	-22405.5001	-20.1277	8.9709E-05	576.9601	15.6342
223.496	-.001845	-22429.5684	12.0240	8.5200E-05	577.0327	14.2883
225.645	-.001667	-22386.7781	41.3429	8.0694E-05	576.9036	12.9978
227.794	-.001499	-22283.0906	67.9495	7.6202E-05	576.5906	11.7641
229.943	-.001340	-22124.2074	91.9673	7.1736E-05	576.1111	10.5886
232.092	-.001190	-21915.5644	113.5218	6.7308E-05	575.4814	9.4717
234.241	-.001050	-21662.3266	132.7409	6.2926E-05	574.7171	8.4148
236.390	-.000920	-21369.3849	149.7538	5.8599E-05	573.8330	7.4184
238.539	-.000799	-21041.3521	164.6909	5.4334E-05	572.8429	6.4830
240.688	-.000686	-20682.5611	177.6835	5.0138E-05	571.7601	5.6088
242.837	-.000583	-20297.0628	188.8637	4.6018E-05	570.5966	4.7962
244.986	-.000489	-19888.6254	198.3636	4.1977E-05	569.3639	4.0450
247.135	-.000403	-19460.7337	206.3152	3.8020E-05	568.0725	3.3553
249.284	-.000325	-19016.5894	212.8506	3.4151E-05	566.7320	2.7270
251.433	-.000256	-18559.1118	279.2688	3.0372E-05	565.3513	59.0861
253.582	-.000195	-17828.0406	391.0442	2.6713E-05	563.1448	44.9393
255.731	-.000141	-16888.7371	474.3299	2.3222E-05	560.3099	32.5718
257.880	-9.48E-05	-15798.3534	532.8492	1.9935E-05	557.0190	21.8900
260.029	-5.54E-05	-14606.2627	570.1074	1.6878E-05	553.4211	12.7850
262.178	-2.22E-05	-13354.5603	589.3654	1.4066E-05	549.6434	5.1378
264.327	5.09E-06	-12078.6113	593.6217	1.1509E-05	545.7924	-1.1766
266.476	2.72E-05	-10807.6260	585.6039	9.2075E-06	541.9565	-6.2053
268.625	4.47E-05	-9565.2473	567.7663	7.1588E-06	538.2060	-10.3154
270.774	5.80E-05	-8370.1354	542.2939	5.3553E-06	534.5998	-13.3909
272.923	6.77E-05	-7236.5396	511.1101	3.7859E-06	531.1705	-15.6309
275.072	7.43E-05	-6174.8487	475.8886	2.4373E-06	527.9742	-17.1486
277.221	7.82E-05	-5192.1134	438.0676	1.2943E-06	525.0092	-18.0500
279.370	7.98E-05	-4292.5348	398.8663	3.4056E-07	522.2932	-18.4333
281.519	7.96E-05	-3477.9178	359.3018	-4.4081E-07	519.8346	-18.3881
283.668	7.79E-05	-2748.0853	320.2073	-1.0669E-06	517.6319	-17.9957
285.817	7.50E-05	-2101.2539	282.2508	-1.5545E-06	515.6797	-17.3291
287.966	7.12E-05	-1534.3703	245.9520	-1.9201E-06	513.9688	-16.4528
290.115	6.68E-05	-1043.4094	211.7011	-2.1793E-06	512.4870	-15.4233
292.264	6.19E-05	-623.6360	179.7744	-2.3469E-06	511.2201	-14.2897
294.413	5.67E-05	-269.8312	150.3507	-2.4368E-06	510.1522	-13.0939
296.562	5.14E-05	23.5136	123.5258	-2.4616E-06	509.4088	-11.8711
298.711	4.61E-05	262.0349	99.3262	-2.4328E-06	510.1287	-10.6507
300.860	4.09E-05	451.3508	77.7211	-2.3611E-06	510.7001	-9.4564
303.009	3.60E-05	596.9936	58.6342	-2.2557E-06	511.1397	-8.3071
305.158	3.13E-05	704.2412	41.9530	-2.1248E-06	511.4633	-7.2175
307.307	2.68E-05	778.1296	27.5379	-1.9758E-06	511.6863	-6.1981
309.456	2.28E-05	823.3634	15.2300	-1.8147E-06	511.8229	-5.2564
311.605	1.90E-05	844.2900	4.8574	-1.6470E-06	511.8860	-4.3969
313.754	1.57E-05	844.8778	-3.7583	-1.4772E-06	511.8878	-3.6217
315.903	1.27E-05	828.7072	-10.7991	-1.3089E-06	511.8390	-2.9307
318.052	1.01E-05	798.9697	-16.4437	-1.1452E-06	511.7492	-2.3225
320.201	7.77E-06	758.4752	-20.8670	-9.8861E-07	511.6270	-1.7940
322.350	5.81E-06	709.6659	-24.2359	-8.4097E-07	511.4797	-1.3413
324.499	4.15E-06	654.6348	-26.7079	-7.0379E-07	511.3136	-.9593363
326.648	2.78E-06	595.1478	-28.4293	-5.7811E-07	511.1341	-.6427335
328.797	1.67E-06	532.6693	-29.5342	-4.6470E-07	510.9455	-.3855312
330.946	7.80E-07	468.3897	-30.1434	-3.6404E-07	510.7515	-.1814935
333.095	1.05E-07	403.2537	-30.3645	-2.7639E-07	510.5549	-.0242047
335.244	-4.02E-07	337.9902	-29.5195	-2.0185E-07	510.3580	.8106177
337.393	-7.63E-07	276.4572	-27.4524	-1.4006E-07	510.1722	1.1131
339.542	-1.00E-06	220.0540	-24.8852	-9.0137E-08	510.0020	1.2761
341.691	-1.15E-06	169.5354	-22.0469	-5.0961E-08	509.8495	1.3654
343.840	-1.22E-06	125.3159	-19.0670	-2.1311E-08	509.7161	1.4079
345.989	-1.24E-06	87.5937	-16.0298	9.8173E-11	509.6022	1.4187
348.138	-1.22E-06	56.4198	-12.9927	1.4580E-08	509.5081	1.4079
350.287	-1.18E-06	31.7456	-9.9941	2.3445E-08	509.4337	1.3828
352.436	-1.12E-06	13.4560	-7.0588	2.7991E-08	509.3785	1.3490
354.585	-1.06E-06	1.3961	-4.2008	2.9484E-08	509.3421	1.3108
356.734	-9.95E-07	-4.6102	-1.4265	2.9161E-08	509.3518	1.2711
358.883	-9.33E-07	-4.7463	-.0529550	2.8220E-08	509.3522	.0012283
361.032	-8.74E-07	-4.8487	-.0378671	2.7255E-08	509.3525	.0060135
363.181	-8.16E-07	-4.9195	-.0236596	2.6273E-08	509.3527	.0064089
365.330	-7.61E-07	-4.9606	-.0103104	2.5279E-08	509.3528	.0060148
367.479	-7.08E-07	-4.9736	.0022039	2.4281E-08	509.3529	.0056319
369.628	-6.57E-07	-4.9605	.0139077	2.3282E-08	509.3528	.0052604
371.777	-6.08E-07	-4.9229	.0248259	2.2288E-08	509.3527	.0049008
373.926	-5.61E-07	-4.8624	.0349842	2.1304E-08	509.3525	.0045532
376.075	-5.16E-07	-4.7807	.0444085	2.0334E-08	509.3523	.0042177
378.224	-4.73E-07	-4.6794	.0531249	1.9380E-08	509.3520	.0038944
380.373	-4.33E-07	-4.5599	.0611596	1.8454E-08	509.3516	.0035833
382.522	-3.94E-07	-4.4237	.0685387	1.7550E-08	509.3512	.0032842
384.671	-3.57E-07	-4.2721	.0752879	1.6676E-08	509.3508	.0029970
386.820	-3.22E-07	-4.1066	.0814328	1.5833E-08	509.3503	.0027215
388.969	-2.89E-07	-3.9283	.0869969	1.5025E-08	509.3497	.0024573
391.118	-2.58E-07	-3.7385	.0920054	1.4255E-08	509.3491	.0022040
393.267	-2.28E-07	-3.5383	.0964810	1.3523E-08	509.3485	.0019612
395.416	-2.00E-07	-3.3290	.1004457	1.2832E-08	509.3479	.0017285
397.565	-1.73E-07	-3.1116	.1039204	1.2185E-08	509.3473	.0015053
399.714	-1.47E-07	-2.8871	.1069251	1.1583E-08	509.3466	.0012910
401.863	-1.23E-07	-2.6565	.1094781	1.1024E-08	509.3459	.0010850
404.012	-9.99E-08	-2.4208	.1115964	1.0513E-08	509.3452	.0008865
406.161	-7.78E-08	-2.1809	.1132955	1.0051E-08	509.3444	.0006949
408.310	-5.67E-08	-1.9377	.1145854	9.6365E-09	509.3437	.0005093
410.459	-3.64E-08	-1.6921	.1154903	9.2715E-09	509.3430	.0003291
412.608	-1.69E-08	-1.4450	.1160086	8.9560E-09	509.3422	.0001533
414.757	2.06E-09	-1.1970	.1161531	8.6903E-09	509.3415	-1.88368-05
416.906	2.05E-08	-.9490865	.1159306	8.4745E-09	509.3407	-.0001803
419.055	3.85E-08	-.7020069	.1106266	8.3085E-09	509.3400	-.0003479
421.204	5.62E-08	-.4568271	.0980408	8.1900E-09	509.3393	-.0004953
423.353	7.37E-08	-.2237957	.0806950	8.1135E-09	509.3387	-.0091776
425.502	9.11E-08	-.1331384	.0585087	8.0710E-09	509.2383	-.0113958
427.651	1.08E-07	-.0351038	.0317017	8.0546E-09	509.3380	-.0136278
429.800	1.26E-07	0.0000	0.0000	8.0511E-09	509.3379	-.0158767

Output Verification:

Computed forces and moments are within specified convergance limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00392257
Maximum bending moment	=	451550.17358 lbs-in
Maximum shear force	=	16409.00409 lbs
Depth of maximum bending moment	=	53.72500000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = .250000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 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
0.000	.250000	0.0000	16409.0641	-.0039226	509.3379	-274.8419
2.149	.241570	35387.1045	15811.3893	-.0039190	616.1400	-281.3934
4.298	.233156	69473.3015	15199.9862	-.0039085	719.0158	-287.6183
6.447	.224772	102229.	14575.5767	-.0038912	817.8746	-293.4979
8.596	.216432	133624.	13938.9225	-.0038675	912.6306	-299.0141
10.745	.208149	163634.	13290.8231	-.0038376	1003.2031	-304.1496
12.894	.199938	192233.	12632.1142	-.0038010	1089.5171	-308.8880
15.043	.191809	219397.	11963.6660	-.0037604	1171.5032	-313.2137
17.192	.183776	245107.	11286.3809	-.0037137	1249.0979	-317.1122
19.341	.175848	269343.	10601.1916	-.0036620	1322.2439	-320.5697
21.490	.168036	292008.	9909.0595	-.0036055	1390.8900	-323.5737
23.639	.160351	313327.	9210.9720	-.0035446	1454.9919	-326.1123
25.788	.152802	333048.	8507.9406	-.0034796	1514.5114	-328.1747
27.937	.145396	351240.	7800.9992	-.0034108	1569.4178	-329.7513
30.086	.138142	367896.	7091.2033	-.0033385	1619.6867	-330.8331
32.235	.131047	383009.	6379.6187	-.0032630	1665.3012	-331.4123
34.384	.124117	396577.	5667.3389	-.0031846	1706.2515	-331.4819
36.533	.117359	408599.	4955.4634	-.0031036	1742.5349	-331.0359
38.682	.110778	419077.	4245.1060	-.0030204	1774.1563	-330.0691
40.831	.104378	428013.	3537.3908	-.0029352	1801.1280	-328.5770
42.980	.098162	435416.	2843.7023	-.0028484	1823.4696	-317.0149
45.129	.092135	441337.	2178.0333	-.0027603	1841.3414	-302.5002
47.278	.086299	445845.	1543.5685	-.0026710	1854.9451	-287.9743
49.427	.080655	449005.	940.2915	-.0025811	1864.4827	-273.4747
51.576	.075205	450884.	368.1077	-.0024906	1870.1557	-259.0371
53.725	.069950	451550.	-173.1530	-.0023998	1872.1653	-244.6955
55.874	.064891	451068.	-683.7318	-.0023091	1870.7113	-230.4825
58.023	.060026	449505.	-1163.9381	-.0022185	1865.9910	-216.4208
60.172	.055356	446924.	-1614.1450	-.0021284	1858.2029	-202.5633
62.321	.050878	443390.	-2034.7863	-.0020308	1847.5382	-188.9131
64.470	.046593	438967.	-2426.3521	-.0019501	1834.1883	-175.5036
66.619	.042497	433716.	-2789.3849	-.0018623	1818.3406	-162.3585
68.768	.038588	427699.	-3124.4764	-.0017757	1800.1791	-149.4995
70.917	.034865	420974.	-3432.2627	-.0016904	1779.8036	-136.9466
73.066	.031323	413601.	-3713.4213	-.0016065	1757.6298	-124.7180
75.215	.027960	405635.	-3968.6669	-.0015241	1733.5892	-112.8302
77.364	.024773	397133.	-4198.7477	-.0014434	1707.9283	-101.2980
79.513	.021757	388147.	-4404.4417	-.0013644	1680.8088	-90.1343
81.662	.018909	378730.	-4586.5531	-.0012873	1652.3875	-79.3505
83.811	.016224	368932.	-4745.9090	-.0012121	1622.8157	-68.9564
85.960	.013699	358801.	-4883.3553	-.0011389	1592.2394	-58.9601
88.109	.011329	348384.	-4999.7542	-.0010678	1560.7993	-49.3683
90.258	.009109	337725.	-5095.9803	-.0009988	1528.6301	-40.1860
92.407	.007036	326868.	-5172.9178	-.0009320	1495.8611	-31.4170
94.556	.005104	315853.	-5231.4572	-.0008674	1462.6159	-23.0636
96.705	.003308	304719.	-5272.4928	-.0008050	1429.0122	-15.1268
98.854	.001644	293503.	-5296.9195	-.0007448	1395.1618	-7.6063
101.003	.000107	282241.	-5305.6305	-.0006869	1361.1710	-.5006941
103.152	-.001308	270965.	-5299.5145	-.0006313	1327.1400	6.1926
105.301	-.002606	259708.	-5279.4535	-.0005779	1293.1635	12.4774
107.450	-.003792	248498.	-5246.3207	-.0005268	1259.3305	18.3582
109.599	-.004870	237363.	-5200.9780	-.0004780	1225.7242	23.8407
111.748	-.005846	226329.	-5144.2744	-.0004313	1192.4223	28.9314
113.897	-.006724	215419.	-5077.0439	-.0003869	1159.4971	33.6377
116.046	-.007509	204657.	-5000.1042	-.0003447	1127.0154	37.9675
118.195	-.008206	194062.	-4914.2546	-.0003046	1095.0389	41.9297
120.344	-.008818	183654.	-4820.2753	-.0002666	1063.6241	45.5337
122.493	-.009351	173448.	-4718.9252	-.0002307	1032.8224	48.7893
124.642	-.009810	163461.	-4610.9418	-.0001968	1002.6803	51.7071
126.791	-.010197	153706.	-4497.0393	-.0001649	973.2398	54.2980
128.940	-.010518	144196.	-4377.9082	-.0001349	944.5380	56.5732
131.089	-.010777	134942.	-4254.2143	-.0001069	916.6078	58.5444
133.238	-.010978	125953.	-4126.5982	-8.0644E-05	889.4778	60.2235
135.387	-.011124	117237.	-3995.6747	-5.6109E-05	863.1725	61.6225
137.536	-.011219	108801.	-3862.0323	-3.3460E-05	837.7122	62.7538
139.685	-.011268	100651.	-3726.2330	-1.2398E-05	813.1139	63.6299
141.834	-.011273	92790.8155	-3588.8119	7.0541E-06	789.3906	64.2631
143.983	-.011237	85223.6797	-3450.2775	2.4955E-05	766.5522	64.6661
146.132	-.011165	77951.8700	-3311.1109	4.1363E-05	744.6051	64.8524
148.281	-.011060	70976.5250	-3171.7667	5.6339E-05	723.5527	64.8324
150.430	-.010923	64297.8238	-3032.6726	6.9942E-05	703.3957	64.6186
152.579	-.010759	57915.0435	-2894.2297	8.2231E-05	684.1338	64.2253
154.728	-.010570	51826.6158	-2756.8132	9.3266E-05	665.7562	63.6636
156.877	-.010358	46030.1833	-2620.7719	.0001031	648.2620	62.9454
159.026	-.010127	40522.6547	-2486.4294	.0001118	631.6396	62.0825
161.175	-.009878	35300.2592	-2354.0845	.0001194	615.8779	61.0864
163.324	-.009613	30358.5999	-2224.0112	.0001260	600.9634	59.9684
165.473	-.009336	25692.7057	-2096.4596	.0001317	586.8812	58.7394
167.622	-.009047	21297.0825	-1971.6569	.0001364	573.6148	57.4102
169.771	-.008750	17165.7626	-1849.8073	.0001403	561.1460	55.9910
171.920	-.008444	13292.3528	-1731.0933	.0001433	549.4556	54.4920
174.069	-.008134	9670.0812	-1615.6760	.0001456	538.5232	52.9229
176.218	-.007818	6291.8418	-1503.6962	.0001472	528.3273	51.2929
178.367	-.007501	3150.2383	-1395.2750	.0001482	518.8456	49.6110
180.516	-.007182	237.6261	-1290.5145	.0001485	510.0550	47.8860
182.665	-.006862	-2453.8484	-1189.4987	.0001483	516.7438	46.1259
184.814	-.006544	-4932.2087	-1092.2944	.0001476	524.2238	44.3388
186.963	-.006228	-7205.6118	-998.9518	.0001463	531.0852	42.5320
189.112	-.005915	-9282.3134	-909.5054	.0001447	537.3529	40.7127
191.261	-.005606	-11170.6348	-823.9750	.0001426	543.0521	38.8875
193.410	-.005302	-12878.9311	-742.3662	.0001402	548.2079	37.0630
195.559	-.005004	-14415.5623	-664.6713	.0001375	552.8456	35.2449
197.708	-.004711	-15788.8644	-590.8704	.0001344	556.9904	33.4391
199.857	-.004426	-17007.1241	-520.9316	.0001311	560.6672	31.6506
202.006	-.004148	-18078.5536	-454.8123	.0001276	563.9009	29.8844
204.155	-.003877	-19011.2680	-392.4598	.0001239	566.7159	28.1450
206.304	-.003615	-19813.2636	-333.8118	.0001200	569.1364	26.4366
208.453	-.003362	-20492.3989	-278.7976	.0001159	571.1861	24.7632
210.602	-.003117	-21056.3756	-227.3382	.0001117	572.8803	23.1283
212.751	-.002881	-21512.7223	-179.3475	.0001075	574.2656	21.5350

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 357.800 in
Distance from top of pile to bottom of layer = 417.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 417.800 in
Distance from top of pile to bottom of layer = 477.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 477.800 in
Distance from top of pile to bottom of layer = 600.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 170.20 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-86.20	.07234
2	249.80	.07234
3	249.80	.07234
4	333.80	.07234
5	333.80	.03623
6	357.80	.03623
7	357.80	.03623
8	417.80	.03623
9	417.80	.03333
10	477.80	.03333
11	477.80	.03623
12	600.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-86.200	.00000	30.00	------	------
2	249.800	.00000	30.00	------	------
3	249.900	6.25000	.00	------	------
4	333.800	6.25000	.00	------	------
5	333.900	6.25000	.00	------	------
6	357.800	6.25000	.00	------	------
7	357.800	.00000	30.00	------	------
8	417.800	.00000	30.00	------	------
9	417.800	5.56000	25.00	------	------
10	477.800	5.56000	25.00	------	------
11	477.800	3.47000	32.00	------	------
12	600.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = .250 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleinfelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A5\
Name of input data file: A5p6mm.lpd
Name of output file: A5p6mm.lpo
Name of plot output file: A5p6mm.lpp
Name of runtime file: A5p6mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:28:42

Problem Title

A5, pinned head, 0.25 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 429.80 in
Depth of ground surface below top of pile = -86.20 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -86.200 in
Distance from top of pile to bottom of layer = 249.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 249.800 in
Distance from top of pile to bottom of layer = 333.800 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 333.800 in
Distance from top of pile to bottom of layer = 357.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Number of iterations = 7
Number of zero deflection points = 5

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= 1.000000	S= 0.000	90000.0000	1.0000000	-2998071.	78270.8245

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = 1.00000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
429.800	1.00000000	-2998071.	78270.82446
408.310	1.00000000	-2998271.	78273.57771
386.820	1.00000000	-2998182.	78267.39492
365.330	1.00000000	-2998535.	78274.47786
343.840	1.00000000	-2998527.	78270.81258
322.350	1.00000000	-2998588.	78269.96375
300.860	1.00000000	-2998782.	78273.23172
279.370	1.00000000	-2998646.	78267.20608
257.880	1.00000000	-2998388.	78256.56089
236.390	1.00000000	-2998602.	78246.02222

The analysis ended normally.

214.900	-.009541	-38623.2312	-700.1574	.0003805	742.4660	71.8234
217.049	-.008740	-40032.1201	-551.7830	.0003647	750.0004	66.2628
219.198	-.007974	-41133.8799	-415.1686	.0003484	757.6309	60.8803
221.347	-.007243	-41951.2825	-289.9152	.0003317	762.5649	55.6887
223.496	-.006548	-42508.2396	-175.6010	.0003147	765.9268	50.6995
225.645	-.005889	-42827.7495	-71.7813	.0002975	767.8555	45.9220
227.794	-.005269	-42931.8507	22.0078	.0002803	768.4838	41.3644
229.943	-.004686	-42841.5828	106.2464	.0002630	767.9390	37.0334
232.092	-.004139	-42576.9542	181.4269	.0002459	766.3416	32.9344
234.241	-.003629	-42156.9158	248.0521	.0002288	763.8062	29.0714
236.390	-.003155	-41599.3400	306.6327	.0002120	760.4405	25.4475
238.539	-.002718	-40921.0062	357.6847	.0001954	756.3459	22.0647
240.688	-.002316	-40137.5897	401.7268	.0001791	751.6171	18.9239
242.837	-.001948	-39263.6562	439.2799	.0001631	746.3418	16.0253
244.986	-.001615	-38312.6601	470.8632	.0001475	740.6014	13.3682
247.135	-.001314	-37296.9465	496.9944	.0001323	734.4703	10.9512
249.284	-.001046	-36227.7563	518.1875	.0001175	728.0165	8.7724
251.433	-.000809	-35115.2351	623.0724	.0001032	721.3011	88.0403
253.582	-.000603	-33589.6996	807.2242	8.9353E-05	712.0926	82.5435
255.731	-.000425	-31680.3488	977.2207	7.6226E-05	700.5673	75.6664
257.880	-.000275	-29419.0906	1126.7257	6.3938E-05	686.9179	63.4820
260.029	-.000150	-26862.3712	1232.2187	5.2619E-05	671.4850	34.6873
262.178	-4.87E-05	-24143.3690	1281.5834	4.2361E-05	655.0725	11.2548
264.327	3.19E-05	-21370.5118	1285.7700	3.3208E-05	638.3349	-7.3584
266.476	9.40E-05	-18629.9747	1254.5407	2.5163E-05	621.7924	-21.7057
268.625	.000140	-15988.2294	1196.4750	1.8201E-05	605.8463	-32.3341
270.774	.000172	-13494.5657	1118.9981	1.2272E-05	590.7940	-39.7710
272.923	.000193	-11183.5227	1028.4236	7.3084E-06	576.8440	-44.5142
275.072	.000204	-9077.1853	930.0747	3.2337E-06	564.1297	-47.0250
277.221	.000207	-7187.3126	826.2670	-3.7298E-08	552.7220	-47.7238
279.370	.000203	-5517.2791	726.4992	-2.5924E-06	542.6414	-46.9880
281.519	.000196	-4063.8163	627.4961	-4.5193E-06	533.8679	-45.1508
283.668	.000184	-2818.5528	533.3127	-5.9036E-06	526.3513	-42.5024
285.817	.000170	-1768.3546	445.4253	-6.8261E-06	520.0181	-39.2914
287.966	.000155	-901.4742	364.8180	-7.3632E-06	514.7794	-35.7271
290.115	.000138	-198.5188	292.0634	-7.5844E-06	510.5362	-31.9830
292.264	.000122	356.7482	227.3977	-7.5526E-06	511.4913	-28.1992
294.413	.000106	781.7579	170.7868	-7.3237E-06	514.0567	-24.4866
296.562	9.06E-05	1093.6227	121.9866	-6.9465E-06	515.9392	-20.9301
298.711	7.62E-05	1308.7432	80.5947	-6.4633E-06	517.2377	-17.5919
300.860	6.29E-05	1442.5191	46.0961	-5.9100E-06	518.0452	-14.5149
303.009	5.08E-05	1509.1501	17.9004	-5.3164E-06	518.4474	-11.7258
305.158	4.00E-05	1521.5215	-4.6253	-4.7069E-06	518.5220	-9.2381
307.307	3.05E-05	1491.0912	-22.1312	-4.1010E-06	518.3304	-7.0540
309.456	2.24E-05	1427.9781	-35.2633	-3.5140E-06	517.9574	-5.1676
311.605	1.54E-05	1340.8890	-44.6477	-2.9571E-06	517.4318	-3.5662
313.754	9.67E-06	1237.2260	-50.8785	-2.4386E-06	516.8060	-2.2325
315.903	4.96E-06	1123.1566	-54.5085	-1.9639E-06	516.1175	-1.1458
318.052	1.23E-06	1003.7084	-56.0439	-1.5362E-06	515.3965	-.2832395
320.201	-1.64E-06	882.8740	-55.9411	-1.1567E-06	514.6671	.3789416
322.350	-3.75E-06	763.7210	-54.6046	-8.2559E-07	513.9478	.8648872
324.499	-5.19E-06	648.5028	-52.3876	-5.4157E-07	513.2524	1.1984
326.648	-6.07E-06	538.7685	-49.5931	-3.0280E-07	512.5900	1.4024
328.797	-6.49E-06	435.4690	-46.4756	-1.0686E-07	511.9664	1.4989
330.946	-6.53E-06	339.0579	-43.2441	4.8905E-08	511.3845	1.5085
333.095	-6.28E-06	249.5870	-40.0040	1.6729E-07	510.8464	1.4504
335.244	-5.81E-06	166.7948	-35.2160	2.5103E-07	510.3467	3.0623
337.393	-5.20E-06	90.1317	-28.8123	3.0431E-07	509.9302	2.8974
339.542	-4.51E-06	42.8417	-22.8009	3.3266E-07	509.5965	2.6972
341.691	-3.77E-06	.0047112	-17.2500	3.4128E-07	509.3379	2.4688
343.840	-3.04E-06	-31.4306	-12.2151	3.2496E-07	509.5276	2.2169
345.989	-2.33E-06	-52.6254	-7.7447	3.1805E-07	509.6555	1.9436
348.138	-1.67E-06	-64.8402	-3.8864	2.9443E-07	509.7293	1.6471
350.287	-1.07E-06	-69.4432	-.6988775	2.6742E-07	509.7570	1.3185
352.436	-5.22E-07	-67.9517	1.7135	2.3879E-07	509.7480	.9275450
354.585	-3.61E-08	-63.1713	2.8843	2.1362E-07	509.7131	.1620714
356.734	3.96E-07	-55.6377	2.2113	1.0993E-07	509.6737	-.7884250
358.883	7.80E-07	-52.7407	1.3576	1.6813E-07	509.6562	-.0060419
361.032	1.12E-06	-49.8676	1.3418	1.4750E-07	509.6309	-.0087234
363.181	1.41E-06	-47.0309	1.3204	1.2801E-07	509.6217	-.0111029
365.330	1.67E-06	-44.2419	1.2943	1.0965E-07	509.6049	-.0131927
367.479	1.89E-06	-41.5103	1.2640	9.2407E-08	509.5894	-.0150056
369.628	2.07E-06	-38.8447	1.2301	7.6296E-08	509.5723	-.0165542
371.777	2.21E-06	-36.2526	1.1932	6.1143E-08	509.5567	-.0178514
373.926	2.33E-06	-33.7402	1.1537	4.7067E-08	509.5415	-.0189100
376.075	2.42E-06	-31.3124	1.1121	3.3984E-08	509.5269	-.0197427
378.224	2.47E-06	-28.9734	1.0690	2.1860E-08	509.5128	-.0203620
380.373	2.51E-06	-26.7261	1.0248	1.0658E-08	509.4992	-.0207802
382.522	2.52E-06	-24.5728	.9799300	-.4070E-10	509.4862	-.0210097
384.671	2.51E-06	-22.5145	.9347238	-9.1292E-09	509.4738	-.0210622
386.820	2.48E-06	-20.5518	.8895825	-1.7790E-08	509.4619	-.0209493
388.969	2.43E-06	-18.6842	.8448493	-2.5681E-08	509.4506	-.0206823
391.118	2.37E-06	-16.9107	.8008437	-3.2840E-08	509.4399	-.0202722
393.267	2.29E-06	-15.2295	.7578617	-3.9304E-08	509.4298	-.0197296
395.416	2.20E-06	-13.6382	.7161773	-4.5109E-08	509.4202	-.0190646
397.565	2.10E-06	-12.1339	.6760428	-5.0293E-08	509.4111	-.0182872
399.714	1.99E-06	-10.7131	.6376897	-5.4887E-08	509.4025	-.0174068
401.863	1.86E-06	-9.3719	.6013294	-5.8927E-08	509.3944	-.0164325
404.012	1.73E-06	-8.1058	.5671541	-6.2442E-08	509.3868	-.0153732
406.161	1.60E-06	-6.9101	.5353376	-6.5462E-08	509.3796	-.0142373
408.310	1.45E-06	-5.7796	.5060356	-6.8014E-08	509.3727	-.0130330
410.459	1.30E-06	-4.7088	.4793867	-7.0123E-08	509.3663	-.0117682
412.608	1.15E-06	-3.6921	.4555130	-7.1813E-08	509.3601	-.0104503
414.757	9.94E-07	-2.7233	.4345202	-7.3103E-08	509.3543	-.0090869
416.906	8.36E-07	-1.7962	.4164986	-7.4012E-08	509.3487	-.0076851
419.055	6.76E-07	-.9045302	.3270476	-7.4555E-08	509.3433	-.0748193
421.204	5.15E-07	-.3582962	.1850330	-7.4809E-08	509.3400	-.0573487
423.353	3.55E-07	-.0768822	.0816040	-7.4896E-08	509.3383	-.0396536
425.502	1.94E-07	.0214092	.0156141	-7.4908E-08	509.3380	-.0217609
427.651	3.26E-08	.0152027	-.0117221	-7.4898E-08	509.3380	-.0036800
429.800	-1.28E-07	0.0000	0.0000	-7.4896E-08	509.3379	.0145893

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.00003362
Maximum bending moment	=	-2998071. lbs-in
Maximum shear force	=	78278.82446 lbs
Depth of maximum bending moment	=	0.00000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = 1.000000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 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
0.000	1.000000	-2998071.	78270.8245	0.0000	18606.3446	-483.7218
2.149	.998704	-2830918.	77183.9103	-.0011723	17597.3731	-505.6889
4.298	.994962	-2665880.	76073.2523	-.0022778	16601.1692	-528.1379
6.447	.988814	-2503074.	74913.6445	-.0033173	15618.4360	-551.0690
8.596	.980704	-2342618.	73704.2400	-.0042919	14649.8892	-574.4820
10.745	.970468	-2184633.	72444.0028	-.0052023	13696.2569	-598.3771
12.894	.958244	-2029241.	71131.8973	-.0060498	12758.2794	-622.7542
15.043	.944466	-1876568.	69766.9874	-.0068353	11836.7091	-647.6133
17.192	.928966	-1726739.	68347.9375	-.0075600	10932.3108	-672.9544
19.341	.911973	-1579884.	66874.0116	-.0082250	10045.8613	-698.7775
21.490	.893615	-1436133.	65344.0739	-.0088316	9178.1493	-725.0826
23.639	.874015	-1295619.	63757.0885	-.0093810	8329.8756	-751.8698
25.788	.853295	-1158476.	62112.0196	-.0098745	7502.1530	-779.1390
27.937	.831574	-1024842.	60407.8313	-.0103136	6695.5061	-806.8902
30.086	.808967	-894854.	58643.4877	-.0106997	5910.8711	-835.1234
32.235	.785587	-768653.	56817.9530	-.0110342	5149.0963	-863.8386
34.384	.761542	-646382.	54930.1913	-.0113188	4411.0412	-893.0359
36.533	.736939	-528105.	52979.1667	-.0115550	3697.5773	-922.7152
38.682	.711879	-414208.	50963.8434	-.0117446	3009.5874	-952.8766
40.831	.686461	-304599.	48883.1853	-.0118891	2347.9658	-983.5200
42.980	.660779	-199509.	46736.1567	-.0119905	1713.6183	-1014.6454
45.129	.634925	-99089.1924	44521.7215	-.0120506	1107.4610	-1046.2528
47.278	.608986	-3493.3610	42238.8440	-.0120712	530.4245	-1078.3424
49.427	.583043	87122.7403	39886.4881	-.0120544	1035.2297	-1110.9139
51.576	.557176	172602.	37472.6674	-.0120021	1551.1989	-1138.5456
53.725	.531458	252823.	35041.5745	-.0119166	2035.4320	-1126.9885
55.874	.505959	327820.	32630.5615	-.0117998	2488.1300	-1116.8580
58.023	.480743	397633.	30242.9113	-.0116539	2909.5400	-1105.2455
60.172	.455870	462312.	27881.7045	-.0114810	3299.9530	-1092.2480
62.321	.431397	521910.	25549.8080	-.0112830	3659.7008	-1077.9674
64.470	.407376	576489.	23249.8653	-.0110621	3989.1536	-1062.5098
66.619	.383852	626117.	20984.2878	-.0108203	4288.7167	-1045.8849
68.768	.360870	670865.	18755.2479	-.0105594	4558.8274	-1028.5055
70.917	.338468	710812.	16564.6732	-.0102815	4799.9520	-1010.1667
73.066	.316680	746038.	14414.2422	-.0099886	5012.5824	-991.1452
75.215	.295537	776628.	12305.3813	-.0096823	5197.2328	-971.4987
77.364	.275065	802671.	10239.2638	-.0093647	5354.4366	-951.3653
79.513	.255288	824259.	8216.9103	-.0090375	5484.7428	-930.8623
81.662	.236222	841483.	6239.0659	-.0087025	5588.7127	-909.7561
83.811	.217884	854442.	4308.2462	-.0083614	5666.9267	-887.1931
85.960	.200285	863234.	2428.7125	-.0080160	5720.0077	-862.0259
88.109	.183432	867900.	643.5701	-.0076678	5748.6532	-799.3443
90.258	.167329	868966.	-1000.4801	-.0073185	5754.6081	-738.1616
92.407	.151977	866476.	-2530.7932	-.0069695	5739.5777	-678.6026
94.556	.137374	860785.	-3926.9781	-.0066221	5705.2233	-620.7784
96.705	.123515	852160.	-5200.8698	-.0062776	5653.1596	-564.7075
98.854	.110393	840860.	-6356.4964	-.0059371	5584.9515	-510.7152
101.003	.097997	827136.	-7398.0627	-.0056017	5502.1115	-458.8345
103.152	.086317	811230.	-8329.9131	-.0052722	5406.0881	-408.6064
105.301	.075338	793374.	-9156.5110	-.0049494	5298.3332	-360.6804
107.450	.065044	773790.	-9892.4172	-.0046343	5180.1012	-314.8946
109.599	.055419	752692.	-10512.2585	-.0043273	5052.7478	-271.2769
111.748	.046445	730282.	-11050.7136	-.0040290	4917.4786	-229.8447
113.897	.038103	706754.	-11502.4879	-.0037400	4775.4593	-190.6060
116.046	.030371	682291.	-11872.2939	-.0034607	4627.7946	-153.5597
118.195	.023229	657066.	-12164.8350	-.0031913	4475.5289	-118.6963
120.344	.016655	631241.	-12384.7770	-.0029322	4319.6450	-85.9981
122.493	.010626	604970.	-12536.7526	-.0026836	4161.0689	-55.4403
124.642	.005121	578396.	-12625.3252	-.0024456	4000.6625	-26.9911
126.791	.000115	551652.	-12654.9853	-.0022183	3839.2320	-.6125593
128.940	-.004414	524863.	-12630.1358	-.0020018	3677.5255	23.7392
131.089	-.008489	498142.	-12555.0796	-.0017961	3516.2342	46.1130
133.238	-.012133	471596.	-12434.0097	-.0016011	3355.9944	66.5625
135.387	-.015370	445320.	-12270.9995	-.0014166	3197.3888	85.1455
137.536	-.018222	419403.	-12069.9943	-.0012427	3040.9476	101.9231
139.685	-.020711	393924.	-11834.8044	-.0010792	2887.1506	116.9600
141.834	-.022860	368955.	-11569.0986	-.0009257	2736.4292	130.3232
143.983	-.024690	344558.	-11276.3982	-.0007822	2589.1674	142.0820
146.132	-.026222	320791.	-10960.0775	-.0006484	2445.7046	152.3076
148.281	-.027477	297703.	-10623.3508	-.0005240	2306.3369	161.0723
150.430	-.028475	275335.	-10269.2795	-.0004088	2171.3196	168.4496
152.579	-.029234	253724.	-9900.7657	-.0003024	2040.8687	174.5134
154.728	-.029774	232898.	-9520.5520	-.0002045	1915.1635	179.3377
156.877	-.030113	212883.	-9131.2243	-.0001149	1794.3483	182.9968
159.026	-.030268	193697.	-8735.2056	-3.3114E-05	1678.5344	185.5641
161.175	-.030256	175352.	-8334.7645	4.2107E-05	1567.8024	187.1127
163.324	-.030092	157858.	-7932.0129	.0001081	1462.2041	187.7143
165.473	-.029791	141219.	-7528.9098	.0001683	1361.7645	187.4398
167.622	-.029366	125434.	-7127.2635	.0002219	1266.4837	186.3584
169.771	-.028837	110500.	-6728.7355	.0002693	1176.3391	184.5378
171.920	-.028211	96409.5363	-6334.8435	.0003110	1091.2868	182.0438
174.069	-.027501	83152.4227	-5946.9662	.0003473	1011.2640	178.9402
176.218	-.026719	70715.2220	-5566.3472	.0003780	936.1903	175.2888
178.367	-.025876	59082.0308	-5194.0997	.0004041	865.9689	171.1491
180.516	-.024982	48234.6601	-4831.2118	.0004257	800.4928	166.5782
182.665	-.024046	38152.8208	-4478.5508	.0004433	739.6366	161.6311
184.814	-.023078	28814.4585	-4136.8693	.0004566	683.2682	156.3600
186.963	-.022084	20195.9565	-3806.8100	.0004668	631.2450	150.8147
189.112	-.021073	12272.3761	-3488.9114	.0004729	583.4166	145.0426
191.261	-.020052	5017.6767	-3183.6329	.0004764	539.6256	139.0881
193.410	-.019026	-1595.0761	-2891.2010	.0004771	518.9661	132.9936
195.559	-.018001	-7593.5134	-2612.1143	.0004752	555.1740	126.7986
197.708	-.016983	-13005.7784	-2346.3488	.0004711	587.8436	120.5401
199.857	-.015976	-17860.3532	-2094.0641	.0004649	627.1468	114.2526
202.006	-.014985	-22185.8973	-1855.2880	.0004568	643.2568	107.9681
204.155	-.014013	-26011.0970	-1629.9821	.0004472	666.3465	101.7163
206.304	-.013063	-29364.5260	-1418.0468	.0004360	686.5885	95.5245
208.453	-.012139	-32274.5209	-1219.3265	.0004236	704.1539	89.4176
210.602	-.011242	-34769.0557	-1033.6142	.0004102	719.2114	83.4184
212.751	-.010376	-36875.0427	-860.6564	.0003957	731.9273	77.5475

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 357.800 in
Distance from top of pile to bottom of layer = 417.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 417.800 in
Distance from top of pile to bottom of layer = 477.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 477.800 in
Distance from top of pile to bottom of layer = 600.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 170.20 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-86.20	.07234
2	249.80	.07234
3	249.80	.07234
4	333.80	.07234
5	333.80	.03623
6	357.80	.03623
7	357.80	.03623
8	417.80	.03623
9	417.80	.03333
10	477.80	.03333
11	477.80	.03623
12	600.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-86.200	.00000	30.00	------	------
2	249.800	.00000	30.00	------	------
3	249.800	6.25000	.00	------	------
4	333.800	6.25000	.00	------	------
5	333.800	6.25000	.00	------	------
6	357.800	6.25000	.00	------	------
7	357.800	.00000	30.00	------	------
8	417.800	.00000	30.00	------	------
9	417.800	5.56000	25.00	------	------
10	477.800	5.56000	25.00	------	------
11	477.800	3.47000	32.00	------	------
12	600.000	3.47000	32.00	------	------

Notes:

(1) Cohesion = unlaxial 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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 1.000 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A5\
Name of input data file: A5f25mm.lpd
Name of output file: A5f25mm.lpo
Name of plot output file: A5f25mm.lpp
Name of runtime file: A5f25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:27:50

Problem Title

A5, fixed head, 1.0 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 429.80 in
Depth of ground surface below top of pile = -86.20 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
3	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -86.200 in
Distance from top of pile to bottom of layer = 249.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 249.800 in
Distance from top of pile to bottom of layer = 333.800 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 333.800 in
Distance from top of pile to bottom of layer = 357.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Number of iterations = 5
Number of zero deflection points = 4

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= .250008 S=	0.000	90000.0000	.2500000	-1356901.	36238.0033

File-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = .25000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
429.800	.25000000	-1356901.	36238.00331
408.310	.25000000	-1356995.	36238.93276
386.820	.25000000	-1357017.	36237.88847
365.330	.25000000	-1357050.	36238.29044
343.840	.25000000	-1357130.	36238.00825
322.350	.25000000	-1357202.	36238.56784
300.860	.25000000	-1357219.	36237.99232
279.370	.25000000	-1357053.	36231.72021
257.880	.25000000	-1356926.	36222.40031
236.390	.25000000	-1356657.	36219.31920

The analysis ended normally.

214.900	-.004627	566.6695	-1205.1392	.0002209	511.0481	34.8275
217.049	-.004367	-1966.1584	-1132.1462	.0002208	515.2719	33.1046
219.198	-.004107	-4346.0261	-1062.9786	.0002202	522.4546	31.3603
221.347	-.003850	-6580.8966	-997.3740	.0001191	529.1997	29.6026
223.496	-.003596	-8678.8005	-935.6529	.0001175	535.5314	27.8392
225.645	-.003345	-10647.8000	-877.7192	.0001156	541.4741	26.0777
227.794	-.003099	-12495.9531	-823.5610	.0001133	547.0520	24.3254
229.943	-.002858	-14231.2604	-773.1510	.0001106	552.2894	22.5894
232.092	-.002624	-15861.7319	-726.4470	.0001076	557.2103	20.8764
234.241	-.002396	-17395.1549	-683.3923	.0001042	561.8383	19.1932
236.390	-.002176	-18839.2635	-643.9160	.0001006	566.1960	17.5461
238.539	-.001964	-20201.6079	-607.9337	9.6643E-05	570.3085	15.9414
240.688	-.001760	-21489.5459	-575.3476	9.2451E-05	574.1956	14.3853
242.837	-.001566	-22710.2136	-546.0469	8.8006E-05	577.8798	12.8838
244.986	-.001382	-23870.4979	-519.9080	8.3322E-05	581.3816	11.4427
247.135	-.001208	-24977.0090	-496.7950	7.8410E-05	584.7212	10.0678
249.284	-.001045	-26036.0535	-476.5596	7.3281E-05	587.9175	8.7647
251.433	-.000893	-27053.6083	-458.6169	6.7942E-05	590.9886	91.6930
253.582	-.000753	-27646.6503	-175.5824	6.2443E-05	592.7785	87.9567
255.731	-.000625	-27832.4150	9.2436	5.6863E-05	593.3391	84.0544
257.880	-.000509	-27628.9169	185.4841	5.1206E-05	592.7249	79.9665
260.029	-.000404	-27055.0429	352.7065	4.5787E-05	590.8929	75.6616
262.178	-.000312	-26130.6938	510.3922	4.0439E-05	588.2031	71.0911
264.327	-.000231	-24877.0197	643.9907	3.5309E-05	584.4194	66.2444
266.476	-.000160	-23376.4824	740.9161	3.0457E-05	579.8906	36.9626
268.625	-9.97E-05	-21704.3351	805.3630	2.5928E-05	574.8439	23.0140
270.774	-4.66E-05	-19925.0602	842.1599	2.1738E-05	569.4739	11.2316
272.923	-6.23E-06	-18093.1403	855.7734	1.7915E-05	563.9449	1.4380
275.072	2.84E-05	-16253.8758	850.2807	1.4461E-05	558.3938	-6.5499
277.221	5.59E-05	-14444.2278	829.3652	1.1374E-05	552.9321	-12.9155
279.370	7.72E-05	-12693.6641	796.9191	8.6453E-06	547.6687	-17.8394
281.519	9.31E-05	-11024.9926	754.0528	6.2603E-06	542.6125	-21.4964
283.668	.000104	-9455.1670	705.1098	4.2008E-06	537.8746	-24.0530
285.817	.000111	-7996.0552	651.6868	2.4660E-06	533.4700	-25.6659
287.966	.000115	-6655.1629	595.6552	9.7271E-07	529.4239	-26.4808
290.115	.000115	-5436.3054	538.5861	-2.4317E-07	525.7452	-26.6314
292.264	.000114	-4340.2257	481.7764	-1.2263E-06	522.4371	-26.2394
294.413	.000110	-3365.1561	426.2745	-2.0011E-06	519.4943	-25.4143
296.562	.000105	-2507.3239	372.9067	-2.5916E-06	516.9052	-24.2533
298.711	9.89E-05	-1761.4005	322.3029	-3.0209E-06	514.6540	-22.8420
300.860	9.20E-05	-1120.8975	274.8208	-3.3107E-06	512.7209	-21.2549
303.009	8.47E-05	-578.5102	231.0696	-3.4816E-06	511.0839	-19.5559
305.158	7.71E-05	-126.4137	190.9314	-3.5525E-06	509.7194	-17.7992
307.307	6.94E-05	243.4872	154.5820	-3.5407E-06	510.0727	-16.0299
309.456	6.19E-05	539.3493	122.0087	-3.4620E-06	510.9657	-14.2849
311.605	5.45E-05	769.2197	93.1276	-3.3304E-06	511.6594	-12.5937
313.754	4.75E-05	940.8998	67.7983	-3.1584E-06	512.1776	-10.9793
315.903	4.10E-05	1061.8385	45.8375	-2.9570E-06	512.5426	-9.4588
318.052	3.48E-05	1139.0531	27.0303	-2.7357E-06	512.7756	-8.0443
320.201	2.92E-05	1179.0731	11.1408	-2.5026E-06	512.8964	-6.7435
322.350	2.41E-05	1187.9044	-2.0797	-2.2646E-06	512.9231	-5.5603
324.499	1.95E-05	1171.0307	-12.8049	-2.0274E-06	512.8721	-4.4950
326.648	1.54E-05	1133.3092	-21.5280	-1.7957E-06	512.7583	-3.5480
328.797	1.17E-05	1079.1779	-28.2560	-1.5732E-06	512.5949	-2.7135
330.946	8.60E-06	1012.4734	-33.3062	-1.3629E-06	512.3936	-1.9866
333.095	5.89E-06	936.5552	-36.9028	-1.1669E-06	512.1645	-1.3607
335.244	3.59E-06	854.3164	-40.9713	-9.8680E-07	511.9163	-.8257
337.393	1.65E-06	768.8421	-45.3361	-8.2438E-07	511.6342	-.6365
339.542	4.39E-08	659.7808	-47.2974	-6.8153E-07	512.3292	-.1880668
341.691	-1.28E-06	557.8215	-45.8958	-5.5909E-07	511.0214	.4933
343.840	-2.36E-06	462.7370	-42.1254	-4.5647E-07	510.7345	.8257
345.989	-3.24E-06	376.9433	-37.4229	-3.7203E-07	510.4755	.3607
348.138	-3.96E-06	302.0371	-32.0809	-3.0376E-07	510.2484	.6110
350.287	-4.55E-06	239.1772	-26.2656	-2.4933E-07	510.0597	.8011
352.436	-5.03E-06	189.2439	-20.0863	-2.0625E-07	509.9090	.9458
354.585	-5.43E-06	152.9261	-13.6193	-1.7184E-07	509.7994	3.0669
356.734	-5.77E-06	130.7747	-6.9209	-1.4332E-07	509.7326	3.1652
358.883	-6.05E-06	123.2356	-3.4696	-1.2777E-07	509.7098	.0466339
361.032	-6.27E-06	115.9080	-3.3667	-9.3727E-08	509.6877	.0489247
363.181	-6.45E-06	108.8019	-3.2597	-7.1131E-08	509.6662	.0506465
365.330	-6.58E-06	101.9254	-3.1494	-4.9941E-08	509.6455	.0520156
367.479	-6.67E-06	95.2852	-3.0365	-3.0110E-08	509.6254	.0530479
369.628	-6.71E-06	88.8863	-2.9217	-1.1590E-08	509.6061	.0537595
371.777	-6.72E-06	82.7322	-2.8058	5.6674E-09	509.5876	.0541659
373.926	-6.69E-06	76.8250	-2.6892	2.1712E-08	509.5697	.0542827
376.075	-6.62E-06	71.1655	-2.5727	3.6593E-08	509.5526	.0541248
378.224	-6.53E-06	65.7532	-2.4569	5.0362E-08	509.5363	.0537070
380.373	-6.41E-06	60.5864	-2.3422	6.3066E-08	509.5207	.0530439
382.522	-6.26E-06	55.6622	-2.2291	7.4755E-08	509.5059	.0521493
384.671	-6.08E-06	50.9766	-2.1183	8.5479E-08	509.4917	.0510370
386.820	-5.89E-06	46.5248	-2.0100	9.5283E-08	509.4783	.0497201
388.969	-5.67E-06	42.3008	-1.9048	1.0422E-07	509.4655	.0482115
391.118	-5.44E-06	38.2978	-1.8030	1.1232E-07	509.4534	.0465235
393.267	-5.19E-06	34.5091	-1.7050	1.1964E-07	509.4420	.0446680
395.416	-4.93E-06	30.9234	-1.6112	1.2622E-07	509.4312	.0426566
397.565	-4.65E-06	27.5345	-1.5218	1.3210E-07	509.4210	.0405004
399.714	-4.36E-06	24.3316	-1.4372	1.3731E-07	509.4113	.0382100
401.863	-4.06E-06	21.3041	-1.3577	1.4190E-07	509.4022	.0357957
404.012	-3.75E-06	18.4412	-1.2835	1.4590E-07	509.3935	.0332675
406.161	-3.43E-06	15.7312	-1.2148	1.4934E-07	509.3853	.0306349
408.310	-3.11E-06	13.1620	-1.1519	1.5224E-07	509.3776	.0279070
410.459	-2.78E-06	10.7212	-1.0950	1.5464E-07	509.3702	.0250930
412.608	-2.44E-06	8.3959	-1.0442	1.5657E-07	509.3632	.0222014
414.757	-2.10E-06	6.1728	-.9996497	1.5803E-07	509.3565	.0192407
416.906	-1.76E-06	4.0383	-.9615482	1.5906E-07	509.3500	.0162191
419.055	-1.42E-06	1.9785	-.7541440	1.5966E-07	509.3438	.1766187
421.204	-1.09E-06	.7343722	-.4199748	1.5994E-07	509.3401	.1345672
423.353	-7.34E-07	.1115780	-.1764534	1.6002E-07	509.3382	.0920698
425.502	-3.90E-07	-.0859738	-.0247022	1.6002E-07	509.3381	.0491599
427.651	-4.62E-08	-.0564921	.0344040	1.6001E-07	509.3380	.0058482
429.800	2.98E-07	0.0000	0.0000	1.6000E-07	509.3379	-.0378660

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00000777
Maximum bending moment	=	-1356901. lbs-in
Maximum shear force	=	36238.00331 lbs
Depth of maximum bending moment	=	0.00000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = .250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 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
0.000	.250000	-1356901.	36238.0033	0.0000	4604.6131	-274.8619
2.149	.249707	-1279662.	35620.9368	-.0002651	4371.4978	-287.1183
4.298	.248860	-1203700.	34990.9377	-.0005148	4142.2342	-299.2460
6.447	.247494	-1129072.	34335.0186	-.0007494	3917.0002	-311.1953
8.596	.245639	-1055838.	33653.6436	-.0009691	3695.9712	-322.9368
10.745	.243329	-984054.	32947.2906	-.0011743	3479.3194	-334.4416
12.894	.240593	-913776.	32216.4985	-.0013651	3267.2137	-345.6813
15.043	.237462	-845059.	31461.8565	-.0015420	3059.8188	-356.6286
17.192	.233965	-777957.	30684.0522	-.0017052	2857.2955	-367.2563
19.341	.230133	-712520.	29883.7700	-.0018550	2659.7997	-377.5386
21.490	.225992	-648799.	29061.7894	-.0019919	2467.4826	-387.4503
23.639	.221571	-586842.	28218.9329	-.0021162	2280.4896	-396.9671
25.788	.216897	-526695.	27356.0739	-.0022282	2098.9608	-406.0659
27.937	.211995	-468403.	26474.1347	-.0023282	1923.0299	-414.7244
30.086	.206890	-412009.	25574.0839	-.0024167	1752.8246	-422.9217
32.235	.201608	-357551.	24656.9341	-.0024941	1588.4658	-430.6378
34.384	.196170	-305068.	23723.7395	-.0025608	1430.0673	-437.8541
36.533	.190601	-254596.	22775.5930	-.0026170	1277.7358	-444.5531
38.682	.184922	-206167.	21813.6236	-.0026634	1131.5708	-450.7185
40.831	.179158	-159811.	20838.9939	-.0027002	991.6639	-456.3356
42.980	.173317	-115556.	19852.8971	-.0027279	858.0985	-461.3906
45.129	.167430	-73427.7144	18856.5542	-.0027469	730.9507	-465.8713
47.278	.161511	-33448.0229	17851.2111	-.0027576	610.2876	-469.7668
49.427	.155578	4363.4922	16838.2358	-.0027605	522.5074	-473.0673
51.576	.149646	39990.1175	15818.6158	-.0027561	630.0324	-475.7646
53.725	.143732	73438.0107	14793.9552	-.0027447	730.9214	-477.8516
55.874	.137850	104636.	13765.4718	-.0027268	825.1414	-479.3223
58.023	.132012	133637.	12738.9989	-.0027028	912.6682	-480.1805
60.172	.126233	160434.	11731.2206	-.0026732	993.5450	-480.9240
62.321	.120523	185092.	10754.0402	-.0026385	1067.9645	-481.5040
64.470	.114893	207675.	9808.1838	-.0025990	1136.1249	-482.1718
66.619	.109352	228253.	8894.2685	-.0025552	1198.2289	-482.7775
68.768	.103911	246891.	8012.8049	-.0025074	1254.4825	-483.2701
70.917	.098575	263661.	7164.2000	-.0024560	1305.0969	-483.6805
73.066	.093354	278633.	6348.7600	-.0024015	1350.2831	-483.9047
75.215	.088254	291877.	5566.6940	-.0023441	1390.2556	-484.0371
77.364	.083279	303466.	4818.3174	-.0022843	1425.2300	-484.0373
79.513	.078436	313469.	4103.0552	-.0022222	1455.4222	-484.9463
81.662	.073728	321960.	3421.4463	-.0021583	1482.0485	-485.4035
83.811	.069159	329010.	2773.1469	-.0020929	1502.3245	-485.9463
85.960	.064733	334689.	2157.9351	-.0020261	1519.4647	-486.6101
88.109	.060451	339068.	1575.5144	-.0019584	1532.6822	-487.4287
90.258	.056316	342218.	1025.5184	-.0018899	1542.1884	-488.4336
92.407	.052328	344207.	507.5146	-.0018209	1548.1915	-489.6546
94.556	.048490	345103.	21.0089	-.0017516	1550.8975	-491.1194
96.705	.044800	344975.	-434.5503	-.0016822	1550.5089	-492.8538
98.854	.041260	343886.	-859.7679	-.0016129	1547.2245	-494.8815
101.003	.037868	341903.	-1255.2976	-.0015439	1541.2391	-497.2244
103.152	.034624	339088.	-1621.0382	-.0014755	1532.7435	-499.9023
105.301	.031526	335509.	-1960.1290	-.0014076	1521.9235	-502.9332
107.450	.028574	331208.	-2270.9459	-.0013406	1508.9603	-506.3334
109.599	.025765	326261.	-2555.0978	-.0012745	1494.0302	-510.1170
111.748	.023096	320719.	-2813.4221	-.0012094	1477.3039	-514.2965
113.897	.020567	314637.	-3046.7811	-.0011455	1458.9469	-518.8827
116.046	.018173	308067.	-3256.0587	-.0010829	1439.1190	-523.8847
118.195	.015912	301061.	-3442.2562	-.0010216	1417.9741	-529.3098
120.344	.013782	293668.	-3605.9891	-.0009618	1395.6606	-535.1639
122.493	.011778	285935.	-3748.4841	-.0009036	1372.3207	-541.4512
124.642	.009898	277907.	-3870.5752	-.0008469	1348.0908	-548.1747
126.791	.008139	269627.	-3973.2011	-.0007918	1323.1010	-555.3357
128.940	.006495	261136.	-4057.3024	-.0007384	1297.4755	-562.9344
131.089	.004965	252474.	-4123.8183	-.0006868	1271.3324	-570.9696
133.238	.003543	243678.	-4173.6844	-.0006369	1244.7838	-579.4390
135.387	.002227	234782.	-4207.8300	-.0005888	1217.9356	-588.3391
137.536	.001013	225820.	-4227.1757	-.0005425	1190.8879	-597.6653
139.685	-.000104	216823.	-4232.6314	-.0004979	1163.7347	-607.4123
141.834	-.001127	207821.	-4223.0943	-.0004552	1136.5643	-617.5736
143.983	-.002061	198840.	-4205.4465	-.0004144	1109.4590	-628.1419
146.132	-.002908	189906.	-4174.5540	-.0003753	1082.4957	-639.1089
148.281	-.003674	181043.	-4133.2644	-.0003380	1055.7455	-650.4657
150.430	-.004361	172272.	-4082.4058	-.0003024	1029.2742	-662.2026
152.579	-.004973	163614.	-4022.7855	-.0002687	1003.1423	-674.3092
154.728	-.005515	155086.	-3955.1886	-.0002366	977.4050	-686.7749
156.877	-.005990	146706.	-3880.3772	-.0002063	952.1125	-699.5886
159.026	-.006402	138488.	-3799.0890	-.0001776	927.3102	-712.7385
161.175	-.006754	130446.	-3712.0373	-.0001505	903.0387	-726.2125
163.324	-.007049	122592.	-3619.9094	-.0001251	879.3340	-739.9977
165.473	-.007291	114936.	-3523.3669	-.0001012	856.2279	-753.8762
167.622	-.007484	107488.	-3423.0444	-7.8847E-05	833.7477	-767.8305
169.771	-.007630	100254.	-3319.5499	-5.7957E-05	811.9168	-781.8282
171.920	-.007733	93242.7804	-3213.4642	-3.8499E-05	790.7547	-795.8021
174.069	-.007796	86457.9075	-3105.3406	-2.0429E-05	770.2772	-809.7248
176.218	-.007821	79903.9288	-2995.7053	-3.7004E-06	750.4966	-823.5091
178.367	-.007812	73583.7975	-2885.0569	1.1734E-05	731.4218	-837.1176
180.516	-.007771	67499.4155	-2773.8668	2.5921E-05	713.0584	-850.5184
182.665	-.007700	61651.6914	-2662.5794	3.8908E-05	695.4094	-863.7501
184.814	-.007603	56040.5988	-2551.6124	5.0742E-05	678.4745	-876.5151
186.963	-.007482	50665.2333	-2441.3566	6.1472E-05	662.2510	-889.0962
189.112	-.007339	45523.8694	-2332.1769	7.1145E-05	646.7338	-901.5136
191.261	-.007176	40614.0166	-2224.4125	7.9807E-05	631.9154	-913.7791
193.410	-.006996	35932.4738	-2118.3771	8.7504E-05	617.7860	-925.9044
195.559	-.006800	31475.3837	-2014.3596	9.4282E-05	604.3340	-937.9010
197.708	-.006591	27238.2858	-1912.6249	.0001002	591.5469	-949.7800
199.857	-.006370	23216.1677	-1813.4139	.0001053	579.4068	-961.5523
202.006	-.006138	19403.5161	-1716.9445	.0001095	567.8998	-973.2285
204.155	-.005899	15794.3660	-1623.4119	.0001131	557.0070	-984.8190
206.304	-.005652	12382.3484	-1532.9896	.0001159	546.7091	-996.3339
208.453	-.005401	9160.7372	-1445.8297	.0001181	536.9860	-1007.782
210.602	-.005145	6122.4949	-1362.0636	.0001196	527.8162	-1019.175
212.751	-.004887	3260.3158	-1281.8028	.0001206	519.1778	-1030.464

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 357.800 in
Distance from top of pile to bottom of layer = 417.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 417.800 in
Distance from top of pile to bottom of layer = 477.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 477.800 in
Distance from top of pile to bottom of layer = 600.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 170.20 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-86.20	.07234
2	249.80	.07234
3	249.80	.07234
4	333.80	.07234
5	333.80	.03623
6	357.80	.03623
7	357.80	.03623
8	417.80	.03623
9	417.80	.03333
10	477.80	.03333
11	477.80	.03623
12	600.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-86.200	.00000	30.00	------	------
2	249.800	.00000	30.00	------	------
3	249.800	6.25000	.00	------	------
4	333.800	6.25000	.00	------	------
5	333.800	6.25000	.00	------	------
6	357.800	6.25000	.00	------	------
7	357.800	.00000	30.00	------	------
8	417.800	.00000	30.00	------	------
9	417.800	5.56000	25.00	------	------
10	477.800	5.56000	25.00	------	------
11	477.800	3.47000	32.00	------	------
12	600.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = .250 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleinfelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A5\
Name of input data file: A5f6mn.lpd
Name of output file: A5f6mn.lpo
Name of plot output file: A5f6mn.lpp
Name of runtime file: A5f6mn.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 11:14:29

Problem Title

A5, fixed head, 0.25 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 429.80 in
Depth of ground surface below top of pile = -86.20 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -86.200 in
Distance from top of pile to bottom of layer = 249.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 249.800 in
Distance from top of pile to bottom of layer = 333.800 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 333.800 in
Distance from top of pile to bottom of layer = 357.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

```
Maximum bending moment              =       1061686. lbs-in
Maximum shear force                 =      36000.00000 lbs
Depth of maximum bending moment     =      54.00000000 in
Depth of maximum shear force        =       0.00000 in
Number of iterations                =            17
Number of zero deflection points    =             2
```

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad
```

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 36000.	M= 0.000	90000.0000	1.0035	1061686.	36000.0000

Pile-head Deflection vs. Pile Length

Boundary Condition Type 1, Shear and Moment

```
Shear      =          36000. lbs
Moment     =              0. in-lbs
Axial Load =          90000. lbs
```

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
200.000	1.00353011	1061686.	36000.00000
190.000	1.00348195	1061614.	36000.00000
180.000	1.00424914	1061354.	36000.00000
170.000	1.00745220	1060347.	36000.00000
160.000	1.01674084	1057984.	36000.00000
150.000	1.03874496	1053740.	36000.00000
140.000	1.08583995	1047774.	36000.00000
130.000	1.18347268	1042559.	36000.00000
120.000	1.39657761	1046457.	36000.00000
110.000	2.04240645	1081494.	36000.00000

The analysis ended normally.

96.000	-.006279	642922.	-14646.8295	-.0025843	4390.1572	28.6014
97.000	-.008803	628517.	-14612.3693	-.0024653	4303.2033	40.3190
98.000	-.011210	614141.	-14566.3993	-.0023490	4216.4285	51.6210
99.000	-.013501	599807.	-14509.3333	-.0022354	4129.9037	62.5111
100.000	-.015681	585525.	-14441.5812	-.0021245	4043.6948	72.9932
101.000	-.017750	571306.	-14363.5489	-.0020162	3957.8669	83.0713
102.000	-.019713	557161.	-14275.6383	-.0019106	3872.4824	92.7499
103.000	-.021572	543099.	-14178.2467	-.0018077	3787.6011	102.0333
104.000	-.023328	529130.	-14071.7669	-.0017073	3703.2805	110.9263
105.000	-.024986	515263.	-13956.5869	-.0016096	3619.5757	119.4337
106.000	-.026547	501506.	-13833.0897	-.0015144	3536.5394	127.5606
107.000	-.028015	487868.	-13701.6533	-.0014218	3454.2220	135.3123
108.000	-.029391	474359.	-13562.6502	-.0013318	3372.6719	142.6939
109.000	-.030679	460984.	-13416.4477	-.0012442	3291.9348	149.7111
110.000	-.031880	447750.	-13263.4074	-.0011592	3212.0546	156.3694
111.000	-.032997	434665.	-13103.8854	-.0010766	3133.0727	162.6747
112.000	-.034033	421736.	-12938.2317	-.0009965	3055.0285	168.6327
113.000	-.034990	408968.	-12766.7907	-.0009187	2977.9594	174.2493
114.000	-.035870	396368.	-12589.9006	-.0008434	2901.9005	179.5308
115.000	-.036677	383940.	-12407.8937	-.0007703	2826.8850	184.4830
116.000	-.037411	371691.	-12221.0960	-.0006996	2752.9440	189.1124
117.000	-.038076	359624.	-12029.8274	-.0006312	2680.1068	193.4250
118.000	-.038673	347745.	-11834.4013	-.0005650	2608.4005	197.4272
119.000	-.039206	336057.	-11635.1249	-.0005010	2537.8506	201.1255
120.000	-.039675	324565.	-11432.2991	-.0004392	2468.4805	204.5261
121.000	-.040084	313271.	-11226.2184	-.0003795	2400.3121	207.6355
122.000	-.040434	302181.	-11017.1705	-.0003219	2333.3651	210.4601
123.000	-.040728	291295.	-10805.4372	-.0002663	2267.6577	213.0065
124.000	-.040967	280618.	-10591.2935	-.0002128	2203.2065	215.2810
125.000	-.041153	270151.	-10375.9079	-.0001613	2140.0262	217.2902
126.000	-.041289	259897.	-10156.8426	-.0001117	2078.1301	219.0404
127.000	-.041377	249857.	-9937.0533	-6.3958E-05	2017.5287	220.5382
128.000	-.041417	240034.	-9715.8693	-1.8112E-05	1958.2352	221.7899
129.000	-.041413	230429.	-9493.5934	2.5916E-05	1900.2550	222.8019
130.000	-.041366	221042.	-9270.4022	6.8161E-05	1843.5962	223.5806
131.000	-.041277	211876.	-9046.5458	.0001087	1788.2646	224.1322
132.000	-.041148	202929.	-8822.2481	.0001475	1734.2643	224.4631
133.000	-.040982	194204.	-8597.7260	.0001847	1681.5983	224.5795
134.000	-.040779	185701.	-8373.1934	.0002202	1630.2682	224.4874
135.000	-.040541	177418.	-8148.6532	.0002542	1580.2742	224.1929
136.000	-.040270	169357.	-7924.9057	.0002867	1531.6155	223.7021
137.000	-.039968	161517.	-7701.5442	.0003176	1484.2898	223.0209
138.000	-.039635	153897.	-7478.9562	.0003471	1438.2940	222.1551
139.000	-.039274	146497.	-7257.3234	.0003753	1393.6235	221.1105
140.000	-.038885	139315.	-7036.8217	.0004020	1350.2727	219.8928
141.000	-.038470	132351.	-6817.6216	.0004274	1308.2351	218.5075
142.000	-.038030	125603.	-6599.8878	.0004516	1267.5030	216.9601
143.000	-.037567	119070.	-6383.7797	.0004745	1228.0678	215.2561
144.000	-.037081	112750.	-6169.4513	.0004962	1189.9197	213.4006
145.000	-.036574	106641.	-5957.0516	.0005167	1153.0484	211.3989
146.000	-.036048	100743.	-5746.7242	.0005361	1117.4422	209.2559
147.000	-.035502	95051.4329	-5538.6079	.0005544	1083.0890	206.9767
148.000	-.034939	89565.6152	-5332.8365	.0005717	1049.9754	204.5661
149.000	-.034359	84282.8549	-5129.5391	.0005880	1018.0875	202.0287
150.000	-.033763	79200.7034	-4928.0402	.0006033	987.4105	199.3691
151.000	-.033152	74316.5869	-4730.8597	.0006176	957.9289	196.5919
152.000	-.032528	69627.8105	-4535.7131	.0006311	929.6265	193.7013
153.000	-.031890	65131.5624	-4343.5117	.0006437	902.4861	190.7015
154.000	-.031240	60824.9187	-4154.3626	.0006555	876.4903	187.5967
155.000	-.030579	56704.8471	-3968.3689	.0006665	851.6206	184.3907
156.000	-.029907	52768.2109	-3785.6299	.0006767	827.8582	181.0874
157.000	-.029225	49011.7732	-3606.2410	.0006863	805.1836	177.6904
158.000	-.028535	45432.2003	-3430.2941	.0006951	783.5765	174.2036
159.000	-.027835	42026.0654	-3257.8776	.0007033	763.0163	170.6296
160.000	-.027128	38789.8522	-3089.0765	.0007109	743.4818	166.9725
161.000	-.026413	35719.9582	-2923.9727	.0007178	724.9513	163.2352
162.000	-.025692	32812.6976	-2762.6447	.0007242	707.4029	159.4207
163.000	-.024965	30064.3050	-2605.1685	.0007301	690.8125	155.5318
164.000	-.024232	27470.9377	-2451.6169	.0007355	675.1584	151.5714
165.000	-.023494	25028.6791	-2302.0601	.0007404	660.4164	147.5420
166.000	-.022751	22733.5409	-2156.5660	.0007449	646.5625	143.4462
167.000	-.022004	20581.4660	-2015.1997	.0007489	633.5721	139.2864
168.000	-.021253	18568.3308	-1878.0242	.0007526	621.4203	135.0647
169.000	-.020499	16689.9474	-1745.1002	.0007559	610.0820	130.7832
170.000	-.019741	14942.0662	-1616.4866	.0007589	599.5314	126.4442
171.000	-.018981	13320.3773	-1492.2400	.0007615	589.7426	122.0491
172.000	-.018218	11820.5131	-1372.4154	.0007639	580.6890	117.6000
173.000	-.017453	10438.0498	-1257.0662	.0007660	572.3442	113.0984
174.000	-.016687	9168.5091	-1146.2441	.0007678	564.6810	108.5459
175.000	-.015918	8007.3598	-1039.9983	.0007694	557.6720	103.9438
176.000	-.015148	6950.0193	-938.3807	.0007708	551.2897	99.2934
177.000	-.014376	5991.8552	-841.4360	.0007720	545.5060	94.5960
178.000	-.013604	5128.1862	-749.2137	.0007730	540.2927	89.8526
179.000	-.012830	4354.2834	-661.7533	.0007739	535.6215	85.0642
180.000	-.012056	3665.3714	-579.1054	.0007747	531.4628	80.2317
181.000	-.011281	3056.6294	-501.3115	.0007753	527.7883	75.3559
182.000	-.010505	2523.1918	-428.4248	.0007758	524.5684	70.4376
183.000	-.009729	2060.1693	-360.4574	.0007763	521.7734	65.4772
184.000	-.008953	1662.5493	-297.4031	.0007766	519.3734	60.4755
185.000	-.008176	1325.3968	-239.5269	.0007769	517.3382	55.4320
186.000	-.007399	1043.6548	-186.6357	.0007771	515.6376	50.3496
187.000	-.006622	812.2447	-138.8478	.0007773	514.2407	45.2262
188.000	-.005844	626.0472	-96.2033	.0007774	513.1168	40.0629
189.000	-.005067	479.9020	-58.7418	.0007775	512.2347	34.8600
190.000	-.004289	368.6088	-26.5031	.0007776	511.5629	29.6175
191.000	-.003512	286.9268	.4734752	.0007777	511.0698	24.3357
192.000	-.002734	229.5756	22.1486	.0007777	510.7236	19.0146
193.000	-.001956	191.2352	38.4831	.0007778	510.4922	13.6543
194.000	-.001178	166.5459	49.4377	.0007778	510.3432	8.2550
195.000	-.000401	150.1088	54.9734	.0007778	510.2439	2.8165
196.000	.000377	136.4855	55.0511	.0007778	510.1617	-2.6611
197.000	.001155	120.1989	49.6316	.0007779	510.0634	-8.1778
198.000	.001933	93.7324	38.6760	.0007779	509.9157	-13.7335
199.000	.002711	57.5308	22.1451	.0007779	509.6851	-19.3283
200.000	.003489	0.0000	0.0000	.0007779	509.3379	-24.9620

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.00353811 in
Computed slope at pile head = -.01682786

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

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 36000.000 lbs
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 lbs

(Zero moment for this load indicates free-head conditions)

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
0.000	1.006	1.0677E-05	36000.0000	-.0160279	509.3379	-483.7266
1.000	.986710	37272.6443	35511.1923	-.0160244	734.3236	-493.8087
2.000	.969889	74050.7720	35012.1704	-.0160140	956.3244	-504.1552
3.000	.953082	110323.	34502.8297	-.0159967	1175.2745	-514.5261
4.000	.936296	146080.	33983.0660	-.0159727	1391.1075	-525.0014
5.000	.919537	181309.	33452.7748	-.0159421	1603.7567	-535.5810
6.000	.902812	215999.	32911.8518	-.0159049	1813.1545	-546.2650
7.000	.886127	250139.	32360.1927	-.0158613	2019.2330	-557.0533
8.000	.869489	283718.	31797.6930	-.0158113	2221.9236	-567.9461
9.000	.852905	316725.	31224.2484	-.0157551	2421.1571	-578.9432
10.000	.836379	349147.	30639.7545	-.0156928	2616.8637	-590.0446
11.000	.819919	380973.	30044.1069	-.0156245	2808.9733	-601.2505
12.000	.803530	412191.	29437.2013	-.0155502	2997.4148	-612.5607
13.000	.787218	442790.	28818.9334	-.0154702	3182.1168	-623.9753
14.000	.770990	472758.	28189.1986	-.0153845	3363.0074	-635.4942
15.000	.754849	502082.	27547.8920	-.0152933	3540.0139	-647.1175
16.000	.738803	530750.	26894.9114	-.0151967	3713.0632	-658.8452
17.000	.722856	558751.	26230.1501	-.0150947	3882.0816	-670.6773
18.000	.707014	586072.	25553.5046	-.0149876	4046.9948	-682.6137
19.000	.691281	612700.	24864.8705	-.0148754	4207.7281	-694.6545
20.000	.675663	638623.	24164.1434	-.0147583	4364.2060	-706.7997
21.000	.660164	663829.	23451.2189	-.0146364	4516.3525	-719.0492
22.000	.644790	688304.	22725.9927	-.0145098	4664.0912	-731.4031
23.000	.629545	712037.	21988.3605	-.0143788	4807.3450	-743.8614
24.000	.614433	735013.	21238.2177	-.0142434	4946.0363	-756.4241
25.000	.599458	757221.	20475.4601	-.0141037	5080.0869	-769.0911
26.000	.584625	778647.	19699.9833	-.0139600	5209.4181	-781.8625
27.000	.569938	799278.	18911.6829	-.0138123	5333.9506	-794.7383
28.000	.555401	819100.	18114.4200	-.0136609	5453.6047	-799.7875
29.000	.541016	838109.	17316.3116	-.0135058	5568.3478	-796.4292
30.000	.526789	856308.	16521.6817	-.0133472	5678.1982	-792.8306
31.000	.512722	873699.	15730.7673	-.0131853	5783.1759	-788.9983
32.000	.498818	890287.	14943.7987	-.0130202	5883.3022	-784.9389
33.000	.485082	906074.	14160.9997	-.0128521	5978.5998	-780.6591
34.000	.471514	921066.	13382.5872	-.0126811	6069.0932	-776.1660
35.000	.458119	935266.	12608.7707	-.0125074	6154.8077	-771.4668
36.000	.444900	948679.	11839.7529	-.0123311	6235.7704	-766.5689
37.000	.431857	961309.	11075.7286	-.0121523	6312.0095	-761.4797
38.000	.418995	973162.	10316.8853	-.0119713	6383.5544	-756.2070
39.000	.406315	984242.	9563.4025	-.0117881	6450.4357	-750.7585
40.000	.393819	994555.	8815.4521	-.0116029	6512.6852	-745.1424
41.000	.381509	1004105.	8073.1976	-.0114159	6570.3357	-739.3665
42.000	.369387	1012900.	7336.7948	-.0112271	6623.4211	-733.4392
43.000	.357455	1020944.	6606.3907	-.0110368	6671.9763	-727.3688
44.000	.345713	1028243.	5882.1245	-.0108450	6716.0372	-721.1637
45.000	.334165	1034804.	5164.1265	-.0106519	6755.6404	-714.8323
46.000	.322809	1040633.	4452.5106	-.0104577	6790.8235	-708.3833
47.000	.311649	1045736.	3747.4143	-.0102625	6821.6249	-701.8253
48.000	.300685	1050119.	3048.9182	-.0100663	6848.0835	-695.1670
49.000	.289917	1053789.	2357.1261	-.0098694	6870.2392	-688.4170
50.000	.279346	1056754.	1672.1255	-.0096719	6888.1323	-681.5843
51.000	.268973	1059029.	993.9946	-.0094739	6901.8038	-674.6775
52.000	.258798	1060591.	322.8031	-.0092755	6911.2950	-667.7054
53.000	.248822	1061478.	-341.3872	-.0090769	6916.6480	-660.6752
54.000	.239044	1061686.	-998.4467	-.0088782	6917.9051	-653.4938
55.000	.229465	1061223.	-1648.1269	-.0086796	6915.1100	-646.1966
56.000	.220085	1060096.	-2290.1318	-.0084811	6908.3080	-638.8934
57.000	.210903	1058313.	-2924.1656	-.0082828	6897.5465	-629.9742
58.000	.201919	1055883.	-3549.9321	-.0080849	6882.8748	-621.5589
59.000	.193133	1052813.	-4167.1352	-.0078876	6864.3439	-612.8472
60.000	.184544	1049112.	-4775.4781	-.0076909	6842.0066	-603.8386
61.000	.176151	1044790.	-5374.6637	-.0074949	6815.9178	-594.5327
62.000	.167954	1039856.	-5964.3943	-.0073000	6786.1339	-584.9285
63.000	.159952	1034319.	-6544.3710	-.0071057	6752.7136	-575.0249
64.000	.152143	1028190.	-7114.2938	-.0077127	6715.7172	-564.8207
65.000	.144526	1021479.	-7668.8587	-.0075208	6675.2068	-546.3092
66.000	.137101	1014204.	-8203.8478	-.0073304	6631.2949	-521.6680
67.000	.129865	1006391.	-8713.3747	-.0071413	6584.1310	-497.3847
68.000	.122818	998063.	-9198.7984	-.0069537	6533.8624	-473.4647
69.000	.115958	989245.	-9660.4803	-.0067677	6480.6344	-449.9172
70.000	.109283	979960.	-10098.8238	-.0065834	6424.5900	-426.7497
71.000	.102791	970232.	-10514.1832	-.0064009	6365.8701	-403.9693
72.000	.096481	960084.	-10906.9591	-.0062203	6304.6130	-381.5825
73.000	.090351	949538.	-11277.5400	-.0060416	6240.9550	-359.5954
74.000	.084398	938616.	-11626.3525	-.0058649	6175.0298	-338.0135
75.000	.078621	927341.	-11953.7803	-.0056902	6106.9689	-316.8421
76.000	.073017	915733.	-12260.2441	-.0055178	6036.9011	-296.0856
77.000	.067585	903814.	-12546.1610	-.0053475	5964.9530	-275.7482
78.000	.062322	891603.	-12811.9519	-.0051795	5891.2486	-255.8337
79.000	.057226	879122.	-13058.0413	-.0050137	5815.9092	-236.3452
80.000	.052295	866390.	-13284.8567	-.0048504	5739.0537	-217.2856
81.000	.047526	853425.	-13492.8282	-.0046894	5660.7986	-198.6573
82.000	.042916	840248.	-13682.3879	-.0045309	5581.2576	-180.4622
83.000	.038464	826876.	-13853.9698	-.0043749	5500.5419	-162.7018
84.000	.034166	813328.	-14008.0095	-.0042214	5418.7599	-145.3774
85.000	.030021	799620.	-14144.9430	-.0040705	5336.0177	-128.4896
86.000	.026025	785770.	-14265.2072	-.0039221	5252.4187	-112.0389
87.000	.022177	771796.	-14369.2393	-.0037763	5168.0634	-96.0252
88.000	.018473	757712.	-14457.4761	-.0036332	5083.0500	-80.4483
89.000	.014910	743535.	-14530.3538	-.0034927	4997.4740	-65.3072
90.000	.011487	729280.	-14588.3080	-.0033549	4911.4282	-50.6011
91.000	.008201	714962.	-14631.7728	-.0032197	4825.0027	-36.3285
92.000	.005048	700596.	-14661.1810	-.0030872	4738.2853	-22.4878
93.000	.002026	686195.	-14676.9633	-.0029575	4651.3609	-9.0769
94.000	-.000867	671774.	-14679.5485	-.0028304	4564.3120	3.9065
95.000	-.003635	657346.	-14669.3628	-.0027060	4477.2183	16.4650

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 357.800 in
Distance from top of pile to bottom of layer = 417.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 417.800 in
Distance from top of pile to bottom of layer = 477.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 477.800 in
Distance from top of pile to bottom of layer = 600.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 400.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-86.20	.07234
2	249.80	.07234
3	249.80	.07234
4	333.80	.07234
5	333.80	.03623
6	357.80	.03623
7	357.80	.03623
8	417.80	.03623
9	417.80	.03333
10	477.80	.03333
11	477.80	.03623
12	600.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-86.200	.00000	30.00	------	------
2	249.800	.00000	30.00	------	------
3	249.800	6.25000	.00	------	------
4	333.800	6.25000	.00	------	------
5	333.800	6.25000	.00	------	------
6	357.800	6.25000	.00	------	------
7	357.800	.00000	30.00	------	------
8	417.800	.00000	30.00	------	------
9	417.800	5.56000	25.00	------	------
10	477.800	5.56000	25.00	------	------
11	477.800	3.47000	32.00	------	------
12	600.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 36000.000 lbs
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

(Zero moment at pile head for this load indicates a free-head condition)

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A5\
Name of input data file: A5Stability.lpd
Name of output file: A5Stability.lpo
Name of plot output file: A5Stability.lpp
Name of runtime file: A5Stability.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:24:15

Problem Title

A5 Stability

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 200.00 in
Depth of ground surface below top of pile = -86.20 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -86.200 in
Distance from top of pile to bottom of layer = 249.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 249.800 in
Distance from top of pile to bottom of layer = 333.800 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 333.800 in
Distance from top of pile to bottom of layer = 357.800 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

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Number of iterations = 17
Number of zero deflection points = 3

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 1.000000	M= 0.000	90000.0000	1.0000000	844828.	28133.4062

Pile-Head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

Deflection = 1.00000 in
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	1.00000000	844828.18392	28133.40424
327.750	1.00000000	844717.53429	28092.44897
310.500	1.00000000	844793.31842	28053.24620
293.250	1.00000000	844686.85328	28012.88657
276.000	1.00000000	844445.37175	27967.89215
258.750	1.00000000	844623.39066	27930.05674
241.500	1.00000000	843558.96750	27874.42019
224.250	1.00000000	842464.77423	27817.21962
207.000	1.00000000	842251.10934	27772.73552
189.750	1.00000000	839280.06162	28590.63292

The analysis ended normally.

172.500	-.019259	18463.7907	-2914.6148	.0004237	626.8255	84.0102
174.225	-.018522	14496.0005	-2770.4247	.0004291	596.0389	82.3668
175.950	-.017770	9772.5763	-2630.5355	.0004331	568.3273	79.8236
177.675	-.017028	5286.1874	-2495.1099	.0004355	541.2464	77.1915
179.400	-.016276	1029.2266	-2364.2921	.0004365	515.5505	74.4813
181.125	-.015522	-3006.1573	-2238.2076	.0004362	527.4837	71.7036
182.850	-.014771	-6828.0274	-2116.9640	.0004346	550.9533	68.8687
184.575	-.014023	-10444.6200	-2000.6512	.0004318	572.3839	65.9868
186.300	-.013281	-13864.3531	-1889.3414	.0004279	593.0261	63.0681
188.025	-.012547	-17095.7164	-1783.0896	.0004229	612.5313	60.1223
189.750	-.011822	-20147.3211	-1681.9342	.0004169	630.9515	57.1593
191.475	-.011108	-23027.8313	-1585.8967	.0004099	648.3389	54.1885
193.200	-.010406	-25745.9425	-1494.9824	.0004020	664.7460	51.2193
194.925	-.009721	-28310.3537	-1409.1808	.0003933	680.2253	48.2609
196.650	-.009051	-30729.7396	-1328.4694	.0003838	694.8292	45.3221
198.375	-.008397	-33012.7235	-1252.7947	.0003735	708.6098	42.4120
200.100	-.007762	-35167.8502	-1182.1117	.0003625	721.6186	39.5392
201.825	-.007147	-37203.5603	-1116.3448	.0003508	733.9066	36.7123
203.550	-.006552	-39128.1635	-1055.4076	.0003385	745.5240	33.9395
205.275	-.005979	-40949.8141	-999.1994	.0003256	756.5198	31.2293
207.000	-.005429	-42676.6852	-947.6050	.0003121	766.9424	28.5898
208.725	-.004902	-44315.9445	-900.4966	.0002980	776.8385	26.0291
210.450	-.004401	-45875.7297	-857.7303	.0002834	786.2537	23.5550
212.175	-.003925	-47363.1245	-819.1502	.0002684	795.2320	21.1755
213.900	-.003475	-48785.1348	-585.1110	.0002529	803.8155	250.1743
215.625	-.003052	-49460.2749	-214.7895	.0002370	807.8908	179.1840
217.350	-.002657	-49559.7513	75.3853	.0002210	808.7327	157.2505
219.075	-.002290	-49268.8230	328.8229	.0002051	806.7352	136.5902
220.800	-.001950	-48520.9839	547.7438	.0001893	802.2694	117.2312
222.525	-.001637	-47437.8763	734.4051	.0001738	795.6832	99.1876
224.250	-.001350	-46049.2456	891.0769	.0001587	787.3811	82.4609
225.975	-.001089	-44412.9340	1020.0223	.0001441	777.4240	67.0409
227.700	-.000853	-42574.9075	1123.4780	.0001300	766.3293	52.9077
229.425	-.000640	-40577.3134	1203.6390	.0001166	754.2713	40.0325
231.150	-.000451	-38458.5634	1262.6439	.0001039	741.4821	28.3790
232.875	-.000282	-36253.4406	1302.5633	9.1800E-05	728.1715	17.9044
234.600	-.000134	-33993.2238	1325.3894	8.0459E-05	714.5203	8.5607
236.325	-4.59E-06	-31705.8296	1333.0280	6.9853E-05	700.7211	.2955941
238.050	.000107	-29415.9667	1327.2915	5.9986E-05	686.8990	-6.9466
239.775	.000202	-27145.2998	1309.8942	5.0855E-05	673.1928	-13.2242
241.500	.000283	-24912.6224	1282.4485	4.2452E-05	659.7159	-18.5970
243.225	.000349	-22734.0338	1246.4625	3.4760E-05	646.5654	-23.1259
244.950	.000402	-20623.1198	1203.3389	2.7760E-05	633.8235	-26.8724
246.675	.000445	-18591.1342	1154.3751	2.1430E-05	621.5580	-29.8973
248.400	.000476	-16647.1798	1100.7635	1.5741E-05	609.8239	-32.2610
250.125	.000499	-14798.3877	1043.5939	1.0665E-05	598.6641	-34.0226
251.850	.000513	-13050.0922	983.8553	6.2692E-06	588.1111	-35.2396
253.575	.000520	-11406.0024	922.4391	2.2212E-06	578.1870	-35.9676
255.300	.000521	-9868.3669	860.1429	-1.2132E-06	568.9055	-36.2600
257.025	.000516	-8438.1328	797.6740	-4.1685E-06	560.2723	-36.1677
258.750	.000506	-7115.0973	735.6543	-6.6793E-06	552.2861	-35.7392
260.475	.000493	-5898.0517	674.6242	-8.7801E-06	544.9398	-35.0202
262.200	.000476	-4784.9175	615.0482	-1.0505E-05	538.2207	-34.0534
263.925	.000457	-3772.8737	557.3190	-1.1896E-05	532.1117	-32.8709
265.650	.000435	-2858.4762	501.7692	-1.2957E-05	526.5922	-31.5326
267.375	.000412	-2037.7676	448.6458	-1.3747E-05	521.6083	-30.0518
269.100	.000388	-1306.3798	398.1753	-1.4287E-05	517.2235	-28.4647
270.825	.000363	-659.6267	350.5089	-1.4604E-05	513.3195	-26.8008
272.550	.000337	-92.5896	305.7567	-1.4726E-05	509.8968	-25.0858
274.275	.000312	399.8062	266.7439	-1.4676E-05	511.7512	-20.1464
276.000	.000287	832.2339	229.4753	-1.4477E-05	514.3614	-23.0636
277.725	.000262	1195.9912	191.2746	-1.4150E-05	516.5571	-21.2271
279.450	.000238	1496.5247	156.2201	-1.3715E-05	518.3712	-19.4158
281.175	.000215	1739.2091	124.2553	-1.3193E-05	519.8361	-17.6448
282.900	.000192	1929.3020	95.2998	-1.2601E-05	520.9835	-15.9268
284.625	.000171	2071.9061	69.2533	-1.1955E-05	521.8443	-14.2722
286.350	.000152	2171.9377	45.9988	-1.1270E-05	522.4481	-12.6896
288.075	.000132	2234.1011	25.4063	-1.0558E-05	522.8234	-11.1858
289.800	.000115	2262.8678	7.3356	-9.8324E-06	522.9970	-9.7658
291.525	9.84E-05	2262.4618	-8.3610	-9.1018E-06	522.9946	-8.4332
293.250	8.33E-05	2236.8483	-21.8362	-8.3755E-06	522.8400	-7.1902
294.975	6.93E-05	2189.7274	-33.2454	-7.6609E-06	522.5555	-6.0378
296.700	5.69E-05	2124.5304	-42.7447	-6.9644E-06	522.1620	-4.9759
298.425	4.55E-05	2044.4207	-50.4892	-6.2914E-06	521.6784	-4.0033
300.150	3.52E-05	1952.2962	-56.6316	-5.6462E-06	521.1223	-3.1183
301.875	2.60E-05	1850.7947	-61.3208	-5.0323E-06	520.5097	-2.3183
303.600	1.78E-05	1742.3021	-64.7004	-4.4522E-06	519.8548	-1.6001
305.325	1.06E-05	1628.9608	-66.9085	-3.9080E-06	519.1706	-.9600566
307.050	4.33E-06	1512.6810	-68.0765	-3.4008E-06	518.4687	-.3941184
308.775	-1.11E-06	1395.1527	-68.3284	-2.9314E-06	517.7593	.1020368
310.500	-5.78E-06	1277.8581	-67.7800	-2.4999E-06	517.0513	.5329599
312.225	-9.74E-06	1162.0853	-66.5420	-2.1060E-06	516.3525	.9033432
313.950	-1.30E-05	1048.9423	-64.7123	-1.7491E-06	515.6695	1.2180
315.675	-1.58E-05	939.3708	-62.3840	-1.4281E-06	515.0081	1.4816
317.400	-1.80E-05	834.1609	-59.6408	-1.1418E-06	514.3730	1.6989
319.125	-1.97E-05	733.9646	-56.5585	-8.8863E-07	513.7682	1.8747
320.850	-2.10E-05	639.3099	-53.2051	-6.6694E-07	513.1969	2.0134
322.575	-2.20E-05	550.6142	-49.6406	-4.7484E-07	512.6615	2.1193
324.300	-2.27E-05	468.1972	-45.9100	-3.1037E-07	512.1640	2.1967
326.025	-2.31E-05	392.2936	-42.0831	-1.7146E-07	511.7058	2.2495
327.750	-2.33E-05	323.0639	-38.1752	-5.5978E-08	511.2879	2.2813
329.475	-2.33E-05	260.6065	-34.2276	3.6246E-08	510.9109	2.2958
331.200	-2.31E-05	204.9670	-30.2677	1.1341E-07	510.5751	2.2955
332.925	-2.29E-05	156.1479	-26.3179	1.7170E-07	510.2804	2.2839
334.650	-2.25E-05	114.1170	-22.3960	2.1593E-07	510.0267	2.2632
336.375	-2.21E-05	78.8149	-18.5156	2.4648E-07	509.8136	2.2357
338.100	-2.17E-05	50.1615	-14.6870	2.6730E-07	509.6406	2.2033
339.825	-2.12E-05	28.0619	-10.9171	2.7993E-07	509.5072	2.1675
341.550	-2.07E-05	12.4106	-7.2109	2.8646E-07	509.4120	2.1296
343.275	-2.02E-05	3.0954	-3.5713	2.8896E-07	509.3565	2.0903
345.000	-1.97E-05	0.0000	0.0000	2.8946E-07	509.3379	2.0503

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.01494119
Maximum bending moment	=	844828.25943 lbs-in
Maximum shear force	=	28133.40618 lbs
Depth of maximum bending moment	=	62.10000000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = 1.000000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 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
0.000	1.000000	0.0000	28133.4062	-.0149412	509.3379	-1444.8484
1.725	.974226	48700.0826	26442.3494	-.0149333	803.3021	-515.7971
3.450	.948480	95862.9053	25551.7115	-.0149100	1087.9072	-516.8266
5.175	.922787	141483.	24660.9460	-.0148717	1363.3602	-515.9450
6.900	.897173	185561.	23774.0614	-.0148189	1629.4233	-512.3270
8.625	.871662	228105.	22893.4725	-.0147521	1886.2281	-508.6456
10.350	.846278	269124.	22019.2881	-.0146718	2133.8278	-504.9015
12.075	.821044	308627.	21151.6160	-.0145786	2372.2773	-501.0951
13.800	.795982	346624.	20290.5633	-.0144728	2601.6330	-497.2267
15.525	.771113	383123.	19436.2369	-.0143550	2821.9528	-493.2968
17.250	.746457	418136.	18588.7423	-.0142256	3033.2964	-489.3056
18.975	.722034	451671.	17748.1852	-.0140852	3235.7248	-485.2534
20.700	.697863	483740.	16914.6705	-.0139342	3429.3006	-481.1404
22.425	.673961	514354.	16088.3030	-.0137731	3614.0880	-476.9669
24.150	.650346	543522.	15269.1870	-.0136023	3790.1528	-472.7328
25.875	.627033	571256.	14457.4268	-.0134223	3957.5621	-468.4384
27.600	.604039	597567.	13653.1265	-.0132337	4116.3848	-464.0837
29.325	.581377	622468.	12856.3902	-.0130367	4266.6909	-459.6685
31.050	.559062	645970.	12067.3221	-.0128319	4408.5524	-455.1930
32.775	.537107	668085.	11286.0266	-.0126198	4542.0425	-450.6569
34.500	.515524	688825.	10512.6084	-.0124007	4667.2360	-446.0600
36.225	.494325	708204.	9747.1724	-.0121752	4784.2091	-441.4021
37.950	.473520	726233.	8989.8242	-.0119437	4893.0387	-436.6828
39.675	.453119	742927.	8240.6700	-.0117065	4993.8071	-431.9018
41.400	.433132	758298.	7499.8168	-.0114641	5086.5920	-427.0585
43.125	.413568	772361.	6767.3724	-.0112170	5171.4770	-422.1524
44.850	.394433	785129.	6043.4457	-.0109656	5248.5457	-417.1829
46.575	.375736	796616.	5328.1469	-.0107103	5317.8037	-412.1490
48.300	.357483	806836.	4621.5878	-.0104514	5379.5777	-407.0500
50.025	.339679	815805.	3923.8815	-.0101895	5433.7165	-401.8848
51.750	.322329	823538.	3235.1433	-.0099248	5480.3899	-396.6522
53.475	.305438	830048.	2555.4905	-.0096579	5519.6897	-391.3510
55.200	.289010	835353.	1885.0430	-.0093890	5551.7091	-385.9795
56.925	.273046	839467.	1223.9233	-.0091186	5576.5429	-380.5361
58.650	.257551	842407.	572.2571	-.0088471	5594.2878	-375.0188
60.375	.242524	844188.	-69.8261	-.0085749	5605.0419	-369.4255
62.100	.227967	844828.	-702.1931	-.0083022	5608.9051	-363.7536
63.825	.213881	844344.	-1324.7056	-.0080295	5605.9791	-358.0002
65.550	.200265	842751.	-1937.2206	-.0077571	5596.3674	-352.1621
67.275	.187119	840069.	-2539.5886	-.0074855	5580.1754	-346.2356
69.000	.174441	836314.	-3131.6534	-.0072149	5557.5102	-340.2168
70.725	.162228	831505.	-3713.2511	-.0069456	5528.4812	-334.0997
72.450	.150478	825660.	-4284.2084	-.0066781	5493.1997	-327.8798
74.175	.139188	818798.	-4844.3410	-.0064126	5451.7792	-321.5501
75.900	.128355	810938.	-5393.4552	-.0061495	5404.3354	-315.1031
77.625	.117973	802100.	-5931.3386	-.0058891	5350.9865	-308.5298
79.350	.108037	792303.	-6457.7650	-.0056317	5291.8533	-301.8197
81.075	.098543	781569.	-6972.4876	-.0053777	5227.0591	-294.9602
82.800	.089484	769918.	-7475.2360	-.0051272	5156.7306	-287.9364
84.525	.080854	757372.	-7965.7109	-.0048806	5080.9974	-280.7302
86.250	.072646	743952.	-8443.5787	-.0046383	4999.9926	-273.3194
87.975	.064852	729681.	-8908.4629	-.0044004	4913.8535	-265.6767
89.700	.057465	714584.	-9359.9336	-.0041672	4822.7217	-257.7676
91.425	.050475	698684.	-9797.4934	-.0039391	4726.7438	-249.5482
93.150	.043875	682006.	-10220.5578	-.0037162	4626.0722	-240.9613
94.875	.037654	664577.	-10628.4269	-.0034988	4520.8663	-231.9304
96.600	.031804	646424.	-11020.2440	-.0032872	4411.2934	-222.3503
98.325	.026313	627577.	-11394.9320	-.0030815	4297.5312	-212.0707
100.050	.021173	608068.	-11751.0894	-.0028820	4179.7700	-200.8654
101.775	.016370	587931.	-12086.8060	-.0026890	4058.2170	-188.3712
103.500	.011896	567206.	-12399.3030	-.0025025	3933.1027	-173.9441
105.225	.007737	545930.	-12684.0972	-.0023228	3804.6924	-156.2521
106.950	.003882	524165.	-12932.3807	-.0021500	3673.3104	-131.6128
108.675	.000319	501981.	-13107.7945	-.0019844	3539.4059	-71.7656
110.400	-.002964	479559.	-13063.9715	-.0018259	3404.0605	222.5748
112.125	-.005980	457478.	-12832.1181	-.0016747	3270.7716	146.2407
113.850	-.008741	435808.	-12567.2495	-.0015304	3139.9710	160.8533
115.575	-.011260	414596.	-12280.6603	-.0013932	3011.9277	171.3915
117.300	-.013548	393872.	-11978.0271	-.0012627	2886.8374	179.5199
119.025	-.015616	373664.	-11662.7465	-.0011387	2764.8524	186.0229
120.750	-.017477	353990.	-11337.2711	-.0010213	2646.0956	191.3398
122.475	-.019140	334867.	-11003.4108	-.0009101	2530.6684	195.7445
124.200	-.020616	316310.	-10662.5809	-.0008049	2418.6558	199.4206
125.925	-.021917	298331.	-10315.9262	-.0007057	2310.1294	202.4979
127.650	-.023051	280940.	-9964.3972	-.0006122	2205.1499	205.0721
129.375	-.024029	264144.	-9617.8312	-.0005242	2103.7687	196.7435
131.100	-.024860	247921.	-9275.5389	-.0004416	2005.8415	200.1171
132.825	-.025552	232281.	-8927.9477	-.0003640	1911.4337	202.8872
134.550	-.026116	217232.	-8576.0480	-.0002915	1820.5997	205.1125
136.275	-.026558	202784.	-8220.7362	-.0002237	1733.3842	206.8432
138.000	-.026887	188940.	-7862.8201	-.0001604	1649.8225	208.1227
139.725	-.027111	175707.	-7503.0690	-.0001016	1569.9419	208.5892
141.450	-.027238	163086.	-7142.1427	-4.6864E-05	1493.7618	209.4761
143.175	-.027273	151081.	-6780.6783	3.8531E-06	1421.2950	209.6130
144.900	-.027224	139692.	-6419.2567	5.0794E-05	1352.5473	209.4264
146.625	-.027098	128919.	-6058.4158	9.4156E-05	1287.5191	208.9399
148.350	-.026899	118761.	-5698.6547	.0001341	1226.2046	208.1744
150.075	-.026635	109217.	-5340.4382	.0001709	1168.5934	207.1491
151.800	-.026310	100283.	-4984.1999	.0002068	1114.6699	205.8808
153.525	-.025929	91957.6059	-4718.7534	.0002358	1064.4140	101.8833
155.250	-.025496	83930.4273	-4543.5217	.0002642	1015.9602	101.2039
156.975	-.025017	76200.4244	-4369.5180	.0002900	969.3002	100.4595
158.700	-.024496	68765.5318	-4197.1206	.0003134	924.4216	99.6215
160.425	-.023936	61623.0335	-4026.6880	.0003345	881.3079	98.1815
162.150	-.023341	54769.5977	-3858.5580	.0003533	839.9391	96.7509
163.875	-.022717	48201.3109	-3693.0518	.0003699	800.2914	95.1413
165.600	-.022065	41913.7128	-3530.4658	.0003845	762.3381	93.3642
167.325	-.021390	35901.8308	-3371.0797	.0003970	726.0491	91.4312
169.050	-.020696	30160.2142	-3215.1527	.0004077	691.3915	89.3536
170.775	-.019984	24682.9688	-3062.9245	.0004165	658.3296	87.1429

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	1.00	.07234
3	1.00	.07234
4	129.00	.07234
5	129.00	.03623
6	153.00	.03623
7	153.00	.03623
8	213.00	.03623
9	213.00	.03333
10	273.00	.03333
11	273.00	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	.00000	30.00	------	------
2	1.000	.00000	30.00	------	------
3	1.000	6.25000	.00	------	------
4	129.000	6.25000	.00	------	------
5	129.000	6.25000	.00	------	------
6	153.000	6.25000	.00	------	------
7	153.000	.00000	30.00	------	------
8	213.000	.00000	30.00	------	------
9	213.000	5.56000	25.00	------	------
10	273.000	5.56000	25.00	------	------
11	273.000	3.47000	32.00	------	------
12	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 1.000 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleinfelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B4\
Name of input data file: B4p25mm.lpd
Name of output file: B4p25mm.lpo
Name of plot output file: B4p25mm.lpp
Name of runtime file: B4p25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 12: 4:26

Problem Title

B4, pinned head, 1.0 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 1.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 1.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Number of iterations = 13
Number of zero deflection points = 3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= .250000	M= 0.000	90000.0000	.2500000	506157.	22781.1370

Pile-head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

Deflection = .25000 in
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	.25000000	506156.50279	22781.13698
327.750	.25000000	505711.03572	22776.28861
310.500	.25000000	505522.48603	22774.02121
293.250	.25000000	505550.42774	22773.08545
276.000	.25000000	505840.29583	22776.99170
258.750	.25000000	505773.19452	22775.76194
241.500	.25000000	504926.69830	22762.39176
224.250	.25000000	504822.45515	22759.35624
207.000	.25000000	504661.32033	22755.94780
189.750	.25000000	504140.55078	22748.63398

The analysis ended normally.

172.500	-.004805	3320.3877	-1022.0505	.0001078	519.3592	27.7748
174.225	-.004618	1581.8988	-974.8965	.0001082	514.1122	26.8965
175.950	-.004432	-76.5959	-929.2737	.0001083	509.5690	25.9995
177.675	-.004245	-1657.7238	-885.2119	.0001082	514.3411	25.0866
179.400	-.004058	-3164.1618	-842.7364	.0001078	518.8876	24.1603
181.125	-.003873	-4598.6285	-801.8682	.0001071	523.2170	23.2232
182.850	-.003689	-5963.8764	-762.6235	.0001063	527.3375	22.2779
184.575	-.003506	-7262.6843	-725.0145	.0001052	531.2574	21.3267
186.300	-.003326	-8497.8499	-689.0492	.0001040	534.9853	20.3722
188.025	-.003148	-9672.1823	-654.7312	.0001025	538.5296	19.4168
189.750	-.002972	-10788.4954	-622.0602	.0001008	541.8987	18.4627
191.475	-.002800	-11849.6001	-591.0319	9.9010E-05	545.1012	17.5122
193.200	-.002631	-12858.2981	-561.6379	9.7016E-05	548.1456	16.5677
194.925	-.002465	-13817.3745	-533.8663	9.4863E-05	551.0402	15.6313
196.650	-.002303	-14729.5910	-507.7011	9.2559E-05	553.7934	14.7052
198.375	-.002146	-15597.6028	-483.1228	9.0111E-05	556.4134	13.7914
200.100	-.001992	-16424.3448	-460.1081	8.7526E-05	558.9083	12.8922
201.825	-.001844	-17212.2327	-438.6303	8.4811E-05	561.2862	12.0096
203.550	-.001700	-17963.9530	-418.6589	8.1972E-05	563.5550	11.1456
205.275	-.001561	-18682.0580	-400.2602	7.9014E-05	565.7223	10.3022
207.000	-.001427	-19369.0394	-383.0969	7.5942E-05	567.7957	9.4813
208.725	-.001299	-20027.3224	-367.4284	7.2762E-05	569.7825	8.6850
210.450	-.001176	-20658.2601	-353.1107	6.9478E-05	571.6898	7.9152
212.175	-.001059	-21267.1274	-340.0965	6.6094E-05	573.5244	7.1737
213.900	-.000948	-21853.1154	-328.2926	6.2614E-05	575.2929	6.4609
215.625	-.000843	-22155.8745	-120.7551	5.9061E-05	576.2067	68.7315
217.350	-.000744	-22253.5590	1.1659	5.5477E-05	576.5015	61.0319
219.075	-.000652	-22169.0777	100.1650	5.1891E-05	576.2465	53.7496
220.800	-.000565	-21924.1021	186.9678	4.8332E-05	575.5072	46.8914
222.525	-.000485	-21539.0458	262.3088	4.4824E-05	574.3450	40.4604
224.250	-.000411	-21033.0547	326.9244	4.1387E-05	572.8179	34.4563
225.975	-.000342	-20424.0073	381.5485	3.8041E-05	570.9797	28.8758
227.700	-.000280	-19728.5243	426.9062	3.4800E-05	568.8807	23.7129
229.425	-.000222	-18961.9863	463.7106	3.1677E-05	566.5672	18.9590
231.150	-.000170	-18138.5584	492.6504	2.8683E-05	564.0820	14.6037
232.875	-.000123	-17271.2208	514.4265	2.5824E-05	561.4643	10.6347
234.600	-8.12E-05	-16371.8056	529.6694	2.3109E-05	558.7497	7.0383
236.325	-4.36E-05	-15451.0367	539.0170	2.0540E-05	555.9708	3.7985
238.050	-1.03E-05	-14518.5747	543.0722	1.8121E-05	553.1565	.9022509
239.775	1.89E-05	-13583.0641	542.4099	1.5853E-05	550.3330	-1.6702
241.500	4.44E-05	-12652.1829	537.5754	1.3735E-05	547.5235	-3.9351
243.225	6.63E-05	-11732.6930	529.0838	1.1767E-05	544.7484	-5.9102
244.950	8.50E-05	-10830.4974	517.4195	9.9450E-06	542.0255	-7.6135
246.675	.000101	-9950.6846	503.0360	8.2684E-06	539.3701	-9.0630
248.400	.000114	-9097.5904	486.3558	6.7309E-06	536.7954	-10.2764
250.125	.000124	-8274.8469	467.7707	5.3286E-06	534.3122	-11.2715
251.850	.000132	-7485.4358	447.6424	4.0565E-06	531.9297	-12.0657
253.575	.000138	-6733.7402	426.3028	2.9089E-06	529.6550	-12.6758
255.300	.000142	-6015.5942	404.0554	1.8800E-06	527.4936	-13.1183
257.025	.000144	-5330.3328	381.1755	9.6355E-07	525.4495	-13.4091
258.750	.000145	-4700.8380	357.9117	1.5322E-07	523.5255	-13.5634
260.475	.000145	-4103.5850	334.4870	-5.5745E-07	521.7229	-13.5957
262.200	.000143	-3546.6848	311.0999	-1.1750E-06	520.0421	-13.5198
263.925	.000141	-3029.9256	287.9256	-1.7858E-06	518.4825	-13.3489
265.650	.000137	-2552.8117	265.1176	-2.1564E-06	517.0425	-13.0952
267.375	.000133	-2114.6002	242.8007	-2.5332E-06	515.7200	-12.7702
269.100	.000129	-1714.3350	221.1126	-2.8422E-06	514.5119	-12.3847
270.825	.000124	-1350.8792	200.1250	-3.0896E-06	513.4150	-11.9487
272.550	.000118	-1022.9443	179.9254	-3.2812E-06	512.4252	-11.4712
274.275	.000112	-728.1176	162.7805	-3.4227E-06	511.5384	-8.4071
276.000	.000106	-460.2880	146.9902	-3.5187E-06	510.7271	-9.9004
277.725	.000100	-220.9088	130.3543	-3.5736E-06	510.0046	-9.3876
279.450	9.39E-05	-9.4571	114.6141	-3.5922E-06	509.3664	-8.8618
281.175	8.77E-05	175.6254	99.7875	-3.5788E-06	508.8679	-8.3285
282.900	8.16E-05	335.9210	85.8831	-3.5375E-06	510.3517	-7.7925
284.625	7.55E-05	473.0206	72.9017	-3.4722E-06	510.7655	-7.2584
286.350	6.96E-05	588.5100	60.8368	-3.3866E-06	511.1140	-6.7299
288.075	6.38E-05	683.9591	49.6759	-3.2839E-06	511.4021	-6.2103
289.800	5.83E-05	760.9115	39.4009	-3.1672E-06	511.6344	-5.7027
291.525	5.29E-05	820.8756	29.9892	-3.0395E-06	511.8154	-5.2094
293.250	4.78E-05	865.3179	21.4144	-2.9034E-06	511.9495	-4.7324
294.975	4.29E-05	895.6566	13.6467	-2.7613E-06	512.0410	-4.2735
296.700	3.83E-05	913.2566	6.6542	-2.6153E-06	512.0942	-3.8338
298.425	3.39E-05	919.4258	.4027971	-2.4674E-06	512.1128	-3.4143
300.150	2.97E-05	915.4124	-5.1430	-2.3193E-06	512.1007	-3.0156
301.875	2.59E-05	902.4027	-10.0192	-2.1725E-06	512.0614	-2.6380
303.600	2.22E-05	881.5207	-14.2625	-2.0285E-06	511.9984	-2.2817
305.325	1.89E-05	853.8269	-17.9094	-1.8885E-06	511.9148	-1.9465
307.050	1.57E-05	820.3197	-20.9958	-1.7533E-06	511.8137	-1.6320
308.775	1.28E-05	781.9358	-23.5571	-1.6240E-06	511.6978	-1.3376
310.500	1.01E-05	739.5521	-25.6273	-1.5012E-06	511.5699	-1.0626
312.225	7.64E-06	693.9878	-27.2392	-1.3855E-06	511.4324	-.8062605
313.950	5.35E-06	646.0071	-28.4240	-1.2773E-06	511.2876	-.5674618
315.675	3.24E-06	596.3215	-29.2112	-1.1771E-06	511.1376	-.3451622
317.400	1.29E-06	545.5940	-29.6281	-1.0849E-06	510.9845	-.1381941
319.125	-5.07E-07	494.4415	-29.7001	-1.0009E-06	510.8301	.0546736
320.850	-2.16E-06	443.4394	-29.4505	-9.2523E-07	510.6762	.2347192
322.575	-3.70E-06	393.1246	-28.9003	-8.5771E-07	510.5244	.4032456
324.300	-5.12E-06	343.9998	-28.0681	-7.9821E-07	510.3761	.5615743
326.025	-6.45E-06	296.5375	-26.9705	-7.4651E-07	510.2328	.7110190
327.750	-7.70E-06	251.1834	-25.6216	-7.0229E-07	510.0960	.8528751
329.475	-8.88E-06	208.3609	-24.0335	-6.6520E-07	509.9667	.9884040
331.200	-9.99E-06	168.4743	-22.2161	-6.3478E-07	509.8463	1.1188
332.925	-1.11E-05	131.9126	-20.1770	-6.1054E-07	509.7360	1.2453
334.650	-1.21E-05	98.0531	-17.9224	-5.9190E-07	509.6368	1.3688
336.375	-1.31E-05	70.2642	-15.4563	-5.7823E-07	509.5499	1.4904
338.100	-1.41E-05	45.9084	-12.7813	-5.6885E-07	509.4764	1.6110
339.825	-1.51E-05	26.3453	-9.8986	-5.6302E-07	509.4174	1.7313
341.550	-1.60E-05	11.9331	-6.8082	-5.5993E-07	509.3739	1.8518
343.275	-1.70E-05	3.0310	-3.5092	-5.5872E-07	509.3470	1.9731
345.000	-1.80E-05	0.0000	0.0000	-5.5846E-07	509.3379	2.0955

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00417363
Maximum bending moment	=	506156.50279 lbs-in
Maximum shear force	=	22781.13698 lbs
Depth of maximum bending moment	=	50.02500000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = .250000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 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
0.000	.250000	0.0000	22781.1370	-.0041736	509.3379	-618.7500
1.725	.242800	39024.8333	21720.1309	-.0041705	627.1190	-611.4020
3.450	.235612	76229.3854	20672.3117	-.0041612	739.4064	-603.4608
5.175	.228444	111636.	19638.6781	-.0041460	846.2685	-594.9550
6.900	.221308	145270.	18620.1793	-.0041253	947.7790	-585.9132
8.625	.214212	177157.	17617.7145	-.0040993	1044.0165	-576.3648
10.350	.207166	207324.	16632.1323	-.0040682	1135.0645	-566.3392
12.075	.200177	235801.	15664.2302	-.0040324	1221.0106	-555.8662
13.800	.193254	262618.	14714.7542	-.0039922	1301.9468	-544.9756
15.525	.186404	287806.	13784.3990	-.0039478	1377.9688	-533.6972
17.250	.179634	311400.	12873.8076	-.0038994	1449.1761	-522.0609
18.975	.172951	333432.	11983.5716	-.0038474	1515.6713	-510.0965
20.700	.166360	353936.	11114.2321	-.0037919	1577.5602	-497.8336
22.425	.159869	372953.	10266.2781	-.0037332	1634.9514	-485.3014
24.150	.153481	390515.	9440.1494	-.0036716	1687.9560	-472.5291
25.875	.147202	406662.	8636.2352	-.0036072	1736.6874	-459.5453
27.600	.141036	421431.	7854.0761	-.0035404	1781.2610	-446.3783
29.325	.134987	434860.	7096.3640	-.0034713	1821.7939	-433.0561
31.050	.129060	446991.	6360.9431	-.0034001	1858.4048	-419.6050
32.775	.123257	457861.	5648.8111	-.0033271	1891.2134	-406.0544
34.500	.117581	467512.	4960.1199	-.0032524	1920.3408	-392.4281
36.225	.112036	475984.	4294.9768	-.0031762	1945.9004	-378.7523
37.950	.106623	483316.	3653.4455	-.0030988	1968.0386	-365.0521
39.675	.101345	489550.	3035.5473	-.0030203	1986.8538	-351.3516
41.400	.096204	494727.	2441.2622	-.0029408	2002.4765	-337.6745
43.125	.091200	498885.	1870.5307	-.0028606	2015.0293	-324.0433
44.850	.086334	502060.	1323.2542	-.0027798	2024.6341	-310.4802
46.575	.081609	504314.	799.2972	-.0026986	2031.4127	-297.0062
48.300	.077024	505664.	298.4882	-.0026171	2035.4857	-283.6419
50.025	.072580	506157.	-179.3788	-.0025354	2036.9732	-270.4868
51.750	.068277	505832.	-634.9427	-.0024537	2035.9939	-257.3195
53.475	.064115	504729.	-1067.2742	-.0023721	2032.6655	-244.3981
55.200	.060093	502886.	-1477.8738	-.0022908	2027.1039	-231.6595
56.925	.056212	500342.	-1866.6711	-.0022098	2019.4239	-219.1199
58.650	.052469	497133.	-2234.0225	-.0021293	2009.7382	-206.7947
60.375	.048865	493296.	-2580.3102	-.0020494	1998.1576	-194.6983
62.100	.045399	488867.	-2905.9407	-.0019701	1984.7913	-182.8443
63.825	.042069	483882.	-3211.3433	-.0018916	1969.7450	-171.2455
65.550	.038873	478375.	-3496.9682	-.0018139	1953.1259	-159.9138
67.275	.035811	472381.	-3763.2858	-.0017372	1935.0336	-148.8602
69.000	.032880	465931.	-4010.7847	-.0016614	1915.5687	-138.0950
70.725	.030079	459059.	-4239.9703	-.0015868	1894.8284	-127.6275
72.450	.027405	451796.	-4451.3638	-.0015133	1872.9071	-117.4664
74.175	.024858	444172.	-4645.5003	-.0014409	1849.8968	-107.6194
75.900	.022434	436216.	-4822.9276	-.0013699	1825.8863	-98.0935
77.625	.020132	427958.	-4984.2051	-.0013001	1800.9619	-88.8949
79.350	.017949	419425.	-5129.9021	-.0012317	1775.2067	-80.0292
81.075	.015882	410642.	-5360.0702	-.0011647	1748.7012	-186.6323
82.800	.013931	401294.	-5677.1527	-.0010992	1720.4866	-180.7996
84.525	.012090	391397.	-5983.5981	-.0010352	1690.6100	-174.4995
86.250	.010359	380972.	-6278.8971	-.0009729	1659.1527	-167.8761
87.975	.008734	370037.	-6562.4253	-.0009122	1626.1509	-160.8522
89.700	.007212	358615.	-6833.3962	-.0008534	1591.6765	-153.3170
91.425	.005790	346727.	-7090.7836	-.0007965	1555.7980	-145.1031
93.150	.004464	334399.	-7333.1831	-.0007415	1518.5903	-135.9399
94.875	.003231	321658.	-7550.5403	-.0006886	1480.1363	-125.3439
96.600	.002088	308536.	-7763.5105	-.0006377	1440.5324	-112.3027
98.325	.001031	295072.	-7941.3974	-.0005890	1399.8566	-93.9430
100.050	5.66E-05	281321.	-8033.6909	-.0005424	1358.3947	-13.0641
101.775	-.000840	267524.	-7967.2560	-.0004981	1316.7543	90.0901
103.500	-.001662	253988.	-7797.6349	-.0004560	1275.9027	106.5721
105.225	-.002413	240764.	-7604.8980	-.0004161	1235.9890	116.8910
106.950	-.003098	227881.	-7396.8123	-.0003783	1197.1068	124.3678
108.675	-.003718	215362.	-7177.2926	-.0003425	1159.3244	130.1479
110.400	-.004279	203225.	-6948.7933	-.0003087	1122.6944	134.7787
112.125	-.004783	191485.	-6713.0305	-.0002769	1087.2595	138.5695
113.850	-.005234	180151.	-6471.2060	-.0002469	1053.0546	141.7139
115.575	-.005635	169235.	-6224.5622	-.0002187	1020.1088	144.3427
117.300	-.005989	158745.	-5973.6687	-.0001922	988.4464	146.5484
119.025	-.006298	148686.	-5719.2760	-.0001674	958.0882	148.3997
120.750	-.006566	139065.	-5462.9504	-.0001441	929.0515	149.9488
122.475	-.006795	129887.	-5202.1779	-.0001224	901.3509	151.2368
124.200	-.006989	121156.	-4940.3005	-.0001022	874.9987	152.2964
125.925	-.007148	112874.	-4676.9295	-8.3282E-05	850.0050	153.1542
127.650	-.007276	105046.	-4412.1577	-6.5692E-05	826.3783	153.8322
129.375	-.007375	97672.8519	-4185.4186	-4.9329E-05	804.1251	109.0490
131.100	-.007446	90621.6837	-3996.8551	-3.4130E-05	782.8439	109.5753
132.825	-.007492	83894.2994	-3807.5453	-2.0044E-05	762.5400	109.9143
134.550	-.007513	77491.8761	-3617.7992	-7.0175E-06	743.2168	110.0813
136.275	-.007517	71415.0711	-3427.9013	5.0018E-06	724.8763	110.0901
138.000	-.007498	65664.0634	-3238.1138	1.6066E-05	707.5191	109.9534
139.725	-.007461	60238.5900	-3048.6781	2.6229E-05	691.1445	109.6822
141.450	-.007407	55137.9799	-2859.8174	3.5542E-05	675.7503	109.2867
143.175	-.007339	50361.1842	-2671.7382	4.4057E-05	661.3334	108.7761
144.900	-.007256	45906.8032	-2484.6320	5.1828E-05	647.8896	108.1586
146.625	-.007160	41773.1112	-2298.6767	5.8905E-05	635.4136	107.4418
148.350	-.007052	37958.0787	-2114.0378	6.5341E-05	623.8995	106.6323
150.075	-.006934	34459.3925	-1930.8701	7.1186E-05	613.3401	105.7360
151.800	-.006807	31274.4735	-1749.3187	7.6492E-05	603.7276	104.7583
153.525	-.006670	28400.4922	-1568.4372	8.1309E-05	595.0536	35.3941
155.250	-.006526	25831.1187	-1567.7996	8.5670E-05	586.6954	34.9104
156.975	-.006375	22964.9831	-1508.0404	8.9592E-05	578.6487	34.3757
158.700	-.006217	20400.5610	-1449.2448	9.3093E-05	570.9090	33.7932
160.425	-.006054	17936.1834	-1391.4925	9.6187E-05	563.4712	33.1659
162.150	-.005885	15570.0456	-1334.8583	9.8892E-05	556.3300	32.4970
163.875	-.005712	13300.2166	-1279.4112	.0001012	549.4794	31.7894
165.600	-.005536	11124.6476	-1225.2155	.0001032	542.9133	31.0462
167.325	-.005356	9041.1016	-1172.3301	.0001048	536.6251	30.2702
169.050	-.005174	7047.5619	-1120.8089	.0001061	530.6082	29.4644
170.775	-.004990	5141.4406	-1070.7010	.0001071	524.8553	28.6317

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	81.00	.07234
3	81.00	.07234
4	129.00	.07234
5	129.00	.03623
6	153.00	.03623
7	153.00	.03623
8	213.00	.03623
9	213.00	.03333
10	273.00	.03333
11	273.00	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	.00000	30.00	------	------
2	81.000	.00000	30.00	------	------
3	81.000	6.25000	.00	------	------
4	129.000	6.25000	.00	------	------
5	129.000	6.25000	.00	------	------
6	153.000	6.25000	.00	------	------
7	153.000	.00000	30.00	------	------
8	213.000	.00000	30.00	------	------
9	213.000	5.56000	25.00	------	------
10	273.000	5.56000	25.00	------	------
11	273.000	3.47000	32.00	------	------
12	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = .250 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B4\
Name of input data file: B4p6mm.lpd
Name of output file: B4p6mm.lpo
Name of plot output file: B4p6mm.lpp
Name of runtime file: B4p6mm.lpr

Time and Date of Analysis

Date: May 17, 2007 Time: 7:26:27

Problem Title

B4, pinned head, 0.25 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in^^4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 81.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in^^3
p-y subgrade modulus k for bottom of layer = .000 lbs/in^^3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 81.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in^^3
p-y subgrade modulus k for bottom of layer = .000 lbs/in^^3

Number of iterations = 16
Number of zero deflection points = 3

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= 1.000000	S= 0.000	90000.0000	1.0000000	-2126970.	51146.4631

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = 1.00000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	1.00000000	-2126970.	51146.46310
327.750	1.00000000	-2127039.	51148.55496
310.500	1.00000000	-2126453.	51136.30897
293.250	1.00000000	-2127187.	51148.33779
276.000	1.00000000	-2126763.	51140.74419
258.750	1.00000000	-2126701.	51135.49792
241.500	1.00000000	-2126923.	51125.12334
224.250	1.00000000	-2127021.	51121.61796
207.000	1.00000000	-2097769.	50568.47469
189.750	1.00000000	-2055389.	49669.05261

The analysis ended normally.

172.500	-.017376	244798.	-8343.3104	-.0003275	1986.9855	76.4347
174.225	-.017873	230564.	-8208.9108	-.0002508	1901.0713	79.3909
175.950	-.018242	216555.	-8069.8715	-.0001786	1816.5094	81.8141
177.675	-.018489	202778.	-7927.0959	-.0001109	1733.3514	83.7229
179.400	-.018624	189241.	-7781.4944	-4.7638E-05	1651.6359	85.1368
181.125	-.018658	175947.	-7633.7834	1.1315E-05	1571.3823	86.0768
182.850	-.018585	162901.	-7484.0838	6.6017E-05	1492.6415	86.5613
184.575	-.018426	150104.	-7335.5199	.0001165	1415.3962	86.6142
186.300	-.018183	137557.	-7186.4186	.0001630	1339.6613	86.2569
188.025	-.017864	125260.	-7038.2681	.0002054	1265.4340	85.5118
189.750	-.017478	113211.	-6891.7173	.0002439	1192.7047	84.4022
191.475	-.017022	101408.	-6747.3743	.0002786	1121.4572	82.9518
193.200	-.016513	89846.1713	-6605.8065	.0003094	1051.6689	81.1848
194.925	-.015955	78521.6519	-6467.5387	.0003366	983.3116	79.1257
196.650	-.015352	67428.6449	-6333.0532	.0003602	916.3518	76.7996
198.375	-.014712	56560.7848	-6202.7885	.0003802	850.7510	74.2320
200.100	-.014040	45910.9762	-6077.1386	.0003967	786.4665	71.4490
201.825	-.013343	35471.4718	-5956.4526	.0004099	723.4514	68.4768
203.550	-.012626	25233.9506	-5841.0336	.0004197	661.6555	65.3422
205.275	-.011895	15189.5986	-5731.1384	.0004262	601.0256	62.0725
207.000	-.011156	5329.1897	-5626.9762	.0004295	541.5060	58.6952
208.725	-.010414	-4356.8313	-5528.7085	.0004297	535.6366	55.2384
210.450	-.009674	-13878.2650	-5436.4477	.0004267	593.1101	51.7306
212.175	-.008941	-23245.0723	-5350.2571	.0004207	649.6502	48.2006
213.900	-.008222	-32467.2877	-5270.6872	.0004117	705.3175	591.3007
215.625	-.007521	-39928.3864	-3908.2938	.0004000	750.3543	441.0394
217.350	-.006842	-46075.1157	-3179.0417	.0003862	787.4573	404.4702
219.075	-.006189	-51015.9837	-2512.1082	.0003705	817.2814	368.7861
220.800	-.005564	-54856.9256	-1905.7925	.0003534	840.4662	334.1887
222.525	-.004970	-57700.6975	-1358.0733	.0003352	857.6318	300.8680
224.250	-.004407	-59646.3664	-866.6621	.0003163	869.3763	268.9042
225.975	-.003878	-60788.8874	-429.0522	.0002968	876.2728	238.4696
227.700	-.003383	-61218.7654	-42.5655	.0002771	878.8676	209.6309
229.425	-.002922	-61021.7918	295.6053	.0002574	877.6787	182.4512
231.150	-.002495	-60278.8531	588.3580	.0002376	873.1941	156.9722
232.875	-.002102	-59065.8023	838.6455	.0002186	865.8719	133.2161
234.600	-.001741	-57453.3898	1049.4434	.0001998	856.1390	111.1873
236.325	-.001413	-55507.2457	1223.7221	.0001815	844.3917	90.8750
238.050	-.001115	-53287.9093	1364.4214	.0001640	830.9953	72.2545
239.775	-.000847	-50850.8994	1474.4278	.0001471	816.2849	55.2891
241.500	-.000607	-48246.8210	1556.5557	.0001311	800.5662	39.9317
243.225	-.000394	-45521.5023	1613.5311	.0001160	784.1155	26.1267
244.950	-.000207	-42716.1587	1647.9773	.0001018	767.1819	13.8109
246.675	-4.34E-05	-39867.5778	1662.4039	8.8430E-05	749.9872	2.9156
248.400	9.80E-05	-37008.3229	1659.1977	7.6020E-05	732.7281	-6.6328
250.125	.000219	-34166.9497	1640.6160	6.4530E-05	715.5770	-14.9112
251.850	.000321	-31368.2340	1608.7812	5.3950E-05	698.6033	-21.9987
253.575	.000405	-28633.4059	1565.6780	4.4264E-05	682.1753	-27.9760
255.300	.000473	-25980.3888	1513.1516	3.5467E-05	666.3611	-32.9242
257.025	.000527	-23424.0394	1452.9075	2.7472E-05	650.7305	-36.9240
258.750	.000568	-20976.3877	1386.5130	2.0304E-05	635.9559	-40.0552
260.475	.000597	-18646.8738	1315.3989	1.3908E-05	621.8944	-42.3959
262.200	.000616	-16442.5797	1240.8631	8.2425E-06	608.5888	-44.0224
263.925	.000626	-14360.4555	1164.0744	3.2690E-06	596.0690	-45.0080
265.650	.000627	-12427.5381	1086.0732	-1.0568E-06	584.3532	-45.4235
267.375	.000622	-10621.1610	1007.7871	-4.7776E-06	573.4495	-45.3361
269.100	.000611	-8949.1546	930.0463	-7.9369E-06	563.3569	-44.8098
270.825	.000595	-7410.0367	853.5299	-1.0578E-05	554.0665	-43.9049
272.550	.000574	-6001.1313	778.8521	-1.2743E-05	545.5624	-42.6781
274.275	.000551	-4719.0402	711.3765	-1.4474E-05	537.8230	-35.5545
276.000	.000525	-3542.4488	644.3405	-1.5807E-05	530.7209	-42.1684
277.725	.000496	-2491.1573	573.3091	-1.6781E-05	524.3750	-40.1880
279.450	.000467	-1559.3252	505.8103	-1.7435E-05	518.7503	-38.0612
281.175	.000436	-740.6707	442.0086	-1.7806E-05	513.8087	-35.8283
282.900	.000405	-28.5906	382.2710	-1.7931E-05	509.5104	-33.5255
284.625	.000374	583.7317	326.4502	-1.7841E-05	512.8614	-31.1850
286.350	.000344	1103.2298	274.6904	-1.7569E-05	515.9972	-28.8356
288.075	.000314	1536.8685	226.9615	-1.7142E-05	518.8147	-26.5022
289.800	.000284	1891.5697	183.2253	-1.6589E-05	520.7558	-24.2064
291.525	.000256	2174.1467	143.4010	-1.5933E-05	522.9615	-21.9667
293.250	.000230	2391.2500	107.3784	-1.5196E-05	523.7720	-19.7985
294.975	.000204	2549.3204	75.0234	-1.4398E-05	524.7261	-17.7145
296.700	.000180	2654.5514	46.1822	-1.3558E-05	525.3613	-15.7246
298.425	.000157	2712.8587	20.6857	-1.2691E-05	525.7133	-13.8366
300.150	.000136	2729.8577	-1.6465	-1.1813E-05	525.8159	-12.0558
301.875	.000116	2710.8462	-21.0025	-1.0935E-05	525.7011	-10.3059
303.600	9.83E-05	2660.7942	-37.5750	-1.0067E-05	525.3990	-8.8285
305.325	8.17E-05	2584.3385	-51.5581	-9.2206E-06	524.9375	-7.3838
307.050	6.65E-05	2485.7817	-63.1453	-8.4021E-06	524.3426	-6.0505
308.775	5.27E-05	2369.0962	-72.5264	-7.6184E-06	523.6302	-4.8262
310.500	4.02E-05	2237.9311	-79.8864	-6.8747E-06	522.8465	-3.7072
312.225	2.90E-05	2095.6226	-85.4032	-6.1751E-06	521.9875	-2.6891
313.950	1.89E-05	1945.2074	-89.2463	-5.5227E-06	521.0796	-1.7667
315.675	9.95E-06	1789.4377	-91.5759	-4.9199E-06	520.1393	-.9342469
317.400	1.96E-06	1630.7982	-92.5416	-4.3677E-06	519.1817	-.1853949
319.125	-5.12E-06	1471.5254	-92.2819	-3.8669E-06	518.2203	.4864086
320.850	-1.14E-05	1313.6264	-90.9236	-3.4173E-06	517.2672	1.0883
322.575	-1.69E-05	1158.8999	-88.5817	-3.0181E-06	516.3332	1.6270
324.300	-2.18E-05	1008.9567	-85.3587	-2.6682E-06	515.4281	2.1090
326.025	-2.61E-05	865.2408	-81.3453	-2.3656E-06	514.5606	2.5435
327.750	-3.00E-05	729.0500	-76.6200	-2.1082E-06	513.7386	2.9351
329.475	-3.34E-05	601.5564	-71.2498	-1.8934E-06	512.9690	3.2911
331.200	-3.65E-05	483.8257	-65.2908	-1.7182E-06	512.2583	3.6180
332.925	-3.93E-05	376.0364	-58.7880	-1.5793E-06	511.6125	3.9216
334.650	-4.19E-05	281.4975	-51.7767	-1.4730E-06	511.0370	4.2075
336.375	-4.44E-05	198.6642	-44.2833	-1.3955E-06	510.5370	4.4806
338.100	-4.67E-05	129.1535	-36.3259	-1.3426E-06	510.1175	4.7454
339.825	-4.90E-05	73.7567	-27.9157	-1.3098E-06	509.7833	5.0055
341.550	-5.13E-05	33.2509	-19.0581	-1.2925E-06	509.5386	5.2642
343.275	-5.35E-05	8.4076	-9.7537	-1.2858E-06	509.3886	5.5236
345.000	-5.57E-05	0.0000	0.0000	-1.2844E-06	509.3379	5.7850

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.00001413
Maximum bending moment	=	-21276970. lbs-in
Maximum shear force	=	51146.46310 lbs
Depth of maximum bending moment	=	0.00000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = 1.000000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 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
0.000	1.000000	-2126970.	51146.4631	0.0000	13368.1906	-1444.8484
1.725	.999408	-2039462.	50250.2277	-.0006726	12819.9722	-519.3902
3.450	.997680	-1953397.	49350.8275	-.0013172	12300.4659	-523.7019
5.175	.994863	-1868792.	48445.6863	-.0019342	11789.7750	-525.7172
6.900	.991006	-1785659.	47539.2298	-.0025242	11287.9617	-525.2269
8.625	.986155	-1704998.	46633.7688	-.0030875	10795.0420	-524.5829
10.350	.980355	-1623814.	45729.5301	-.0036247	10311.0290	-523.8089
12.075	.973650	-1545106.	44826.7325	-.0041363	9835.9332	-522.9120
13.800	.966084	-1467877.	43925.5680	-.0046227	9369.7621	-521.8933
15.525	.957701	-1392127.	43026.3017	-.0050844	8912.5209	-520.7575
17.250	.948543	-1317858.	42129.0727	-.0055219	8464.2121	-519.5080
18.975	.938651	-1245067.	41234.0941	-.0059356	8024.8357	-510.1483
20.700	.928065	-1173757.	40341.5536	-.0063261	7594.3894	-516.6813
22.425	.916826	-1103925.	39451.6338	-.0066938	7172.8682	-515.1098
24.150	.904972	-1035570.	38564.5124	-.0070392	6760.2653	-513.4367
25.875	.892541	-968692.	37680.3626	-.0073627	6356.5710	-511.6645
27.600	.879570	-903287.	36799.3534	-.0076649	5961.7740	-509.7954
29.325	.866097	-839354.	35921.6498	-.0079463	5575.8604	-507.8319
31.050	.852155	-776890.	35047.4131	-.0082072	5198.8142	-505.7760
32.775	.837782	-715892.	34176.8008	-.0084482	4830.6175	-503.6296
34.500	.823009	-656357.	33309.9672	-.0086697	4471.2501	-501.3948
36.225	.807871	-598281.	32447.0636	-.0088722	4120.6899	-499.0732
37.950	.792400	-541660.	31588.2380	-.0090563	3778.9129	-496.6666
39.675	.776627	-486489.	30733.6359	-.0092222	3445.8928	-494.1765
41.400	.760583	-432765.	29883.3999	-.0093706	3121.6017	-491.6044
43.125	.744298	-380482.	29037.6704	-.0095019	2806.0096	-488.9516
44.850	.727802	-329635.	28196.5851	-.0096166	2499.0848	-486.2197
46.575	.711121	-280218.	27360.2798	-.0097150	2200.7934	-483.4096
48.300	.694285	-232225.	26528.0882	-.0097977	1911.1000	-480.5227
50.025	.677319	-185651.	25702.5418	-.0098652	1629.9673	-477.5600
51.750	.660250	-140488.	24881.3705	-.0099178	1357.3560	-474.5226
53.475	.643103	-96730.7158	24065.5025	-.0099561	1093.2255	-471.4113
55.200	.625901	-54370.8902	23255.0644	-.0099805	837.5329	-468.2271
56.925	.608670	-13401.7876	22450.1812	-.0099915	590.2340	-464.9708
58.650	.591431	26184.4979	21650.9766	-.0099894	667.3932	-461.6432
60.375	.574206	64395.7940	20857.5731	-.0099748	898.0449	-458.2449
62.100	.557018	101240.	20070.0921	-.0099480	1120.4463	-454.7766
63.825	.539885	136726.	19288.6538	-.0099096	1334.6466	-451.2388
65.550	.522829	170863.	18513.3776	-.0098600	1540.7046	-447.6322
67.275	.505869	203659.	17744.3819	-.0097995	1738.6680	-443.9570
69.000	.489021	235124.	16981.7845	-.0097287	1928.5972	-440.2138
70.725	.472305	265267.	16225.7027	-.0096479	2110.5475	-436.4028
72.450	.455736	294098.	15476.2530	-.0095576	2284.5792	-432.5244
74.175	.439331	321628.	14733.5516	-.0094582	2450.7530	-428.5786
75.900	.423105	347866.	13997.7146	-.0093501	2609.1316	-424.5657
77.625	.407073	372823.	13268.8577	-.0092338	2759.7792	-420.4858
79.350	.391240	396510.	12547.0966	-.0091096	2902.7613	-416.3387
81.075	.375615	418939.	11832.5472	-.0089779	3038.1454	-412.1244
82.800	.360275	440120.	11125.3256	-.0088393	3166.0004	-407.8427
84.525	.345149	460066.	10425.5482	-.0086939	3286.3967	-403.4935
86.250	.330280	478780.	9733.3318	-.0085424	3399.4065	-399.0763
87.975	.315678	496298.	9048.7941	-.0083850	3505.1034	-394.5906
89.700	.301352	512610.	8372.0536	-.0082221	3603.5627	-390.0360
91.425	.287312	527735.	7703.2298	-.0080541	3694.8612	-385.4118
93.150	.273565	541687.	7042.4435	-.0078815	3779.0775	-380.7172
94.875	.260121	554479.	6389.8169	-.0077046	3856.2916	-375.9512
96.600	.246985	566124.	5745.4742	-.0075236	3926.5853	-371.1128
98.325	.234164	576637.	5109.5413	-.0073392	3990.0420	-366.2007
100.050	.221665	586031.	4482.1466	-.0071515	4046.7467	-361.2134
101.775	.209492	594321.	3863.4211	-.0069609	4096.7861	-356.1494
103.500	.197649	601521.	3253.4991	-.0067679	4140.2487	-351.0066
105.225	.186142	607647.	2652.5181	-.0065727	4177.2247	-345.7830
106.950	.174974	612713.	2060.6197	-.0063757	4207.8061	-340.4760
108.675	.164146	616735.	1477.9504	-.0061772	4232.0866	-335.0827
110.400	.153662	619730.	904.6614	-.0059776	4250.1619	-329.6002
112.125	.143524	621712.	340.9104	-.0057772	4262.1296	-324.0242
113.850	.133731	622700.	-213.1381	-.0055763	4268.0892	-318.3509
115.575	.124285	622709.	-757.3119	-.0053752	4268.1423	-312.5752
117.300	.115187	621756.	-1291.4292	-.0051743	4262.3927	-306.6913
119.025	.106434	619860.	-1815.2979	-.0049739	4250.9463	-300.6927
120.750	.098027	617038.	-2328.7132	-.0047742	4233.9115	-294.5715
122.475	.089963	613308.	-2831.4560	-.0045756	4211.3991	-288.3187
124.200	.082241	608690.	-3323.2897	-.0043783	4183.5224	-281.9234
125.925	.074858	603202.	-3803.9577	-.0041827	4150.3978	-275.3728
127.650	.067811	596865.	-4273.1788	-.0039890	4112.1445	-268.6516
129.375	.061096	589698.	-4775.5257	-.0037974	4068.8053	-313.7797
131.100	.054709	581569.	-5302.2624	-.0036083	4019.8117	-296.9294
132.825	.048647	572526.	-5799.8614	-.0034220	3965.2289	-279.9971
134.550	.042904	562622.	-6268.1544	-.0032388	3905.4436	-262.9513
136.275	.037473	551906.	-6706.9098	-.0030588	3840.7651	-245.7506
138.000	.032351	540432.	-7115.8120	-.0028825	3771.5056	-228.3388
139.725	.027529	528252.	-7494.4304	-.0027100	3697.9812	-210.6391
141.450	.023001	515418.	-7842.1756	-.0025415	3620.5136	-192.5438
143.175	.018761	501986.	-8158.2302	-.0023773	3539.4317	-173.8963
144.900	.014800	488010.	-8441.4357	-.0022174	3455.0744	-154.4579
146.625	.011110	473551.	-8690.0904	-.0020622	3367.7952	-133.8375
148.350	.007685	458670.	-8901.5410	-.0019117	3277.9688	-111.3225
150.075	.004515	443434.	-9071.1706	-.0017661	3186.0041	-85.3495
151.800	.001592	427923.	-9188.5460	-.0016254	3092.3722	-50.7379
153.525	-.001093	412239.	-9228.6088	-.0014898	2997.6995	4.2083
155.250	-.003548	396547.	-9212.7695	-.0013592	2902.9791	14.0761
156.975	-.005782	380877.	-9180.6277	-.0012337	2808.3916	23.1898
158.700	-.007804	365256.	-9133.3401	-.0011133	2714.1053	31.6363
160.425	-.009623	349712.	-9072.0507	-.0009978	2620.2768	39.4238
162.150	-.011247	334268.	-8997.0881	-.0008874	2527.0505	46.5618
163.875	-.012684	318945.	-8911.9692	-.0007820	2434.5595	53.0611
165.600	-.013945	303764.	-8815.3677	-.0006815	2342.9250	58.9337
167.325	-.015035	288744.	-8709.1712	-.0005858	2252.2573	64.1926
169.050	-.015966	273900.	-8594.4201	-.0004950	2162.6545	68.8522
170.775	-.016743	259247.	-8472.1352	-.0004089	2074.2064	72.9274

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends. 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	.10	.07234
3	.10	.07234
4	129.00	.07234
5	129.00	.03623
6	153.00	.03623
7	153.00	.03623
8	213.00	.03623
9	213.00	.03333
10	273.00	.03333
11	273.00	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	.00000	30.00	------	------
2	.100	.00000	30.00	------	------
3	.100	6.25000	.00	------	------
4	129.000	6.25000	.00	------	------
5	129.000	6.25000	.00	------	------
6	153.000	6.25000	.00	------	------
7	153.000	.00000	30.00	------	------
8	213.000	.00000	30.00	------	------
9	213.000	5.56000	25.00	------	------
10	273.000	5.56000	25.00	------	------
11	273.000	3.47000	32.00	------	------
12	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 1.000 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B4\
Name of input data file: B4f25mm.lpd
Name of output file: B4f25mm.lpo
Name of plot output file: B4f25mm.lpp
Name of runtime file: B4f25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13: 8:31

Problem Title

B4, fixed head, 1.0 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = .100 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = .100 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Number of iterations = 13
Number of zero deflection points = 3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= .250000	S= 0.000	90000.0000	.2500000	-1560228.	48517.7454

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = .25000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	.25000000	-1560228.	48517.74525
327.750	.25000000	-1560709.	48529.03100
310.500	.25000000	-1561022.	48530.99410
293.250	.25000000	-1560720.	48520.40979
276.000	.25000000	-1560758.	48523.33820
258.750	.25000000	-1560561.	48518.65467
241.500	.25000000	-1560608.	48508.59658
224.250	.25000000	-1560650.	48502.96046
207.000	.25000000	-1554713.	48395.47270
189.750	.25000000	-1544865.	48187.94625

The analysis ended normally.

172.500	-.007951	73365.6827	-3291.4975	6.5992E-05	730.7635	45.9622
174.225	-.007827	67745.0678	-3212.5402	7.7382E-05	713.7998	45.5826
175.950	-.007684	62258.3919	-3134.3422	8.7876E-05	697.2405	45.0817
177.675	-.007524	56904.3019	-3057.1073	9.7494E-05	681.0812	44.4660
179.400	-.007348	51681.0999	-2981.0278	.0001063	665.3170	43.7421
181.125	-.007157	46586.7628	-2906.2044	.0001142	649.9418	42.9168
182.850	-.006954	41618.9624	-2833.0466	.0001213	634.9484	41.9967
184.575	-.006739	36775.0852	-2761.4719	.0001276	620.3291	40.9885
186.300	-.006514	32052.2528	-2691.7064	.0001332	606.0750	39.8991
188.025	-.006279	27447.3417	-2623.8844	.0001380	592.1769	38.7351
189.750	-.006037	22957.0038	-2558.1286	.0001421	578.6246	37.5035
191.475	-.005789	18577.6870	-2494.5498	.0001454	565.4073	36.2110
193.200	-.005536	14305.6549	-2433.2471	.0001481	552.5139	34.8646
194.925	-.005278	10137.0083	-2374.3077	.0001500	539.9325	33.4710
196.650	-.005018	6067.7046	-2317.8069	.0001514	527.6509	32.0372
198.375	-.004756	2093.5796	-2263.8091	.0001520	515.6565	30.5701
200.100	-.004494	-1789.6329	-2212.3629	.0001520	514.7392	29.0766
201.825	-.004232	-5586.2794	-2163.5106	.0001514	526.1979	27.5637
203.550	-.003971	-9300.7667	-2117.2787	.0001502	537.4086	26.0385
205.275	-.003713	-12937.5401	-2073.6825	.0001484	548.3848	24.5078
207.000	-.003459	-16501.0632	-2032.7253	.0001461	559.1399	22.9785
208.725	-.003209	-19995.7963	-1994.3978	.0001431	569.6873	21.4587
210.450	-.002965	-23426.1751	-1958.6789	.0001396	580.0406	19.9545
212.175	-.002728	-26796.5896	-1925.5349	.0001356	590.2129	18.4734
213.900	-.002498	-30111.3626	-1893.7756	.0001310	600.2172	250.2330
215.625	-.002276	-32680.7813	-1317.9504	.0001259	607.9720	185.5062
217.350	-.002063	-34697.3839	-1012.0562	.0001205	614.0503	169.1538
219.075	-.001860	-36209.7786	-733.8566	.0001147	618.6229	153.3964
220.800	-.001667	-37264.8155	-482.2833	.0001088	621.8071	138.2827
222.525	-.001485	-37907.4411	-256.1926	.0001027	623.7466	123.8515
224.250	-.001313	-38180.5810	-54.3813	9.6599E-05	624.5710	110.1326
225.975	-.001152	-38125.0507	124.3978	9.0440E-05	624.4034	97.1475
227.700	-.001001	-37779.4903	281.4223	8.4313E-05	623.3605	84.9099
229.425	-.000861	-37180.3230	417.9077	7.8263E-05	621.5521	73.4268
231.150	-.000731	-36361.7332	535.3961	7.2327E-05	619.0815	62.6989
232.875	-.000611	-35355.6639	634.9458	6.6538E-05	616.0451	52.7211
234.600	-.000501	-34191.8302	717.9224	6.0924E-05	612.5325	43.4836
236.325	-.000401	-32897.7486	785.5906	5.5509E-05	608.6268	34.9722
238.050	-.000310	-31498.7783	839.1873	5.0311E-05	604.4046	27.1689
239.775	-.000227	-30010.1741	879.9155	4.5346E-05	599.9360	20.0522
241.500	-.000153	-28477.1497	908.9390	4.0624E-05	595.2850	13.5982
243.225	-8.73E-05	-26894.9483	927.3782	3.6155E-05	590.5097	7.7805
244.950	-2.87E-05	-25268.9209	936.3064	3.1943E-05	585.6626	2.5710
246.675	2.29E-05	-23674.6093	936.7472	2.7990E-05	580.7904	-2.0600
248.400	6.79E-05	-22065.8342	929.6719	2.4298E-05	575.9349	-6.1432
250.125	.000107	-20474.7858	915.9987	2.0865E-05	571.1330	-9.7099
251.850	.000140	-18912.2172	896.5909	1.7685E-05	566.4167	-12.7819
253.575	.000168	-17387.0384	872.2573	1.4755E-05	561.8138	-15.4211
255.300	.000191	-15907.4112	843.7513	1.2068E-05	557.3482	-17.6293
257.025	.000209	-14479.8435	811.7723	9.6152E-06	553.0396	-19.4478
258.750	.000224	-13109.7823	776.9658	7.3883E-06	548.9046	-20.9075
260.475	.000235	-11801.6054	739.9250	5.3775E-06	544.9564	-22.0384
262.200	.000242	-10558.7109	701.1916	3.5727E-06	541.2052	-22.8698
263.925	.000247	-9383.6036	661.2584	1.9630E-06	537.6586	-23.4296
265.650	.000249	-8277.9700	620.5703	5.3739E-07	534.3217	-23.7450
267.375	.000249	-7242.8031	579.5268	-7.1540E-07	531.1974	-23.8416
269.100	.000247	-6278.3694	538.4842	-1.8068E-06	528.2867	-23.7440
270.825	.000243	-5384.4716	497.7577	-2.7482E-06	525.5888	-23.4752
272.550	.000237	-4560.2722	457.6237	-3.5509E-06	523.1013	-23.0569
274.275	.000231	-3804.5672	422.8458	-4.2261E-06	520.8205	-17.2653
276.000	.000223	-3100.1418	390.0553	-4.7834E-06	518.6944	-20.7527
277.725	.000214	-2457.3911	354.8464	-5.2320E-06	516.7545	-20.0692
279.450	.000205	-1874.2973	320.8810	-5.5816E-06	514.9947	-19.3109
281.175	.000195	-1348.6186	288.2759	-5.8418E-06	513.4081	-18.4921
282.900	.000185	-877.9317	257.1242	-6.0215E-06	511.9876	-17.6258
284.625	.000174	-459.6705	227.4975	-6.1295E-06	510.7252	-16.7240
286.350	.000163	-91.1619	199.4479	-6.1739E-06	509.6130	-15.7974
288.075	.000153	230.3427	173.0084	-6.1627E-06	510.0331	-14.8559
289.800	.000142	507.6348	148.2003	-6.1031E-06	510.8700	-13.9082
291.525	.000132	743.5279	125.0248	-6.0021E-06	511.5819	-12.9620
293.250	.000121	940.8333	103.4745	-5.8662E-06	512.1774	-12.0240
294.975	.000111	1102.3364	83.5300	-5.7013E-06	512.6648	-11.1000
296.700	.000102	1230.7822	65.1629	-5.5129E-06	513.0525	-10.1952
298.425	9.24E-05	1328.8602	48.3367	-5.3063E-06	513.3485	-9.3135
300.150	8.34E-05	1399.1914	33.0084	-5.0861E-06	513.5608	-8.4584
301.875	7.48E-05	1444.3185	19.1301	-4.8566E-06	513.6970	-7.6325
303.600	6.67E-05	1466.6980	6.6494	-4.6216E-06	513.7645	-6.8378
305.325	5.89E-05	1468.6941	-4.4884	-4.3847E-06	513.7705	-6.0756
307.050	5.15E-05	1452.5746	-14.3402	-4.1489E-06	513.7219	-5.3468
308.775	4.46E-05	1420.5088	-22.9636	-3.9170E-06	513.6251	-4.6515
310.500	3.80E-05	1374.5663	-30.4165	-3.6914E-06	513.4865	-3.9895
312.225	3.19E-05	1316.7181	-36.7557	-3.4742E-06	513.3119	-3.3603
313.950	2.60E-05	1248.8380	-42.0367	-3.2671E-06	513.1070	-2.7627
315.675	2.06E-05	1172.7060	-46.3129	-3.0716E-06	512.8772	-2.1953
317.400	1.54E-05	1090.0121	-49.6353	-2.8890E-06	512.6276	-1.6566
319.125	1.06E-05	1002.3614	-52.0513	-2.7201E-06	512.3631	-1.1446
320.850	6.06E-06	911.2796	-53.6054	-2.5656E-06	512.0882	-.6572236
322.575	1.76E-06	818.2193	-54.3380	-2.4260E-06	511.8073	-.1921482
324.300	-2.31E-06	724.5667	-54.2855	-2.3015E-06	511.5247	.2529971
326.025	-6.18E-06	631.6489	-53.4802	-2.1920E-06	511.2442	.6806850
327.750	-9.87E-06	540.7406	-51.9500	-2.0974E-06	510.9699	1.0934
329.475	-1.34E-05	453.0724	-49.7186	-2.0172E-06	510.7053	1.4937
331.200	-1.68E-05	369.8377	-46.8053	-1.9508E-06	510.4541	1.8841
332.925	-2.01E-05	292.2000	-43.2251	-1.8973E-06	510.2198	2.2660
334.650	-2.34E-05	221.3001	-38.9893	-1.8559E-06	510.0058	2.6443
336.375	-2.65E-05	158.2631	-34.1052	-1.8252E-06	509.8155	3.0185
338.100	-2.97E-05	104.2039	-28.5767	-1.8040E-06	509.6524	3.3914
339.825	-3.28E-05	60.2336	-22.4046	-1.7908E-06	509.5197	3.7646
341.550	-3.59E-05	27.4639	-15.5873	-1.7837E-06	509.4207	4.1396
343.275	-3.89E-05	7.0113	-8.1208	-1.7809E-06	509.3590	4.5172
345.000	-4.20E-05	0.0000	0.0000	-1.7803E-06	509.3379	4.8982

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00000668
Maximum bending moment	=	-1560228. lbs-in
Maximum shear force	=	48517.74536 lbs
Depth of maximum bending moment	=	0.00000 in
Depth of maximum shear force	=	0.00000 in

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = .250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rnd.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	.250000	-1560228.	48517.7454	0.0000	5218.2765	-618.7500
1.725	.249783	-1477451.	47432.6532	-.0002452	4960.4469	-620.9842
3.450	.249154	-1396509.	46339.8479	-.0004772	4724.3544	-638.1459
5.175	.248137	-1317431.	45232.0645	-.0006962	4485.4873	-646.2406
6.900	.246752	-1240242.	44111.2314	-.0009027	4252.5242	-653.2762
8.625	.245022	-1164967.	42978.1662	-.0010968	4025.3343	-659.2631
10.350	.242968	-1091624.	41837.6673	-.0012790	3803.9769	-664.2140
12.075	.240610	-1020230.	40688.5089	-.0014494	3588.5021	-668.1435
13.800	.237968	-950798.	39533.4305	-.0016085	3378.9505	-671.0685
15.525	.235060	-883340.	38374.2739	-.0017566	3175.3537	-673.0075
17.250	.231907	-817862.	37212.3955	-.0018939	2977.7343	-673.9809
18.975	.228527	-754369.	36049.7528	-.0020208	2786.1058	-674.0106
20.700	.224936	-692863.	34887.8527	-.0021376	2600.4734	-673.1200
22.425	.221152	-633342.	33728.2610	-.0022447	2420.8337	-671.3342
24.150	.217192	-575803.	32572.4999	-.0023422	2247.1752	-668.6788
25.875	.213071	-520240.	31422.0456	-.0024307	2079.4784	-665.1813
27.600	.208806	-466643.	30278.3264	-.0025104	1917.7161	-660.8699
29.325	.204410	-415000.	29142.7212	-.0025815	1761.8536	-655.7738
31.050	.199899	-365299.	28016.5580	-.0026445	1611.8490	-649.9228
32.775	.195287	-317522.	26901.1123	-.0026996	1467.6536	-643.3476
34.500	.190586	-271652.	25797.6065	-.0027472	1329.2120	-636.0794
36.225	.185809	-227667.	24707.2085	-.0027875	1196.4622	-628.1501
37.950	.180969	-185546.	23631.0312	-.0028209	1069.3366	-619.5917
39.675	.176077	-145264.	22570.1317	-.0028476	947.7612	-610.4367
41.400	.171145	-106795.	21525.5110	-.0028679	831.6571	-600.7178
43.125	.166183	-70110.7832	20498.1134	-.0028822	720.9398	-590.4678
44.850	.161201	-35181.7064	19488.8266	-.0028907	615.5201	-579.7197
46.575	.156210	-1976.7762	18498.4018	-.0028937	515.3040	-568.5062
48.300	.151218	29536.5422	17527.8533	-.0028915	598.4824	-556.8602
50.025	.146234	59392.1133	16577.4590	-.0028843	688.5897	-544.8143
51.750	.141267	87625.0320	15648.5609	-.0028724	773.7997	-532.4009
53.475	.136325	114272.	14741.3652	-.0028561	854.2218	-519.6521
55.200	.131414	139369.	13856.0231	-.0028356	929.9683	-506.5996
56.925	.126542	162955.	12993.6313	-.0028112	1001.1546	-493.2749
58.650	.121715	185070.	12154.4320	-.0027831	1067.8986	-479.7088
60.375	.116940	205752.	11338.8178	-.0027516	1130.3205	-465.9318
62.100	.112222	225043.	10547.1244	-.0027168	1188.5423	-451.9736
63.825	.107567	242983.	9779.6397	-.0026790	1242.6881	-437.8637
65.550	.102979	259615.	9036.6009	-.0026385	1292.8832	-423.6306
67.275	.098464	274979.	8318.1962	-.0025953	1339.2543	-409.3023
69.000	.094025	289118.	7624.5664	-.0025498	1381.9283	-394.9062
70.725	.089667	302075.	6955.8053	-.0025021	1421.0342	-380.4689
72.450	.085393	313893.	6311.9618	-.0024524	1456.7002	-366.0163
74.175	.081207	324613.	5693.0407	-.0024008	1489.0555	-351.5735
75.900	.077110	334279.	5099.0039	-.0023476	1518.2287	-337.1648
77.625	.073107	342934.	4529.7724	-.0022930	1544.3487	-322.8139
79.350	.069200	350619.	3985.2267	-.0022370	1567.5437	-308.5435
81.075	.065390	357377.	3489.4997	-.0021798	1587.9411	-266.2125
82.800	.061679	363334.	3033.6110	-.0021217	1605.9208	-262.3541
84.525	.058070	368502.	2584.4346	-.0020626	1621.5168	-258.4302
86.250	.054563	372891.	2142.0052	-.0020028	1634.7641	-254.4306
87.975	.051160	376514.	1706.6819	-.0019423	1645.6980	-250.3769
89.700	.047862	379382.	1278.3480	-.0018813	1654.3550	-246.2421
91.425	.044670	381508.	857.2123	-.0018198	1660.7718	-242.0311
93.150	.041584	382905.	443.4097	-.0017582	1664.9861	-237.7400
94.875	.038604	383584.	37.0822	-.0016963	1667.0364	-233.3643
96.600	.035732	383559.	-361.6196	-.0016343	1666.9618	-228.8987
98.325	.032968	382844.	-752.5356	-.0015725	1664.8026	-224.3372
100.050	.030307	381451.	-1135.4939	-.0015108	1660.5997	-219.6724
101.775	.027754	379396.	-1510.3088	-.0014494	1654.3951	-214.8956
103.500	.025306	376691.	-1876.7783	-.0013884	1646.2319	-209.9966
105.225	.022964	373352.	-2234.6807	-.0013278	1636.1542	-204.9627
106.950	.020725	369394.	-2583.7702	-.0012679	1624.2076	-199.7787
108.675	.018590	364831.	-2923.7715	-.0012086	1610.4389	-194.4257
110.400	.016556	359682.	-3254.3728	-.0011501	1594.8965	-188.8801
112.125	.014622	353961.	-3575.2158	-.0010925	1577.6307	-183.1118
113.850	.012787	347687.	-3885.8029	-.0010359	1558.6935	-177.0820
115.575	.011048	340876.	-4185.8705	-.0009803	1538.1397	-170.7390
117.300	.009405	333550.	-4474.6017	-.0009259	1516.0268	-164.0126
119.025	.007854	325726.	-4751.3055	-.0008726	1492.4157	-156.8034
120.750	.006394	317429.	-5015.0306	-.0008207	1467.3717	-148.9649
122.475	.005022	308679.	-5264.4924	-.0007702	1440.9659	-140.2661
124.200	.003737	299505.	-5497.8656	-.0007211	1413.2771	-130.3116
125.925	.002535	289936.	-5712.3158	-.0006735	1384.3953	-118.3262
127.650	.001413	280007.	-5902.6828	-.0006275	1354.4289	-102.3091
129.375	.000370	269766.	-6012.2125	-.0005832	1323.5218	-24.6019
131.100	-.000599	259446.	-6006.7713	-.0005404	1292.3734	30.9106
132.825	-.001495	249211.	-5937.8619	-.0004994	1261.4829	48.9844
134.550	-.002322	239115.	-5842.9247	-.0004600	1231.0135	62.0877
136.275	-.003082	229195.	-5729.5135	-.0004222	1201.0747	70.4036
138.000	-.003778	219479.	-5601.5441	-.0003859	1171.7507	77.9667
139.725	-.004413	209990.	-5461.6097	-.0003513	1143.1104	84.2761
141.450	-.004990	200746.	-5313.6256	-.0003181	1115.2110	89.6209
143.175	-.005511	191764.	-5159.0890	-.0002864	1088.1014	94.1874
144.900	-.005978	183057.	-4987.2367	-.0002562	1061.8231	98.1051
146.625	-.006395	174637.	-4815.1047	-.0002273	1036.4120	101.4682
148.350	-.006762	166515.	-4637.5876	-.0001998	1011.8989	104.3487
150.075	-.007084	158700.	-4455.4697	-.0001735	988.3104	106.8025
151.800	-.007361	151198.	-4269.4481	-.0001485	965.6691	108.8747
153.525	-.007596	144016.	-4140.7795	-.0001247	943.9941	40.3063
155.250	-.007793	136951.	-4070.0688	-.0001020	922.6702	41.6771
156.975	-.007948	130006.	-3997.1562	-8.0455E-05	901.7102	42.8591
158.700	-.000069	123186.	-3922.3628	-6.0028E-05	881.1253	43.8579
160.425	-.000155	116493.	-3845.9997	-4.0672E-05	860.9269	44.6791
162.150	-.008209	109929.	-3768.3680	-2.2396E-05	841.1170	45.3286
163.875	-.008232	103499.	-3689.7589	-5.1608E-06	821.7079	45.8124
165.600	-.008227	97201.4254	-3610.4528	1.1031E-05	802.7023	46.1366
167.325	-.008194	91039.1063	-3530.7198	2.6225E-05	784.1038	46.3074
169.050	-.008136	85012.2991	-3450.8192	4.0436E-05	765.9142	46.3310
170.775	-.008055	79121.2249	-3370.9993	5.3684E-05	748.1343	46.2138

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	81.00	.07234
3	81.00	.07234
4	129.00	.07234
5	129.00	.03623
6	153.00	.03623
7	153.00	.03623
8	213.00	.03623
9	213.00	.03333
10	273.00	.03333
11	273.00	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	.00000	30.00	------	------
2	81.000	.00000	30.00	------	------
3	81.000	6.25000	.00	------	------
4	129.000	6.25000	.00	------	------
5	129.000	6.25000	.00	------	------
6	153.000	6.25000	.00	------	------
7	153.000	.00000	30.00	------	------
8	213.000	.00000	30.00	------	------
9	213.000	5.56000	25.00	------	------
10	273.000	5.56000	25.00	------	------
11	273.000	3.47000	32.00	------	------
12	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = .250 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B4\
Name of input data file: B4f6mm.lpd
Name of output file: B4f6mm.lpo
Name of plot output file: B4f6mm.lpp
Name of runtime file: B4f6mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13: 7:19

Problem Title

B4, fixed head, 0.25 inch

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 81.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 81.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

```
Maximum bending moment                =       1353946. lbs-in
Maximum shear force                   =     65700.00000 lbs
Depth of maximum bending moment       =     42.00000000 in
Depth of maximum shear force          =       0.00000 in
Number of iterations                  =            17
Number of zero deflection points      =             2
```

Summary of Pile-Head 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 = rotational stiffness of pile-headin-lbs/rad
```

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 65700.	M= 0.000	90000.0000	1.0015	1353946.	65700.0000

Pile-head Deflection vs. Pile Length

Boundary Condition Type 1, Shear and Moment

```
Shear      =          65700. lbs
Moment     =              0. in-lbs
Axial Load =          90000. lbs
```

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
210.000	1.00150054	1353946.	65700.00000
199.500	1.00179991	1353858.	65700.00000
189.000	1.00106123	1354030.	65700.00000
178.500	1.00101363	1353976.	65700.00000
168.000	1.00257669	1352228.	65700.00000
157.500	1.00760165	1350315.	65700.00000
147.000	1.03259069	1339066.	65700.00000
136.500	1.14502336	1311230.	65700.00000
126.000	1.49287097	1295321.	65700.00000
115.500	1.77128828	1308083.	65700.00000

The analysis ended normally.

100.800	-.041545	501814.	-15811.6107	-.0011836	3530.3964	237.7036
101.850	-.042736	485450.	-15561.1375	-.0010866	3439.6200	239.3882
102.900	-.043827	469341.	-15308.9860	-.0009920	3342.3823	240.9004
103.950	-.044821	453489.	-15055.3299	-.0009022	3246.6951	242.2540
105.000	-.045722	437895.	-14800.3287	-.0008145	3152.5692	243.4608
106.050	-.046532	422562.	-14544.1337	-.0007300	3060.0145	244.5314
107.100	-.047255	407491.	-14286.8803	-.0006484	2969.0398	245.4750
108.150	-.047893	392682.	-14028.6985	-.0005698	2879.6529	246.2999
109.200	-.048451	378138.	-13769.7090	-.0004940	2791.8612	247.0134
110.250	-.048931	363859.	-13510.0254	-.0004211	2705.6710	247.6221
111.300	-.049336	349847.	-13249.7545	-.0003510	2621.0878	248.1320
112.350	-.049668	336101.	-12988.9971	-.0002836	2538.1168	248.5486
113.400	-.049931	322623.	-12727.8488	-.0002189	2456.7621	248.8768
114.450	-.050128	309414.	-12466.3999	-.0001568	2377.0275	249.1210
115.500	-.050260	296473.	-12204.7366	-9.7220E-05	2298.9163	249.2854
116.550	-.050332	283802.	-11942.9405	-4.0200E-05	2222.4305	249.3738
117.600	-.050345	271401.	-11681.0898	1.4357E-05	2147.5726	249.3896
118.650	-.050302	259269.	-11419.2588	6.6503E-05	2074.3440	249.3360
119.700	-.050205	247408.	-11157.5190	.0001163	2002.7456	249.2161
120.750	-.050057	235817.	-10895.9185	.0001638	1932.7780	249.0325
121.800	-.049861	224495.	-10634.5828	.0002090	1864.4412	248.7879
122.850	-.049619	213444.	-10373.5148	.0002520	1797.7349	248.4845
123.900	-.049332	202663.	-10112.7950	.0002929	1732.6584	248.1247
124.950	-.049003	192152.	-9852.4814	.0003317	1668.2104	247.7106
126.000	-.048635	181911.	-9592.6303	.0003685	1604.3894	247.2439
127.050	-.048230	171938.	-9333.2958	.0004033	1547.1933	246.7266
128.100	-.047788	162234.	-9074.5301	.0004361	1488.6199	246.1604
129.150	-.047314	152799.	-8800.3236	.0004670	1431.6665	276.1376
130.200	-.046808	143665.	-8511.1567	.0004962	1376.5337	274.6565
131.250	-.046272	134832.	-8223.5950	.0005235	1323.2126	273.0800
132.300	-.045708	126297.	-7937.7369	.0005492	1271.6937	271.4137
133.350	-.045118	118059.	-7653.6768	.0005732	1221.9668	269.6552
134.400	-.044504	110116.	-7371.5056	.0005956	1174.0213	267.8139
135.450	-.043868	102466.	-7091.3105	.0006165	1127.8457	265.8910
136.500	-.043210	95107.6096	-6813.1757	.0006359	1083.4281	263.8895
137.550	-.042532	88038.2648	-6537.1822	.0006539	1040.7560	261.8124
138.600	-.041836	81255.9330	-6263.4080	.0006706	999.8163	259.6623
139.650	-.041124	74758.3699	-5991.9284	.0006859	960.5956	257.4417
140.700	-.040396	68543.2478	-5722.8161	.0007000	923.0798	255.1531
141.750	-.039654	62608.1591	-5456.1414	.0007129	887.2543	252.7988
142.800	-.038899	56950.6183	-5191.9722	.0007246	853.1042	250.3807
143.850	-.038132	51568.0644	-4930.3744	.0007353	820.6139	247.9008
144.900	-.037355	46457.8635	-4671.4120	.0007449	789.7676	245.3609
145.950	-.036568	41617.3102	-4415.1471	.0007536	760.5490	242.7627
147.000	-.035772	37043.6298	-4161.6403	.0007613	732.9413	240.1075
148.050	-.034969	32733.9799	-3910.9506	.0007682	706.9273	237.3967
149.100	-.034159	28685.4520	-3663.1359	.0007742	682.4895	234.6313
150.150	-.033343	24895.0723	-3418.2530	.0007795	659.6099	231.8124
151.200	-.032522	21359.8034	-3176.3576	.0007840	638.2703	228.9407
152.250	-.031697	18076.5450	-2937.5048	.0007879	618.4518	226.0169
153.300	-.030868	15042.1345	-2732.6408	.0007911	600.1355	164.2003
154.350	-.030036	12188.4755	-2562.1407	.0007938	582.9101	160.5617
155.400	-.029201	9511.6094	-2395.4912	.0007959	566.7520	156.8659
156.450	-.028364	7007.5114	-2232.7509	.0007976	551.6367	153.1156
157.500	-.027526	4672.0931	-2073.9756	.0007987	537.5398	149.3136
158.550	-.026687	2501.2064	-1919.2182	.0007994	524.4357	145.4623
159.600	-.025847	490.6455	-1768.5293	.0007997	512.2995	141.5642
160.650	-.025007	-1363.8501	-1621.9568	.0007996	517.5704	137.6214
161.700	-.024168	-3066.5927	-1479.5467	.0007992	527.0485	133.6360
162.750	-.023329	-4621.9447	-1341.3424	.0007984	537.2369	129.6102
163.800	-.022491	-6034.3158	-1207.3857	.0007974	545.7623	125.5456
164.850	-.021655	-7308.1605	-1077.7162	.0007961	553.4515	121.4439
165.900	-.020820	-8447.9777	-952.3720	.0007945	560.3317	117.3069
166.950	-.019986	-9458.3072	-831.3895	.0007928	566.4303	113.1359
168.000	-.019155	-10343.7286	-714.8037	.0007908	571.7749	108.9322
169.050	-.018325	-11108.8602	-602.6483	.0007887	576.3934	104.6971
170.100	-.017498	-11758.3568	-494.9557	.0007865	580.3139	100.4316
171.150	-.016674	-12296.9092	-391.7571	.0007841	583.5647	96.1367
172.200	-.015852	-12729.2425	-293.0837	.0007816	586.1743	91.8132
173.250	-.015032	-13060.1154	-198.9643	.0007791	588.1716	87.4618
174.300	-.014216	-13294.3191	-109.4282	.0007765	589.5853	83.0831
175.350	-.013402	-13436.6768	-24.5038	.0007739	590.4446	78.6777
176.400	-.012591	-13492.0427	55.7811	.0007712	590.7788	74.2459
177.450	-.011782	-13465.3020	131.3988	.0007686	590.6173	69.7880
178.500	-.010976	-13361.3700	202.3222	.0007660	589.9900	65.3041
179.550	-.010174	-13185.1920	268.5240	.0007634	588.9265	60.7945
180.600	-.009373	-12941.7433	329.9771	.0007608	587.4570	56.2590
181.650	-.008576	-12636.0285	386.6543	.0007582	585.6117	51.6977
182.700	-.007781	-12273.0825	438.5285	.0007556	583.4209	47.1102
183.750	-.006989	-11857.9695	485.5719	.0007535	580.9151	42.4964
184.800	-.006199	-11395.7840	527.7569	.0007512	578.1253	37.8560
185.850	-.005411	-10891.6507	565.0553	.0007490	575.0822	33.1885
186.900	-.004626	-10350.7248	597.4383	.0007469	571.8171	28.4935
187.950	-.003843	-9778.1925	624.8769	.0007449	568.3612	23.7705
189.000	-.003062	-9179.2718	647.3413	.0007430	564.7459	19.0189
190.050	-.002282	-8559.2122	664.8012	.0007413	561.0031	14.2381
191.100	-.001505	-7923.2961	677.2257	.0007397	557.1646	9.4275
192.150	-.000729	-7276.8391	684.5829	.0007382	553.2624	4.5863
193.200	4.53E-05	-6625.1906	686.8405	.0007368	549.3290	-.2060986
194.250	.000810	-5973.7344	683.9653	.0007356	545.3966	-5.1905
195.300	.001590	-5327.8898	675.9233	.0007345	541.4982	-10.1276
196.350	.002361	-4693.1119	662.6757	.0007335	537.6665	-15.0982
197.400	.003130	-4074.8927	644.1991	.0007326	533.9348	-20.1031
198.450	.003899	-3478.7614	620.4449	.0007319	530.3364	-25.1429
199.500	.004667	-2910.2856	591.3802	.0007313	526.9050	-30.2184
200.550	.005435	-2375.0716	556.9671	.0007307	523.6743	-35.3304
201.600	.006202	-1878.7652	517.1669	.0007303	520.6785	-40.4795
202.650	.006969	-1427.0526	471.9403	.0007300	517.9519	-45.6663
203.700	.007735	-1025.6605	421.2475	.0007298	515.5290	-50.8914
204.750	.008501	-680.3572	365.0480	.0007296	513.4446	-56.1553
205.800	.009267	-396.9525	303.3007	.0007295	511.7340	-61.4586
206.850	.010033	-181.2986	235.9642	.0007294	510.4322	-66.8015
207.900	.010799	-39.2898	162.9966	.0007294	509.5750	-72.1843
208.950	.011565	23.1364	84.3559	.0007294	509.1775	-77.6074
210.000	.012331	0.0000	0.0000	.0007294	509.3279	-83.0706

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.00150054 in
Computed slope at pile head = -.01943849

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

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 65700.000 lbs
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 lbs

(Zero moment for this load indicates free-head conditions)

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
0.000	1.002	1.2912E-05	65700.0000	-.0194385	509.3379	-1444.8582
1.050	.981090	70025.4594	64168.1417	-.0194316	932.0268	-1472.9670
2.100	.960694	138426.	62606.6283	-.0194111	1344.9053	-1501.3442
3.150	.940827	205168.	61015.1780	-.0193774	1747.7770	-1529.9897
4.200	.920002	270220.	59393.5090	-.0193307	2140.4437	-1558.9036
5.250	.899732	333548.	57741.3395	-.0192713	2522.7057	-1588.0858
6.300	.879532	395119.	56058.3880	-.0191997	2894.3618	-1617.5363
7.350	.859413	454899.	54344.3725	-.0191162	3255.2089	-1647.2551
8.400	.839388	512855.	52599.0113	-.0190211	3605.0427	-1677.2423
9.450	.819469	568952.	50822.0227	-.0189148	3943.6571	-1707.4978
10.500	.799667	623156.	49013.1251	-.0187977	4270.8444	-1738.0216
11.550	.779984	675433.	47172.0365	-.0186701	4586.3954	-1768.8138
12.600	.760460	725746.	45298.4753	-.0185324	4890.0994	-1799.8742
13.650	.741076	774062.	43392.1597	-.0183850	5181.7440	-1831.2030
14.700	.721851	820344.	41452.8081	-.0182283	5461.1153	-1862.8001
15.750	.702796	864558.	39480.1386	-.0180627	5727.9978	-1894.6655
16.800	.683919	906667.	37473.8696	-.0178887	5982.1746	-1926.7993
17.850	.665230	946634.	35442.0660	-.0177066	6223.4269	-1943.3028
18.900	.646736	984441.	33421.0490	-.0175168	6451.6407	-1906.2533
19.950	.628445	1020129.	31439.1267	-.0173199	6667.0580	-1868.8369
21.000	.610364	1053737.	29496.6641	-.0171161	6869.9241	-1831.0918
22.050	.592501	1085307.	27593.9867	-.0169059	7060.4862	-1793.0555
23.100	.574862	1114880.	25731.3809	-.0166897	7238.9940	-1754.7650
24.150	.557452	1142497.	23909.0945	-.0164679	7405.6990	-1716.2568
25.200	.540279	1168201.	22127.3372	-.0162408	7560.8543	-1677.5666
26.250	.523347	1192034.	20386.2818	-.0160089	7704.7146	-1638.7296
27.300	.506660	1214038.	18686.0641	-.0157724	7837.5356	-1599.7803
28.350	.490225	1234256.	17026.7842	-.0155319	7959.5741	-1560.7527
29.400	.474044	1252730.	15408.5072	-.0152875	8071.0875	-1521.6797
30.450	.458121	1269503.	13831.2636	-.0150396	8172.3339	-1482.5938
31.500	.442460	1284618.	12295.0504	-.0147887	8263.5713	-1443.5266
32.550	.427065	1298118.	10799.8316	-.0145349	8345.0582	-1404.5091
33.600	.411937	1310045.	9345.5394	-.0142786	8417.0526	-1365.5713
34.650	.397080	1320442.	7932.0747	-.0140201	8479.8124	-1326.7425
35.700	.382495	1329352.	6559.3079	-.0137597	8533.5948	-1288.0513
36.750	.368184	1336817.	5227.0802	-.0134977	8578.6563	-1249.5254
37.800	.354150	1342880.	3935.2038	-.0132344	8615.2524	-1211.1916
38.850	.340392	1347582.	2683.4634	-.0129700	8643.6376	-1173.0759
39.900	.326912	1350966.	1471.6166	-.0127049	8664.0650	-1135.2036
40.950	.313712	1353074.	299.3953	-.0124392	8676.7862	-1097.5980
42.000	.300790	1353946.	-833.4942	-.0121732	8682.0513	-1060.2856
43.050	.288148	1353624.	-1927.3693	-.0119071	8680.1084	-1023.2860
44.100	.275785	1352149.	-2982.5710	-.0116412	8671.2040	-986.6220
45.150	.263702	1349561.	-3999.4627	-.0113757	8655.5820	-950.3165
46.200	.251896	1345900.	-4978.4292	-.0111109	8633.4845	-914.3835
47.250	.240369	1341206.	-5919.8758	-.0108468	8605.1510	-878.8401
48.300	.229118	1335519.	-6824.2276	-.0105838	8570.8184	-843.7268
49.350	.218143	1328876.	-7691.9285	-.0103220	8530.7212	-809.0369
50.400	.207442	1321316.	-8523.4402	-.0100616	8485.0909	-774.7950
51.450	.197013	1312878.	-9319.2414	-.0098027	8434.1562	-741.0168
52.500	.186856	1303599.	-10079.6268	-.0095456	8378.1430	-707.7172
53.550	.176968	1293515.	-10805.7063	-.0092904	8317.2739	-674.9103
54.600	.167346	1282663.	-11497.4040	-.0090373	8251.7682	-642.6093
55.650	.157989	1271078.	-12155.4578	-.0087863	8181.8422	-610.8264
56.700	.148895	1258797.	-12780.4176	-.0085377	8107.7088	-579.5733
57.750	.140060	1245853.	-13372.8454	-.0082916	8029.5772	-548.8606
58.800	.131482	1232281.	-13933.3139	-.0080481	7947.6533	-518.6984
59.850	.123159	1218114.	-14462.4057	-.0078073	7862.1394	-489.0956
60.900	.115087	1203385.	-14960.7128	-.0075694	7773.2340	-460.0607
61.950	.107263	1188127.	-15428.8353	-.0073344	7681.1320	-431.6012
63.000	.099685	1172371.	-15867.3809	-.0071024	7586.0246	-403.7239
64.050	.092348	1156148.	-16276.9643	-.0068736	7488.0989	-376.4348
65.100	.085250	1139489.	-16658.2059	-.0066480	7387.5386	-349.7395
66.150	.078387	1122422.	-17011.7313	-.0064258	7284.5230	-323.6422
67.200	.071756	1104978.	-17338.1707	-.0062069	7179.2277	-298.1471
68.250	.065353	1087185.	-17638.1579	-.0059915	7071.8244	-273.2572
69.300	.059174	1069071.	-17912.3298	-.0057796	6962.4808	-248.9750
70.350	.053216	1050662.	-18161.3254	-.0055713	6851.3604	-225.3025
71.400	.047474	1031985.	-18385.7856	-.0053667	6738.6228	-202.2407
72.450	.041946	1013066.	-18586.3519	-.0051657	6624.4237	-179.7903
73.500	.036626	993930.	-18763.6661	-.0049685	6508.9144	-157.9512
74.550	.031512	974601.	-18918.3699	-.0047751	6392.2426	-136.7227
75.600	.026599	955104.	-19051.1037	-.0045854	6274.5517	-116.1035
76.650	.021883	935461.	-19162.5063	-.0043997	6155.9810	-96.0919
77.700	.017359	915694.	-19253.2144	-.0042178	6036.6660	-76.6854
78.750	.013025	895826.	-19323.8618	-.0040398	5916.7380	-57.8811
79.800	.008876	875877.	-19375.0791	-.0038657	5796.3244	-39.6756
80.850	.004907	855869.	-19407.4929	-.0036955	5675.5485	-22.0650
81.900	.001115	835820.	-19419.2958	-.0035293	5554.5299	-95.6548
82.950	-.002504	815660.	-19457.5312	-.0033670	5432.7010	118.0635
84.000	-.005955	795596.	-19318.6895	-.0032086	5311.7263	146.3969
85.050	-.009242	775608.	-19156.0792	-.0030542	5191.5568	163.3370
86.100	-.012369	755945.	-18978.1108	-.0029037	5072.3872	175.6504
87.150	-.015340	736382.	-18788.5890	-.0027571	4954.3019	185.3435
88.200	-.018159	717010.	-18589.7932	-.0026143	4837.3674	193.3150
89.250	-.020830	697838.	-18383.2750	-.0024753	4721.6391	200.0531
90.300	-.023357	678873.	-18170.1729	-.0023400	4607.1639	205.8556
91.350	-.025744	660123.	-17951.3661	-.0022084	4493.9825	210.9192
92.400	-.027995	641593.	-17727.5586	-.0020805	4382.1308	215.3810
93.450	-.030113	623288.	-17499.3295	-.0019562	4271.6405	219.3410
94.500	-.032103	605214.	-17267.1663	-.0018355	4162.5400	222.8748
95.550	-.033968	587374.	-17031.4856	-.0017183	4054.8549	226.0407
96.600	-.035711	569772.	-16792.6496	-.0016046	3948.6083	228.8851
97.650	-.037337	552413.	-16550.9762	-.0014943	3843.8209	231.4453
98.700	-.038849	535298.	-16306.7476	-.0013874	3740.5119	233.7521
99.750	-.040251	518431.	-16060.2164	-.0012839	3639.6985	235.8311

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 240.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	81.00	.07234
3	81.00	.07234
4	129.00	.07234
5	129.00	.03623
6	153.00	.03623
7	153.00	.03623
8	213.00	.03623
9	213.00	.03333
10	273.00	.03233
11	273.00	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	.00000	30.00	------	------
2	81.000	.00000	30.00	------	------
3	81.000	6.25000	.00	------	------
4	129.000	6.25000	.00	------	------
5	129.000	6.25000	.00	------	------
6	153.000	6.25000	.00	------	------
7	153.000	.00000	30.00	------	------
8	213.000	.00000	30.00	------	------
9	213.000	5.56000	25.00	------	------
10	273.000	5.56000	25.00	------	------
11	273.000	3.47000	32.00	------	------
12	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 65700.000 lbs
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

(Zero moment at pile head for this load indicates a free-head condition)

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleinfelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B4\
Name of input data file: B4stability.lpd
Name of output file: B4stability.lpo
Name of plot output file: B4stability.lpp
Name of runtime file: B4stability.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13: 6:10

Problem Title

B4 Stability

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 210.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 81.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 81.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 3 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

```
Type 1 = Shear and Moment,          y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad
```

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= 1.000000	M= 0.000	90000.0000	1.0000000	839266.	26050.1201

Pile-head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

```
Deflection =          1.00000  in
Moment     =               0.  in-lbs
Axial Load =           90000.  lbs
```

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	1.00000000	839265.86547	26050.11949
327.750	1.00000000	839145.06694	26048.59097
310.500	1.00000000	839199.66803	26049.17250
293.250	1.00000000	839173.32639	26048.56682
276.000	1.00000000	839110.95016	26047.86358
258.750	1.00000000	838984.29377	26046.12819
241.500	1.00000000	838011.82287	26030.01491
224.250	1.00000000	837038.82453	26014.81706
207.000	1.00000000	836554.01713	26007.65196
189.750	1.00000000	832624.97328	25950.74178

The analysis ended normally.

194.925	-.010409	-26331.9008	-1530.6085	.0004066	668.2029	47.0528
196.650	-.009715	-28964.6654	-1451.7876	.0003977	684.1749	44.3339
198.375	-.009037	-31464.0569	-1377.6440	.0003880	699.2617	41.6296
200.100	-.008376	-33837.9973	-1308.1457	.0003774	713.5914	38.9482
201.825	-.007735	-36094.3463	-1243.2455	.0003661	727.2112	36.2983
203.550	-.007113	-38240.8750	-1182.8821	.0003541	740.1681	33.6883
205.275	-.006513	-40285.2448	-1126.9793	.0003414	752.5084	31.1265
207.000	-.005935	-42234.9737	-1075.4470	.0003281	764.2773	28.6211
208.725	-.005381	-44097.4200	-1028.1808	.0003142	775.5195	26.1803
210.450	-.004851	-45879.7531	-985.0623	.0002997	786.2780	23.8123
212.175	-.004347	-47588.9302	-945.9388	.0002846	796.5950	21.5251
213.900	-.003869	-49231.6713	-709.5966	.0002689	806.5109	252.5180
215.625	-.003419	-50820.5458	-334.7390	.0002529	811.8764	182.0996
217.350	-.002997	-50465.0479	-38.7902	.0002367	813.9559	161.0294
219.075	-.002603	-50327.8572	221.7811	.0002204	813.1217	141.0823
220.800	-.002236	-49768.3360	448.9430	.0002042	809.7504	122.2938
222.525	-.001898	-48842.4195	644.7138	.0001883	804.1613	104.6860
224.250	-.001587	-47602.5460	811.1409	.0001727	796.6772	88.2721
225.975	-.001302	-46097.6219	950.2807	.0001576	787.5931	73.0495
227.700	-.001043	-44373.0191	1064.1815	.0001430	777.1830	59.0094
229.425	-.000809	-42470.6023	1154.8673	.0001290	765.6096	46.1335
231.150	-.000598	-40428.7806	1224.3242	.0001156	753.3748	34.3961
232.875	-.000410	-38282.5024	1274.4880	.0001029	740.4198	23.7648
234.600	-.000243	-36063.7500	1307.2343	9.0906E-05	727.0265	14.2018
236.325	-9.61E-05	-33800.8506	1324.3691	7.9628E-05	713.3671	5.6646
238.050	3.19E-05	-31519.4010	1327.6221	6.9083E-05	699.5958	-1.8931
239.775	.000142	-29242.0047	1318.6402	5.9274E-05	685.8490	-8.5207
241.500	.000236	-26988.4971	1298.9834	5.0196E-05	672.2463	-14.2697
243.225	.000315	-24776.0980	1270.1214	4.1840E-05	658.8918	-19.1934
244.950	.000381	-22619.5695	1233.4312	3.4189E-05	645.8745	-23.3459
246.675	.000433	-20531.3759	1190.1960	2.7223E-05	633.2697	-26.7818
248.400	.000475	-18521.8459	1141.6049	2.0918E-05	621.1397	-29.5556
250.125	.000506	-16599.3340	1088.7536	1.5248E-05	609.5350	-31.7213
251.850	.000527	-14770.3807	1032.6453	1.0184E-05	598.4951	-33.3318
253.575	.000541	-13039.8700	974.1930	5.6947E-06	588.0493	-34.4389
255.300	.000547	-11411.1829	914.2220	1.7475E-06	578.2182	-35.0927
257.025	.000547	-9886.3467	853.4724	-1.6907E-06	569.0140	-35.3416
258.750	.000541	-8466.1783	792.6028	-4.6534E-06	560.4416	-35.2318
260.475	.000531	-7150.4221	732.1942	-7.1744E-06	552.4994	-34.8072
262.200	.000516	-5937.8807	672.7532	-9.2873E-06	545.1802	-34.1098
263.925	.000498	-4826.5396	614.7170	-1.1025E-05	538.4719	-33.1786
265.650	.000478	-3813.6830	558.4569	-1.2420E-05	532.3581	-32.0505
267.375	.000456	-2896.0071	504.2829	-1.3503E-05	526.8188	-30.7598
269.100	.000432	-2069.7149	452.4485	-1.4305E-05	521.8311	-29.3381
270.825	.000406	-1330.6181	403.1543	-1.4854E-05	517.3698	-27.8146
272.550	.000380	-674.2204	356.5528	-1.5177E-05	513.4076	-26.2161
274.275	.000354	-95.7984	315.2085	-1.5302E-05	509.9161	-24.7193
276.000	.000328	410.0000	274.8777	-1.5250E-05	511.8610	-23.0411
277.725	.000301	857.2645	233.2557	-1.5044E-05	514.5125	-23.2162
279.450	.000276	1227.4032	194.7762	-1.4707E-05	516.7467	-21.3977
281.175	.000251	1533.8089	159.4136	-1.4261E-05	518.5963	-19.6024
282.900	.000227	1781.8082	127.1151	-1.3726E-05	520.0932	-17.8451
284.625	.000203	1976.6178	97.8044	-1.3119E-05	521.2692	-16.1382
286.350	.000181	2123.3070	71.3858	-1.2458E-05	522.1546	-14.4921
288.075	.000160	2226.7667	47.7468	-1.1755E-05	522.7791	-12.9154
289.800	.000141	2291.6835	26.7621	-1.1026E-05	523.1710	-11.4147
291.525	.000122	2322.5194	8.2959	-1.0281E-05	523.3571	-8.9953
293.250	.000105	2323.4967	-7.7949	-9.5310E-06	523.3630	-8.6608
294.975	8.94E-05	2298.5862	-21.6590	-8.7848E-06	523.2126	-7.4135
296.700	7.49E-05	2251.5010	-33.4475	-8.0503E-06	522.9284	-6.2545
298.425	6.17E-05	2185.6919	-43.3131	-7.3339E-06	522.5312	-5.1839
300.150	4.96E-05	2104.3481	-51.4073	-6.6414E-06	522.0402	-4.2007
301.875	3.88E-05	2010.3990	-57.8795	-5.9771E-06	521.4731	-3.3034
303.600	2.90E-05	1906.5196	-62.8757	-5.3448E-06	520.8460	-2.4893
305.325	2.03E-05	1795.1373	-66.5370	-4.7472E-06	520.1737	-1.7556
307.050	1.26E-05	1678.4409	-68.9988	-4.1865E-06	519.4693	-1.0987
308.775	5.88E-06	1558.3913	-70.3902	-3.6639E-06	518.7446	-.5145659
310.500	-1.06E-08	1436.7324	-70.8332	-3.1804E-06	518.0103	.0009360
312.225	-5.10E-06	1315.0042	-70.4423	-2.7362E-06	517.2755	.4523279
313.950	-9.45E-06	1194.5561	-69.3240	-2.3311E-06	516.5485	.8442585
315.675	-1.31E-05	1076.5603	-67.5768	-1.9644E-06	515.8362	1.1815
317.400	-1.62E-05	962.0262	-65.2910	-1.6353E-06	515.1449	1.4687
319.125	-1.88E-05	851.8143	-62.5486	-1.3425E-06	514.4796	1.7108
320.850	-2.09E-05	746.6504	-59.4235	-1.0845E-06	513.8448	1.9124
322.575	-2.25E-05	647.1398	-55.9817	-8.5948E-07	513.2441	2.0781
324.300	-2.38E-05	553.7803	-52.2813	-6.6561E-07	512.6806	2.2122
326.025	-2.48E-05	466.9758	-48.3731	-5.0083E-07	512.1566	2.3191
327.750	-2.56E-05	387.0406	-44.3006	-3.6296E-07	511.6742	2.4026
329.475	-2.61E-05	314.2513	-40.1009	-2.4975E-07	511.2347	2.4667
331.200	-2.64E-05	248.7781	-35.8045	-1.5886E-07	510.8395	2.5146
332.925	-2.66E-05	190.7750	-31.4365	-8.7898E-08	510.4894	2.5497
334.650	-2.67E-05	140.3494	-27.0166	-3.4443E-08	510.1850	2.5748
336.375	-2.67E-05	97.5786	-22.5598	3.966JE-09	509.9269	2.5925
338.100	-2.67E-05	62.5171	-18.0771	2.9811E-08	509.7152	2.6048
339.825	-2.66E-05	35.2035	-13.5760	4.5587E-08	509.5504	2.6138
341.550	-2.65E-05	15.6656	-9.0614	5.3799E-08	509.4324	2.6206
343.275	-2.64E-05	3.9251	-4.5356	5.6961E-08	509.3616	2.6266
345.000	-2.64E-05	0.0000	0.0000	5.7595E-08	509.3379	2.6322

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.01405743
Maximum bending moment	=	839265.90326 lbs-in
Maximum shear force	=	26050.12009 lbs
Depth of maximum bending moment	=	62.10000000 in
Depth of maximum shear force	=	0.00000 in
Number of iterations	=	20
Number of zero deflection points	=	3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

File: U:\Yzhou\Projects\75010\Analysis\Appendix C\15 B2p25mm.lpo

in	ln	lbs-in	lbs	Rad.	lbs/in**2	lbs/in
0.000	1.000000	0.0000	26050.1201	-.0148574	509.3379	-435.5124
1.725	.974371	46595.1132	25297.4007	-.0148499	790.5961	-437.1965
3.450	.948768	91886.9580	24541.8896	-.0148276	1063.9875	-438.7677
5.175	.923216	135869.	23783.7588	-.0147908	1329.4702	-440.2247
6.900	.897740	178533.	23023.2141	-.0147400	1587.0047	-441.5663
8.625	.872363	219875.	22260.4557	-.0146757	1836.5539	-442.7912
10.350	.847108	259889.	21495.6861	-.0145983	2078.0834	-443.8982
12.075	.821999	298568.	20729.1097	-.0145081	2311.5612	-444.8860
13.800	.797055	335909.	19960.9334	-.0144057	2536.9579	-445.7533
15.525	.772299	371907.	19191.3660	-.0142914	2754.2465	-446.4987
17.250	.747750	406557.	18420.6190	-.0141658	2963.4027	-447.1210
18.975	.723427	439856.	17648.9061	-.0140291	3164.4050	-447.6187
20.700	.699350	471802.	16876.4432	-.0138819	3357.2343	-447.9905
22.425	.675535	502390.	16103.4469	-.0137247	3541.8743	-448.2349
24.150	.652000	531620.	15330.1440	-.0135577	3718.3122	-448.3505
25.875	.628760	559489.	14556.7520	-.0133816	3886.5343	-448.3358
27.600	.605833	585996.	13783.4991	-.0131967	4046.5353	-448.1893
29.325	.583232	611140.	13010.6140	-.0130034	4198.3088	-447.9094
31.050	.560971	634920.	12238.3282	-.0128023	4341.8523	-447.4944
32.775	.539064	657337.	11466.8761	-.0125937	4477.1660	-446.9428
34.500	.517523	678391.	10696.4950	-.0123780	4604.2530	-446.2527
36.225	.496360	698083.	9930.5016	-.0121558	4723.1194	-445.4256
37.950	.475585	716426.	9172.3522	-.0119275	4833.8382	-437.1502
39.675	.455210	733431.	8422.3589	-.0116934	4936.4802	-432.3991
41.400	.435243	749113.	7680.6288	-.0114541	5031.1497	-427.5770
43.125	.415693	763486.	6947.2695	-.0112099	5117.9047	-422.6936
44.850	.396569	776562.	6222.3899	-.0109613	5196.8364	-417.7463
46.575	.377877	788357.	5506.1000	-.0107087	5268.0297	-412.7347
48.300	.359624	798883.	4798.5113	-.0104524	5331.5713	-407.6581
50.025	.341816	808157.	4099.7366	-.0101930	5387.5489	-402.5154
51.750	.324458	816192.	3409.8911	-.0099308	5436.0522	-397.3065
53.475	.307555	823005.	2729.0917	-.0096661	5477.1724	-392.0272
55.200	.291110	828609.	2057.4578	-.0093995	5511.0021	-386.6788
56.925	.275127	833021.	1395.1116	-.0091313	5537.6358	-381.2588
58.650	.259607	836257.	742.1783	-.0088618	5557.1695	-375.7653
60.375	.244553	838333.	98.7867	-.0085915	5569.7008	-370.1960
62.100	.229967	839266.	-534.9305	-.0083206	5575.3292	-364.5485
63.825	.215847	839072.	-1158.0359	-.0080497	5574.1550	-358.8201
65.550	.202195	837767.	-1772.7870	-.0077790	5566.2836	-353.0074
67.275	.189010	835371.	-2376.6356	-.0075089	5551.8174	-347.1069
69.000	.176290	831899.	-2970.2265	-.0072397	5530.8638	-341.1144
70.725	.164033	827371.	-3553.3969	-.0069719	5503.5316	-335.0251
72.450	.152237	821805.	-4125.9750	-.0067056	5469.9315	-328.8335
74.175	.140898	815219.	-4687.7788	-.0064414	5430.1764	-322.5332
75.900	.130014	807632.	-5238.6142	-.0061794	5384.3815	-316.1166
77.625	.119579	799064.	-5778.2733	-.0059200	5332.6643	-309.5751
79.350	.109590	789535.	-6306.5316	-.0056636	5275.1448	-302.8984
81.075	.100040	779065.	-6823.1455	-.0054103	5211.9460	-296.0742
82.800	.090924	767675.	-7327.8478	-.0051606	5143.1935	-289.0879
84.525	.082236	755387.	-7820.3439	-.0049148	5069.0162	-281.9220
86.250	.073968	742221.	-8300.3052	-.0046730	4989.5467	-274.5549
87.975	.066114	728202.	-8767.3616	-.0044356	4904.9211	-266.9599
89.700	.058665	713351.	-9221.0915	-.0042029	4815.2803	-259.1038
91.425	.051614	697694.	-9661.0079	-.0039751	4720.7697	-250.9441
93.150	.044951	681255.	-10086.5395	-.0037525	4621.5406	-242.4258
94.875	.038668	664060.	-10497.0045	-.0035353	4517.7511	-233.4756
96.600	.032754	646136.	-10891.5713	-.0033238	4409.5671	-223.9931
98.325	.027200	627517.	-11269.1987	-.0031182	4297.1644	-213.8357
100.050	.021996	608227.	-11628.5391	-.0029187	4180.7309	-202.7909
101.775	.017131	588304.	-11967.7706	-.0027256	4060.4710	-190.5209
103.500	.012593	567785.	-12284.2721	-.0025389	3936.6111	-176.4374
105.225	.008371	546712.	-12573.8950	-.0023590	3809.4203	-158.3572
106.950	.004454	525137.	-12828.8098	-.0021860	3679.1817	-136.1962
108.675	.000830	503131.	-13023.9476	-.0020200	3546.3480	-90.0504
110.400	-.002515	480832.	-13000.2023	-.0018611	3412.7446	117.5812
112.125	-.005591	458859.	-12774.7745	-.0017094	3279.1077	143.7044
113.850	-.008412	437290.	-12513.3589	-.0015648	3148.9115	159.3062
115.575	-.010990	416173.	-12229.0342	-.0014270	3021.4504	170.3436
117.300	-.013335	395543.	-11927.8910	-.0012960	2896.9200	178.8059
119.025	-.015461	375424.	-11613.6313	-.0011715	2775.4816	185.5532
120.750	-.017377	355839.	-11288.8000	-.0010534	2657.2624	191.0628
122.475	-.019095	336805.	-10955.2801	-.0009416	2542.3673	195.6269
124.200	-.020626	318336.	-10614.5350	-.0008359	2430.8041	199.4400
125.925	-.021979	300445.	-10267.7425	-.0007360	2322.0868	202.6382
127.650	-.023165	283141.	-9915.8770	-.0006418	2216.4383	205.3218
129.375	-.024193	266434.	-9568.5191	-.0005530	2117.5820	197.4121
131.100	-.025073	250301.	-9224.9134	-.0004696	2020.2109	200.9714
132.825	-.025813	234754.	-8875.6957	-.0003913	1926.3638	203.9187
134.550	-.026423	219802.	-8521.8700	-.0003179	1836.1084	206.3141
136.275	-.026910	205452.	-8164.3441	-.0002493	1749.4922	208.2088
138.000	-.027283	191712.	-7803.9433	-.0001852	1666.5536	209.6472
139.725	-.027549	178586.	-7441.4216	-.0001254	1587.3226	210.6678
141.450	-.027715	166078.	-7077.4703	-6.9758E-05	1511.8214	211.3047
143.175	-.027789	154191.	-6712.7256	-1.8056E-05	1440.0653	211.5877
144.900	-.027778	142925.	-6347.7749	2.9909E-05	1372.0631	211.5435
146.625	-.027686	132282.	-5983.1621	7.4336E-05	1307.8172	211.1959
148.350	-.027521	122260.	-5619.3925	.0001154	1247.3247	210.5660
150.075	-.027288	112859.	-5256.9366	.0001534	1190.5773	209.6727
151.800	-.026992	104076.	-4896.2342	.0001884	1137.5618	208.5329
153.525	-.026638	95908.1560	-4636.2938	.0002207	1088.2603	92.8472
155.250	-.026231	88022.0228	-4476.3014	.0002504	1040.5976	92.5584
156.975	-.025774	80386.8973	-4317.1485	.0002776	994.5706	92.0594
158.700	-.025273	73031.0766	-4158.9498	.0003023	950.1729	91.3592
160.425	-.024731	65944.6464	-4002.1247	.0003248	907.3941	90.4670
162.150	-.024153	59123.5965	-3846.9962	.0003450	866.2202	89.3921
163.875	-.023541	52565.4003	-3693.8713	.0003630	826.6340	88.1440
165.600	-.022900	46266.9438	-3543.0404	.0003789	788.6152	86.7323
167.325	-.022234	40224.2493	-3394.7775	.0003929	752.1402	85.1666
169.050	-.021545	34432.9634	-3249.3399	.0004050	717.1827	83.4567
170.775	-.020837	28888.2073	-3106.9680	.0004152	683.7138	81.6122
172.500	-.020112	23585.0105	-2967.8855	.0004237	651.7021	79.6429
174.225	-.019375	18517.5389	-2832.2992	.0004304	621.1137	77.5586
175.950	-.018627	13679.9243	-2700.3993	.0004356	591.9129	75.3689
177.675	-.017872	9065.8936	-2572.3589	.0004393	564.0616	73.0836
179.400	-.017112	4668.8781	-2448.3349	.0004415	537.5202	70.7123
181.125	-.016349	482.0410	-2328.4674	.0004424	512.2476	68.2646
182.850	-.015586	-3501.6889	-2212.8799	.0004419	530.4748	65.7499
184.575	-.014824	-7289.5970	-2101.6798	.0004401	553.3395	63.1777
186.300	-.014067	-10889.1466	-1994.9584	.0004372	575.0671	60.5573
188.025	-.013316	-14307.9545	-1892.7907	.0004331	595.7038	57.8980
189.750	-.012573	-17553.7625	-1795.2360	.0004280	615.2962	55.2089
191.475	-.011839	-20634.4096	-1702.3379	.0004218	633.8916	52.4990
193.200	-.011118	-23557.8050	-1614.1245	.0004147	651.5379	49.7774

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	129.00	.07234
3	129.00	.03623
4	153.00	.03623
5	153.00	.03623
6	213.00	.03623
7	213.00	.03333
8	273.00	.03333
9	273.00	.03622
10	450.00	.03622

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	6.25000	.00	------	------
2	129.000	6.25000	.00	------	------
3	129.000	6.25000	.00	------	------
4	153.000	6.25000	.00	------	------
5	153.000	.00000	30.00	------	------
6	213.000	.00000	30.00	------	------
7	213.000	5.56000	25.00	------	------
8	273.000	5.56000	25.00	------	------
9	273.000	3.47000	32.00	------	------
10	450.000	3.47000	32.00	------	------

Notes:

(1) Cohesion = unlaxial 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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = 1.000 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = 1.000000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 lbs

Depth X	Deflect. y	Moment M	Shear V	Slope S	Total Stress	Soil Res p

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B2D3\
Name of input data file: B2p25mm.lpd
Name of output file: B2p25mm.lpo
Name of plot output file: B2p25mm.lpp
Name of runtime file: B2p25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:22:55

Problem Title

B2-B3, pinned head, 1 in

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is stiff clay without free water
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 2 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

```
Type 1 = Shear and Moment,          y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad
```

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
4	y= .250000	M= 0.000	90000.0000	.2500000	489911.	17108.4644

Pile-head Deflection vs. Pile Length

Boundary Condition Type 4, Deflection and Moment

```
Deflection =          .25000  in
Moment     =             0. in-lbs
Axial Load =          90000. lbs
```

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	.25000000	489910.83402	17108.46442
327.750	.25000000	490117.83080	17111.32341
310.500	.25000000	490083.36174	17110.74658
293.250	.25000000	490053.78000	17110.23077
276.000	.25000000	489870.14239	17107.73248
258.750	.25000000	489750.40342	17105.65036
241.500	.25000000	486971.62337	17092.62206
224.250	.25000000	488857.21636	17089.95159
207.000	.25000000	488173.71865	17079.02886
189.750	.25000000	486303.91708	17048.51397

The analysis ended normally.

196.925	-.003189	-11520.8047	-673.2039	.0001083	544.1330	14.4140
196.650	-.003003	-12685.3022	-648.9501	.0001063	547.6235	13.7064
198.375	-.002822	-13800.6966	-625.8165	.0001042	550.9899	12.9991
200.100	-.002644	-14877.0646	-604.1011	.0001019	554.2385	12.2941
201.825	-.002470	-15916.4771	-583.4984	9.9388E-05	557.3755	11.5931
203.550	-.002301	-16920.9940	-564.0997	9.6737E-05	560.4073	10.8982
205.275	-.002137	-17892.6581	-545.8930	9.3927E-05	563.3398	10.2111
207.000	-.001977	-18833.4892	-528.8629	9.0963E-05	566.1794	9.5339
208.725	-.001823	-19745.4789	-512.9908	8.7849E-05	568.9319	8.8685
210.450	-.001674	-20630.5844	-498.2547	8.4590E-05	571.6032	8.2167
212.175	-.001531	-21490.7228	-484.6295	8.1190E-05	574.1992	7.5806
213.900	-.001394	-22327.7657	-399.6350	7.7653E-05	576.7255	90.9638
215.625	-.001263	-22893.5747	-263.1615	7.4003E-05	578.4332	67.2662
217.350	-.001139	-23258.6589	-152.3790	7.0278E-05	579.5350	61.1773
219.075	-.001021	-23441.1035	-51.8990	6.6508E-05	580.0857	55.3213
220.800	-.000909	-23458.3533	38.6908	6.2723E-05	580.1377	49.7103
222.525	-.000804	-23327.0958	119.8212	5.8946E-05	579.7416	44.3538
224.250	-.000706	-23063.2729	191.9377	5.5202E-05	578.9453	39.2594
225.975	-.000614	-22682.0509	255.4963	5.1509E-05	577.7948	34.4317
227.700	-.000528	-22197.8044	310.9602	4.7887E-05	576.3332	29.8742
229.425	-.000448	-21624.1072	358.7964	4.4350E-05	574.6018	25.5881
231.150	-.000375	-20973.7275	399.4727	4.0913E-05	572.6388	21.5729
232.875	-.000307	-20250.6294	433.4549	3.7583E-05	570.4806	17.8260
234.600	-.000245	-19489.9778	461.2042	3.4375E-05	568.1607	14.3464
236.325	-.000189	-18678.1484	483.1750	3.1294E-05	565.7105	11.1271
238.050	-.000137	-17832.7408	499.8129	2.8347E-05	563.1590	8.1632
239.775	-9.10E-05	-16962.5957	511.5526	2.5538E-05	560.5320	5.4481
241.500	-4.93E-05	-16075.8141	518.8167	2.2872E-05	557.8564	2.9741
243.225	-1.20E-05	-15179.7798	522.0139	2.0349E-05	555.1521	.7329131
244.950	2.09E-05	-14282.1043	521.5303	1.7971E-05	552.4400	-1.2843
246.675	5.00E-05	-13386.0525	517.7680	1.5737E-05	549.7384	-3.0871
248.400	7.52E-05	-12499.7712	511.0644	1.3646E-05	547.0635	-4.6852
250.125	9.70E-05	-11627.1180	501.7717	1.1701E-05	544.4298	-6.0890
251.850	.000116	-10772.2919	490.2162	9.8926E-06	541.8459	-7.3087
253.575	.000131	-9930.9437	476.7064	8.2208E-06	539.3347	-8.3549
255.300	.000144	-9130.2075	461.5322	6.6816E-06	536.0938	-9.2383
257.025	.000154	-8348.7329	444.9654	5.2708E-06	534.5352	-9.9695
258.750	.000162	-7596.7133	427.2595	3.9837E-06	532.2656	-10.5590
260.475	.000168	-6875.9238	408.6499	2.8155E-06	530.0901	-11.0173
262.200	.000172	-6187.7453	389.3541	1.7611E-06	528.0131	-11.3546
263.925	.000174	-5533.1989	369.5721	8.1498E-07	526.0377	-11.5810
265.650	.000175	-4912.9745	349.4870	-2.8200E-08	524.1658	-11.7061
267.375	.000174	-4327.4600	329.2651	-7.7406E-07	522.3986	-11.7395
269.100	.000172	-3776.7695	309.0569	-1.4282E-06	520.7366	-11.6903
270.825	.000169	-3260.7705	288.9971	-1.9963E-06	519.1792	-11.5673
272.550	.000165	-2779.1097	269.2060	-2.4838E-06	517.7255	-11.3709
274.275	.000160	-2331.2387	250.9024	-2.8963E-06	516.3738	-9.8426
276.000	.000155	-1912.5972	232.1869	-3.2388E-06	515.1103	-11.8565
277.725	.000149	-1529.1883	212.0448	-3.5166E-06	513.9531	-11.4967
279.450	.000143	-1179.9508	192.5578	-3.7353E-06	512.8991	-11.0969
281.175	.000136	-863.7080	173.7889	-3.9003E-06	511.9446	-10.6641
282.900	.000130	-579.1680	155.7896	-4.0167E-06	511.0859	-10.2046
284.625	.000123	-324.9827	138.6009	-4.0897E-06	510.3187	-9.7243
286.350	.000115	-99.7252	122.2540	-4.1240E-06	509.6388	-9.2285
288.075	.000108	98.0742	106.7715	-4.1241E-06	509.0339	-8.7222
289.800	.000101	269.9172	92.1678	-4.0944E-06	510.1525	-8.2097
291.525	9.42E-05	417.3244	78.4500	-4.0389E-06	510.5974	-7.6950
293.250	8.73E-05	541.8238	65.6189	-3.9615E-06	510.9731	-7.1816
294.975	8.05E-05	644.9397	53.6695	-3.8657E-06	511.2844	-6.6727
296.700	7.39E-05	728.1841	42.5920	-3.7549E-06	511.5356	-6.1700
298.425	6.76E-05	793.0481	32.3723	-3.6321E-06	511.7314	-5.6782
300.150	6.14E-05	840.9961	22.9925	-3.5002E-06	511.8761	-5.1969
301.875	5.55E-05	873.4590	14.4320	-3.3618E-06	511.9741	-4.7203
303.600	4.98E-05	891.8304	6.6679	-3.2193E-06	512.0295	-4.2736
305.325	4.44E-05	897.4629	-.3246115	-3.0749E-06	512.0465	-3.8337
307.050	3.92E-05	891.6653	-6.5716	-2.9305E-06	512.0290	-3.4092
308.775	3.43E-05	875.7008	-12.0998	-2.7878E-06	511.9808	-3.0003
310.500	2.96E-05	850.7865	-16.9364	-2.6485E-06	511.9056	-2.6072
312.225	2.51E-05	818.0927	-21.1081	-2.5138E-06	511.8070	-2.2296
313.950	2.09E-05	778.7439	-24.6416	-2.3849E-06	511.6882	-1.8672
315.675	1.69E-05	733.8197	-27.5624	-2.2628E-06	511.5526	-1.5192
317.400	1.31E-05	684.3564	-29.8949	-2.1483E-06	511.4033	-1.1851
319.125	9.48E-06	631.3495	-31.6621	-2.0421E-06	511.2433	-.8638874
320.850	6.05E-06	575.7562	-32.8855	-1.9447E-06	511.0756	-.5545490
322.575	2.77E-06	518.4983	-33.5846	-1.8564E-06	510.9027	-.2559750
324.300	-3.56E-07	460.4658	-33.7769	-1.7773E-06	510.7276	.0330330
326.025	-3.36E-06	402.5200	-33.4778	-1.7077E-06	510.5527	.3137310
327.750	-6.25E-06	345.4976	-32.7006	-1.6473E-06	510.3806	.5874106
329.475	-9.04E-06	290.2145	-31.4562	-1.5960E-06	510.2138	.8553770
331.200	-1.18E-05	237.4694	-29.7531	-1.5534E-06	510.0546	1.1189
332.925	-1.44E-05	188.0479	-27.5986	-1.5191E-06	509.9054	1.3793
334.650	-1.70E-05	142.7260	-24.9963	-1.4924E-06	509.7686	1.6370
336.375	-1.95E-05	102.2740	-21.9489	-1.4726E-06	509.6465	1.8954
338.100	-2.21E-05	67.4594	-18.4569	-1.4589E-06	509.5415	2.1533
339.825	-2.46E-05	39.0505	-14.5191	-1.4503E-06	509.4557	2.4123
341.550	-2.71E-05	17.8187	-10.1330	-1.4457E-06	509.3916	2.6731
343.275	-2.96E-05	4.5406	-5.2948	-1.4439E-06	509.3516	2.9364
345.000	-3.21E-05	0.0000	0.0000	-1.4435E-06	509.3379	3.2025

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00402232
Maximum bending moment	=	889910.83324 lbs-in
Maximum shear force	=	17108.46440 lbs
Depth of maximum bending moment	=	56.92500000 in
Depth of maximum shear force	=	0.00000 in
Number of iterations	=	16
Number of zero deflection points	=	3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

File: U:\YZhou\Projects\75010\Analysis\Appendix C\14 B2p5mm.lpo

in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs/in
0.000	.250000	0.0000	17108.4644	-.0040223	509.3379	-307.9537
1.725	.243062	29678.3881	16576.3624	-.0040199	598.9105	-308.9761
3.450	.236131	58436.6352	16042.5743	-.0040128	685.7060	-309.9006
5.175	.229217	86271.2461	15507.2561	-.0040011	769.7139	-310.7502
6.900	.222327	113179.	14970.5654	-.0039850	850.9244	-311.4999
8.625	.215469	139157.	14432.5617	-.0039647	929.3290	-312.1567
10.350	.208649	164203.	13893.7060	-.0039402	1004.9195	-312.7195
12.075	.201875	188314.	13353.8612	-.0039117	1077.6892	-313.1874
13.800	.195154	211488.	12813.2921	-.0038794	1147.6320	-313.5593
15.525	.188491	233724.	12272.1653	-.0038435	1214.7420	-313.8341
17.250	.181894	255021.	11730.6492	-.0038041	1279.0175	-314.0107
18.975	.175367	275376.	11188.9142	-.0037613	1340.4528	-314.0879
20.700	.168917	294790.	10647.1327	-.0037152	1399.0465	-314.0646
22.425	.162550	313262.	10105.4790	-.0036661	1454.7974	-313.9396
24.150	.156269	330792.	9564.1298	-.0036142	1507.7052	-313.7117
25.875	.150081	347381.	9023.2636	-.0035594	1557.7706	-313.3796
27.600	.143989	363028.	8483.0613	-.0035021	1604.9953	-312.9419
29.325	.137999	377735.	7943.7062	-.0034423	1649.3822	-312.3974
31.050	.132113	391502.	7405.3838	-.0033802	1690.9348	-311.7445
32.775	.126337	404333.	6868.2822	-.0033160	1729.6582	-310.9818
34.500	.120673	416228.	6332.5923	-.0032497	1765.5581	-310.1079
36.225	.115125	427189.	5800.6423	-.0031817	1798.6415	-306.6457
37.950	.109697	437228.	5274.8524	-.0031119	1828.9387	-302.9659
39.675	.104389	446354.	4755.4548	-.0030406	1856.4820	-299.2342
41.400	.099207	454578.	4242.5396	-.0029678	1881.3042	-295.4508
43.125	.094150	461912.	3736.1992	-.0028939	1903.4386	-291.6126
44.850	.089223	468367.	3236.5229	-.0028188	1922.9191	-287.7211
46.575	.084426	473953.	2743.6079	-.0027427	1939.7803	-283.7746
48.300	.079760	478684.	2257.5490	-.0026658	1954.0571	-279.7720
50.025	.075229	482570.	1778.4442	-.0025882	1965.7852	-275.7119
51.750	.070831	485623.	1306.3936	-.0025101	1975.0006	-271.5930
53.475	.066569	487856.	841.5005	-.0024315	1981.7402	-267.4136
55.200	.062442	489281.	383.8708	-.0023526	1986.0414	-263.1716
56.925	.058452	489911.	-66.3856	-.0022736	1987.9420	-258.8648
58.650	.054599	489750.	-509.1548	-.0021945	1987.4808	-254.4908
60.375	.050881	488836.	-944.3181	-.0021155	1984.6970	-250.0464
62.100	.047300	487157.	-1371.7511	-.0020367	1979.6306	-245.5282
63.825	.043854	484736.	-1791.3233	-.0019583	1972.3223	-240.9323
65.550	.040544	481585.	-2202.8964	-.0018803	1962.8136	-236.2539
67.275	.037367	477719.	-2606.3235	-.0018029	1951.1468	-231.4876
69.000	.034324	473153.	-3001.4474	-.0017261	1937.3649	-226.6270
70.725	.031412	467900.	-3388.0987	-.0016502	1921.5119	-221.6644
72.450	.028631	461976.	-3766.0938	-.0015751	1903.6328	-216.5907
74.175	.025978	455396.	-4135.2315	-.0015011	1883.7736	-211.3950
75.900	.023452	448176.	-4495.2898	-.0014281	1861.9815	-206.0639
77.625	.021051	440331.	-4846.0212	-.0013564	1838.3048	-200.5812
79.350	.018773	431878.	-5187.1466	-.0012860	1812.7935	-194.9265
81.075	.016614	422835.	-5518.3473	-.0012170	1785.4989	-189.0743
82.800	.014574	413218.	-5839.2544	-.0011495	1756.4743	-182.9919
84.525	.012649	403046.	-6149.4339	-.0010836	1725.7751	-176.6364
86.250	.010835	392339.	-6448.3649	-.0010194	1693.4590	-169.9503
87.975	.009131	381116.	-6735.4088	-.0009570	1659.5870	-162.8542
89.700	.007534	369399.	-7009.7600	-.0008964	1624.2236	-155.2340
91.425	.006039	357211.	-7270.3654	-.0008378	1587.4361	-146.9172
93.150	.004643	344576.	-7515.7821	-.0007811	1549.3062	-137.6240
94.875	.003344	331524.	-7743.8939	-.0007266	1509.9122	-126.8534
96.600	.002137	318085.	-7951.2419	-.0006741	1469.3540	-113.5501
98.325	.001018	304301.	-8130.8406	-.0006239	1427.7519	-94.6803
100.050	-1.58E-05	290228.	-8209.9633	-.0005759	1385.2765	9.6596
101.775	-.000969	276158.	-8126.6878	-.0005302	1342.8118	92.2161
103.500	-.001845	262355.	-7953.4017	-.0004867	1301.1544	108.6953
105.225	-.002648	248870.	-7756.9214	-.0004455	1260.4533	119.1078
106.950	-.003382	235732.	-7544.9202	-.0004063	1220.8031	126.6807
108.675	-.004050	222966.	-7321.3017	-.0003693	1182.2728	132.5771
110.400	-.004656	210588.	-7088.5225	-.0003343	1144.9163	137.3118
112.125	-.005203	198614.	-6848.3027	-.0003013	1108.7770	141.2040
113.850	-.005695	187055.	-6601.9282	-.0002702	1073.8909	144.4476
115.575	-.006135	175921.	-6350.4046	-.0002409	1040.2878	147.1738
117.300	-.006526	165221.	-6094.5442	-.0002133	1007.9932	149.4758
119.025	-.006871	154961.	-5835.0195	-.0001875	977.0284	151.4224
120.750	-.007173	145149.	-5572.3979	-.0001633	947.4119	153.0664
122.475	-.007435	135787.	-5307.1659	-.0001406	919.1590	154.4489
124.200	-.007658	126882.	-5039.7462	-.0001194	892.2829	155.6030
125.925	-.007846	118437.	-4770.5093	-9.9579E-05	866.7946	156.5556
127.650	-.008002	110455.	-4499.7839	-8.1103E-05	842.7034	157.3289
129.375	-.008126	102938.	-4265.4389	-6.3879E-05	820.0167	114.3755
131.100	-.008222	95759.1777	-4067.5596	-4.7841E-05	798.3495	115.0498
132.825	-.008291	88920.0373	-3868.6807	-3.2934E-05	777.7082	115.5344
134.550	-.008336	82422.4553	-3669.1160	-1.9104E-05	758.0978	115.8449
136.275	-.008367	76267.5187	-3469.1538	-6.2947E-06	739.5215	115.9953
138.000	-.008357	70455.8293	-3269.0594	5.5483E-06	721.9812	115.9981
139.725	-.008338	64907.5410	-3069.0778	1.6481E-05	705.4773	115.8646
141.450	-.008301	59862.3936	-2869.4353	2.6558E-05	690.0091	115.6049
143.175	-.008246	55079.7428	-2670.3418	3.5836E-05	675.5745	115.2281
144.900	-.008177	50638.5873	-2471.9921	4.4369E-05	662.1706	114.7425
146.625	-.008093	46537.5934	-2274.5677	5.2213E-05	649.7934	114.1553
148.350	-.007997	42775.1165	-2078.2382	5.9422E-05	638.4378	113.4731
150.075	-.007888	39349.2210	-1883.1624	6.6051E-05	628.0981	112.7017
151.800	-.007769	36257.6973	-1689.4900	7.2154E-05	618.7675	111.8461
153.525	-.007639	33498.0768	-1570.0569	7.7784E-05	610.4387	26.6271
155.250	-.007501	30816.8490	-1524.2636	8.2976E-05	602.3465	26.4666
156.975	-.007353	28213.6034	-1478.7839	8.7740E-05	594.4896	26.2635
158.700	-.007198	25687.8010	-1433.6901	9.2091E-05	586.8664	26.0193
160.425	-.007035	23238.7784	-1389.0516	9.6040E-05	579.4750	25.7355
162.150	-.006866	20865.7525	-1344.9354	9.9600E-05	572.3130	25.4138
163.875	-.006692	18567.8255	-1301.4055	.0001028	565.3776	25.0557
165.600	-.006512	16343.9695	-1256.5231	.0001056	558.6658	24.6630
167.325	-.006327	14193.1336	-1216.3466	.0001081	552.1743	24.2373
169.050	-.006139	12114.0391	-1174.9313	.0001102	545.8993	23.7804
170.775	-.005947	10105.4047	-1134.3256	.0001120	539.8371	23.2941
172.500	-.005753	8165.8314	-1094.5906	.0001135	533.9832	22.7801
174.225	-.005556	6293.0384	-1055.7607	.0001146	528.3333	22.2401
175.950	-.005357	4487.8659	-1017.8829	.0001155	522.8827	21.6762
177.675	-.005157	2746.2811	-980.9972	.0001161	517.6264	21.0899
179.400	-.004957	1067.3832	-945.1402	.0001164	512.5593	20.4833
181.125	-.004756	-550.5909	-910.3457	.0001164	510.9996	19.8581
182.850	-.004555	-2109.4607	-876.6440	.0001162	515.7044	19.2163
184.575	-.004355	-3611.0972	-844.0623	.0001158	520.2365	18.5596
186.300	-.004156	-5057.4165	-812.6244	.0001151	524.6017	17.8900
188.025	-.003958	-6450.3751	-782.3511	.0001141	528.8058	17.2094
189.750	-.003762	-7791.9633	-753.2599	.0001130	532.8549	16.5196
191.475	-.003568	-9084.2001	-725.3649	.0001116	536.7550	15.8225
193.200	-.003377	-10329.1275	-698.6770	.0001100	540.5123	15.1200

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	129.00	.07234
3	129.00	.03623
4	153.00	.03623
5	153.00	.03623
6	213.00	.03623
7	213.00	.03333
8	273.00	.03333
9	273.00	.03622
10	450.00	.03622

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	6.25000	.00	------	------
2	129.000	6.25000	.00	------	------
3	129.000	6.25000	.00	------	------
4	153.000	6.25000	.00	------	------
5	153.000	.00000	30.00	------	------
6	213.000	.00000	30.00	------	------
7	213.000	5.56000	25.00	------	------
8	273.000	5.56000	25.00	------	------
9	273.000	3.47000	32.00	------	------
10	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Deflection at pile head = .250 in
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

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

Pile-head boundary conditions are Displacement and Moment (BC Type 4)
Specified deflection at pile head = .250000 in
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 lbs

Depth X	Deflect. y	Moment M	Shear V	Slope S	Total Stress	Soil Res p

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\Y2hou\Projects\75010\Analysis\LPILE\B2B3\
Name of input data file: B2p6mm.lpd
Name of output file: B2p6mm.lpo
Name of plot output file: B2p6mm.lpp
Name of runtime file: B2p6mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13:21:25

Problem Title

B2-B3, pinned head, 0.25 in

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	580.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is stiff clay without free water
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 2 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

```
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 = rotational stiffness of pile-headin-lbs/rad
```

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= 1.000000	S= 0.000	90000.0000	1.0000000	-2112883.	49644.6290

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

```
Deflection =          1.00000  in
Slope      =           .00000
Axial Load =          90000. lbs
```

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	1.00000000	-2112883.	49644.62899
327.750	1.00000000	-2112885.	49645.72730
310.500	1.00000000	-2112337.	49633.49194
293.250	1.00000000	-2112890.	49642.84288
276.000	1.00000000	-2112666.	49638.14646
258.750	1.00000000	-2112511.	49631.05662
241.500	1.00000000	-2112841.	49621.47901
224.250	1.00000000	-2112712.	49615.46783
207.000	1.00000000	-2082330.	49014.45770
189.750	1.00000000	-2037935.	48080.75300

The analysis ended normally.

194.925	-.016760	81344.9326	-6510.7238	.0003432	1000.3536	75.7649
196.650	-.016146	70171.3376	-6381.8254	.0003677	932.9073	73.6826
198.375	-.015492	59213.4770	-6256.7199	.0003885	866.7633	71.3672
200.100	-.014805	48465.0103	-6135.7895	.0004059	801.8832	68.8420
201.825	-.014091	37918.9623	-6019.3752	.0004199	738.2250	66.1310
203.550	-.013357	27567.7947	-5907.7760	.0004304	675.7431	63.2584
205.275	-.012606	17403.4785	-5801.2518	.0004377	614.3890	60.2490
207.000	-.011846	7417.5683	-5700.0140	.0004417	554.1119	57.1282
208.725	-.011082	-2398.7216	-5604.2335	.0004425	523.8171	53.9217
210.450	-.010320	-12054.4405	-5514.0353	.0004402	582.1011	50.6559
212.175	-.009564	-21558.8222	-5429.4987	.0004348	639.4716	47.3576
213.900	-.008820	-30921.2050	-4892.2012	.0004263	695.9850	575.5961
215.625	-.008093	-38569.2798	-4023.9831	.0004151	742.1504	431.0336
217.350	-.007388	-44932.8270	-3309.8245	.0004016	780.5622	306.9763
219.075	-.006708	-50112.8691	-2653.8218	.0003862	811.8300	363.6065
220.800	-.006055	-54208.4426	-2054.6222	.0003694	836.5518	331.1176
222.525	-.005433	-57316.0172	-1510.5637	.0003514	855.3098	299.6749
224.250	-.004843	-59528.9987	-1019.7211	.0003325	868.6678	269.4179
225.975	-.004286	-60937.3094	-579.9504	.0003131	877.1687	240.4611
227.700	-.003763	-61627.0436	-188.9298	.0002933	881.3321	212.8961
229.425	-.003274	-61680.1898	155.8019	.0002734	881.6529	186.7930
231.150	-.002819	-61174.4184	456.8105	.0002536	878.5999	162.2024
232.875	-.002399	-60182.9272	716.7329	.0002340	872.6151	139.1569
234.600	-.002012	-58774.3405	938.2484	.0002148	864.1126	117.6727
236.325	-.001658	-57012.6580	1124.0514	.0001961	853.4787	97.7511
238.050	-.001336	-54957.2471	1276.8275	.0001780	841.0717	79.3806
239.775	-.001044	-52662.8744	1399.2321	.0001606	827.2224	62.5377
241.500	-.000782	-50179.7733	1493.8712	.0001440	812.2339	47.1888
243.225	-.000547	-47553.7408	1563.2854	.0001283	796.3826	33.2915
244.950	-.000339	-44826.2615	1609.9359	.0001133	779.9189	20.7959
246.675	-.000156	-42034.6545	1636.1918	9.9319E-05	763.0602	9.6458
248.400	3.53E-06	-39212.2382	1644.3216	8.6203E-05	746.0315	-.2200424
250.125	.000141	-36388.5111	1636.4840	7.3958E-05	728.9868	-8.8670
251.850	.000259	-33589.3449	1614.7227	6.2701E-05	712.0804	-16.3634
253.575	.000358	-30837.1864	1580.9617	5.2301E-05	695.4778	-22.7797
255.300	.000439	-28151.2662	1537.0023	4.2778E-05	679.2650	-28.1877
257.025	.000505	-25547.8110	1484.5215	3.4109E-05	663.5500	-32.6596
258.750	.000557	-23040.2579	1425.0720	2.6265E-05	648.4139	-36.2675
260.475	.000596	-20639.4682	1360.0825	1.9214E-05	633.9222	-39.0827
262.200	.000623	-18353.9394	1290.8599	1.2919E-05	620.1262	-41.1754
263.925	.000640	-16190.0131	1218.5816	7.3427E-06	607.0643	-42.6139
265.650	.000649	-14152.0781	1144.3492	2.4445E-06	594.7629	-43.4644
267.375	.000649	-12242.7675	1069.0917	-1.8165E-06	583.2379	-43.7906
269.100	.000642	-10463.1477	993.6708	-5.4820E-06	572.4957	-43.6537
270.825	.000630	-8812.9006	918.8356	-8.5939E-06	562.5344	-43.1118
272.550	.000613	-7290.4963	845.2370	-1.1192E-05	553.3449	-42.2199
274.275	.000591	-5893.3572	777.5361	-1.3322E-05	544.9114	-36.2739
276.000	.000567	-4603.8603	708.8926	-1.5016E-05	537.1278	-41.3127
277.725	.000540	-3443.0150	635.6974	-1.6315E-05	530.1206	-41.5513
279.450	.000510	-2405.6393	565.6964	-1.7260E-05	523.8588	-39.6092
281.175	.000480	-1486.0032	499.1654	-1.7888E-05	518.3077	-37.5282
282.900	.000449	-677.9836	436.3111	-1.8237E-05	513.4302	-35.3463
284.625	.000417	24.9327	377.2781	-1.8343E-05	509.4884	-33.0978
286.350	.000385	629.3412	322.1549	-1.8237E-05	513.1367	-30.8132
288.075	.000354	1142.0296	270.9802	-1.7951E-05	516.2314	-28.5198
289.800	.000323	1569.7966	223.7489	-1.7513E-05	518.8135	-26.2412
291.525	.000294	1919.4010	180.4174	-1.6950E-05	520.9230	-23.9982
293.250	.000265	2197.4996	140.9094	-1.6285E-05	522.6024	-21.8082
294.975	.000238	2410.5951	105.1208	-1.5541E-05	523.8887	-19.6859
296.700	.000211	2564.9918	72.9241	-1.4738E-05	524.8207	-17.6435
298.425	.000187	2666.7595	44.1735	-1.3894E-05	525.4350	-15.6906
300.150	.000163	2721.7042	18.7083	-1.3024E-05	525.7667	-13.8343
301.875	.000142	2735.3449	-3.6428	-1.2143E-05	525.8490	-12.0800
303.600	.000122	2712.9068	-23.0585	-1.1263E-05	525.7136	-10.4310
305.325	.000103	2659.2922	-39.7219	-1.0396E-05	525.3899	-8.8888
307.050	8.57E-05	2579.0944	-53.8172	-9.5504E-06	524.9058	-7.4536
308.775	6.99E-05	2476.5883	-65.5279	-8.7342E-06	524.2871	-6.1240
310.500	5.56E-05	2355.7353	-75.0339	-7.9541E-06	523.5576	-4.8975
312.225	4.25E-05	2220.1910	-82.5102	-7.2154E-06	522.7394	-3.7706
313.950	3.07E-05	2073.3155	-88.1246	-6.5223E-06	523.8528	-2.7389
315.675	2.00E-05	1918.1862	-92.0369	-5.8779E-06	520.9164	-1.7971
317.400	1.04E-05	1757.6134	-94.3971	-5.2845E-06	519.9472	-.9394339
319.125	1.75E-06	1594.1571	-95.3451	-4.7435E-06	518.9605	-.1597080
320.850	-5.99E-06	1430.1457	-95.0096	-4.2552E-06	517.9705	.5487353
322.575	-1.29E-05	1267.6953	-93.5075	-3.8197E-06	516.9899	1.1928
324.300	-1.92E-05	1108.7307	-90.9441	-3.4361E-06	516.0304	1.7794
326.025	-2.48E-05	955.0053	-87.4121	-3.1029E-06	515.1025	2.3156
327.750	-2.99E-05	808.1223	-82.9927	-2.8183E-06	514.2159	2.8084
329.475	-3.45E-05	669.5557	-77.7547	-2.5797E-06	513.3794	3.2646
331.200	-3.88E-05	540.6697	-71.7557	-2.3844E-06	512.6015	3.6907
332.925	-4.27E-05	422.7389	-65.0422	-2.2288E-06	511.8896	4.0930
334.650	-4.65E-05	316.9663	-57.6503	-2.1094E-06	511.2511	4.4773
336.375	-5.00E-05	224.5004	-49.6066	-2.0220E-06	510.6930	4.8488
338.100	-5.34E-05	146.4514	-40.9289	-1.9621E-06	510.2219	5.2122
339.825	-5.68E-05	83.9048	-31.6278	-1.9250E-06	509.8443	5.5717
341.550	-6.01E-05	37.9393	-21.7071	-1.9053E-06	509.5668	5.9305
343.275	-6.34E-05	9.6070	-11.1660	-1.8976E-06	509.3959	6.2911
345.000	-6.66E-05	0.0000	0.0000	-1.8961E-06	509.3379	6.6550

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.00000000 in
Computed slope at pile head	=	-.00001373
Maximum bending moment	=	-2112883. lbs-in
Maximum shear force	=	49646.62898 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	=	3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

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in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs/in
0.000	1.000000	-2112883.	49644.6290	0.0000	13263.1583	-435.5124
1.725	.999412	-2027848.	48885.3992	-.0006685	12749.8666	-439.9786
3.450	.997694	-1944020.	48122.9601	-.0013096	12243.8639	-444.3179
5.175	.994893	-1861417.	47352.8780	-.0019240	11745.2537	-448.5310
6.900	.991056	-1780055.	46575.6364	-.0025118	11254.1366	-452.6187
8.625	.986228	-1699951.	45791.4510	-.0030736	10770.6107	-456.5817
10.350	.980452	-1621120.	45000.5365	-.0036098	10294.7712	-460.4206
12.075	.973774	-1543578.	44203.1069	-.0041206	9826.7112	-464.1356
13.800	.966236	-1467340.	43399.3754	-.0046067	9366.5207	-467.7270
15.525	.957881	-1392420.	42589.5550	-.0050684	8914.2873	-471.1952
17.250	.948750	-1318832.	41773.8583	-.0055061	8470.0960	-474.5401
18.975	.938885	-1246591.	40952.4978	-.0059202	8034.0291	-477.7619
20.700	.928325	-1175708.	40125.6861	-.0063112	7606.1664	-480.8604
22.425	.917111	-1106197.	39293.6357	-.0066796	7186.5849	-483.8357
24.150	.905281	-1038071.	38456.5594	-.0070258	6775.3591	-486.6875
25.875	.892872	-971341.	37614.6704	-.0073502	6372.5609	-489.4157
27.600	.879923	-906018.	36768.1823	-.0076532	5978.2595	-492.0199
29.325	.866469	-842114.	35917.3091	-.0079354	5592.5214	-494.4998
31.050	.852545	-779639.	35062.2654	-.0081972	5215.4104	-496.8552
32.775	.838188	-718604.	34203.2665	-.0084391	4846.9878	-499.0855
34.500	.823430	-659018.	33340.5286	-.0086615	4487.3121	-501.1904
36.225	.808306	-600890.	32477.7435	-.0088649	4136.4392	-499.1402
37.950	.792847	-544217.	31618.6001	-.0090498	3794.3498	-496.7364
39.675	.777084	-488995.	30764.0752	-.0092166	3461.0178	-494.2490
41.400	.761049	-435219.	29913.7120	-.0093657	3136.4354	-491.6794
43.125	.744772	-382885.	29067.8507	-.0094978	2820.5125	-489.0292
44.850	.728282	-331986.	28226.6296	-.0096132	2513.2776	-486.2996
46.575	.711607	-282518.	27390.1845	-.0097124	2214.6769	-483.4918
48.300	.694774	-234474.	26558.6492	-.0097959	1924.6749	-480.6071
50.025	.677811	-187849.	25732.1556	-.0098641	1643.2344	-477.6464
51.750	.660743	-142635.	24910.8337	-.0099174	1370.3164	-474.6108
53.475	.643596	-98827.1329	24094.8120	-.0099564	1105.8799	-471.5013
55.200	.626394	-56416.8009	23284.2171	-.0099815	849.0824	-468.3188
56.925	.609160	-15397.3421	22479.1745	-.0099930	602.2796	-465.0640
58.650	.591918	24239.1125	21679.8080	-.0099916	655.6504	-461.7377
60.375	.574689	62500.3938	20886.2404	-.0099776	886.6038	-458.3407
62.100	.557495	99394.6923	20098.5932	-.0099515	1109.3058	-454.8734
63.825	.540356	134930.	19316.9870	-.0099137	1323.8075	-451.3366
65.550	.523293	169116.	18541.5414	-.0098646	1530.1617	-447.7307
67.275	.506323	201962.	17772.3751	-.0098047	1728.4228	-444.0562
69.000	.489467	233476.	17009.6063	-.0097344	1918.6469	-440.3134
70.725	.472740	263667.	16253.3524	-.0096541	2100.8916	-436.5027
72.450	.456160	292547.	15503.7304	-.0095643	2275.2163	-432.6243
74.175	.439743	320125.	14760.8569	-.0094654	2441.6819	-428.6784
75.900	.423504	346411.	14024.8482	-.0093578	2600.3510	-424.6651
77.625	.407458	371416.	13295.6204	-.0092419	2751.2875	-420.5845
79.350	.391619	395153.	12573.8898	-.0091182	2894.5574	-416.4365
81.075	.376000	417627.	11859.1727	-.0089870	3030.2279	-412.2211
82.800	.360614	438856.	11151.7856	-.0088487	3158.3679	-407.9380
84.525	.345473	458849.	10451.8454	-.0087038	3279.0479	-403.5869
86.250	.330586	477617.	9759.4696	-.0085526	3392.3401	-399.1676
87.975	.315966	495174.	9074.7764	-.0083956	3498.3181	-394.6795
89.700	.301622	511532.	8397.8851	-.0082331	3597.0572	-390.1220
91.425	.287562	526703.	7728.9158	-.0080655	3688.6344	-385.4945
93.150	.273796	540701.	7067.9902	-.0078931	3773.1281	-380.7961
94.875	.260331	553539.	6415.2313	-.0077165	3850.6186	-376.0258
96.600	.247174	565230.	5770.7641	-.0075359	3921.1876	-371.1825
98.325	.234332	575788.	5134.7157	-.0073517	3984.9185	-366.2649
100.050	.221811	585227.	4507.2156	-.0071643	4041.8966	-361.2714
101.775	.209615	593562.	3888.3962	-.0069740	4092.2087	-356.2004
103.500	.197750	600808.	3278.3920	-.0067811	4135.9432	-351.0498
105.225	.186220	606978.	2677.3448	-.0065862	4173.1906	-345.8175
106.950	.175028	612089.	2085.3954	-.0063894	4204.0429	-340.5007
108.675	.164177	616157.	1502.6828	-.0061911	4228.5941	-335.0965
110.400	.153669	619196.	929.3906	-.0059917	4246.9400	-329.6016
112.125	.143506	621224.	365.6407	-.0057914	4259.1784	-324.0121
113.850	.133688	622256.	-188.3657	-.0055907	4265.4091	-318.3234
115.575	.124218	622310.	-732.4771	-.0053898	4265.7340	-312.5305
117.300	.115094	621402.	-1266.5007	-.0051890	4260.2571	-306.6272
119.025	.106316	619551.	-1790.2400	-.0049887	4249.0846	-300.6068
120.750	.097883	616775.	-2303.4859	-.0047891	4232.3254	-294.4610
122.475	.089794	613091.	-2806.0139	-.0045905	4210.0906	-288.1802
124.200	.082046	608520.	-3297.5815	-.0043933	4182.4941	-281.7532
125.925	.074637	603079.	-3777.9246	-.0041977	4149.6527	-275.1664
127.650	.067563	596789.	-4246.7536	-.0040040	4111.6866	-268.4034
129.375	.060823	589671.	-4704.2788	-.0038125	4068.7188	-261.4494
131.100	.054410	581591.	-5273.7043	-.0036234	4019.9494	-296.1140
132.825	.048322	572602.	-5769.7894	-.0034371	3965.6856	-279.0571
134.550	.042552	562753.	-6236.3393	-.0032538	3906.2358	-261.8704
136.275	.037096	552097.	-6673.0911	-.0030738	3841.9124	-244.5084
138.000	.031948	540685.	-7079.6893	-.0028974	3773.0301	-226.9099
139.725	.027100	528571.	-7455.6533	-.0027248	3699.9086	-208.9905
141.450	.022547	515809.	-7800.3271	-.0025562	3622.8735	-190.6313
143.175	.018281	502454.	-8112.8015	-.0023918	3542.2582	-171.6579
144.900	.014295	488563.	-8391.7848	-.0022318	3458.4076	-151.8009
146.625	.010582	474195.	-8635.3644	-.0020764	3371.6027	-130.6102
148.350	.007132	459415.	-8840.5089	-.0019257	3282.4683	-107.2385
150.075	.003936	444293.	-9001.7506	-.0017798	3191.1888	-79.7094
151.800	.000991	428912.	-9105.0586	-.0016388	3098.3431	-40.0690
153.525	-.001716	413390.	-9134.4589	-.0015029	3004.6480	5.9817
155.250	-.004193	397865.	-9116.5370	-.0013719	2910.9352	14.7973
156.975	-.006449	382364.	-9083.9065	-.0012460	2817.3679	23.0351
158.700	-.008492	366912.	-9037.5620	-.0011250	2724.0985	30.6977
160.425	-.010330	351533.	-8978.4923	-.0010090	2631.2696	37.7889
162.150	-.011973	336250.	-8907.6785	-.0008980	2539.0130	44.3141
163.875	-.013428	321081.	-8826.0913	-.0007919	2447.4507	50.2797
165.600	-.014705	306045.	-8734.6893	-.0006906	2356.6943	55.6936
167.325	-.015811	291160.	-8634.4164	-.0005942	2266.8456	60.5647
169.050	-.016755	276441.	-8526.2004	-.0005026	2177.9967	64.9031
170.775	-.017545	261901.	-8410.9507	-.0004157	2090.2299	68.7198
172.500	-.018189	247552.	-8289.5566	-.0003336	2003.6181	72.0270
174.225	-.018695	233406.	-8162.0855	-.0002558	1918.2252	74.8379
175.950	-.019072	219470.	-8031.7816	-.0001827	1834.1059	77.1665
177.675	-.019326	205753.	-7897.0641	-.0001140	1751.3062	79.0277
179.400	-.019465	192260.	-7759.5255	-4.9786E-05	1669.8637	80.4373
181.125	-.019497	178990.	-7619.9307	1.0147E-05	1589.8078	81.4118
182.850	-.019430	165969.	-7479.0153	6.5837E-05	1511.1600	81.9685
184.575	-.019270	153175.	-7337.4843	.0001174	1433.9342	82.1254
186.300	-.019025	140618.	-7196.0313	.0001648	1358.1373	81.9013
188.025	-.018702	128297.	-7055.2366	.0002082	1283.7688	81.3156
189.750	-.018307	116213.	-6915.7671	.0002477	1210.8221	80.3882
191.475	-.017847	104361.	-6778.1743	.0002833	1139.2841	79.1397
193.200	-.017330	92739.8981	-6642.9936	.0003151	1069.1360	77.5914

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	129.00	.07234
3	129.00	.03623
4	153.00	.03623
5	153.00	.03623
6	213.00	.03623
7	213.00	.03333
8	273.00	.03333
9	273.00	.03622
10	450.00	.03622

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	6.25000	.00	------	------
2	129.000	6.25000	.00	------	------
3	129.000	6.25000	.00	------	------
4	153.000	6.25000	.00	------	------
5	153.000	.00000	30.00	------	------
6	213.000	.00000	30.00	------	------
7	213.000	5.56000	25.00	------	------
8	273.000	5.56000	25.00	------	------
9	273.000	3.47000	32.00	------	------
10	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = 1.000 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = 1.000000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 lbs

Depth X	Deflect. y	Moment M	Shear V	Slope S	Total Stress	Soil Res p

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B2B3\
Name of input data file: B2f25mm.lpd
Name of output file: B2f25mm.lpo
Name of plot output file: B2f25mm.lpp
Name of runtime file: B2f25mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 13: 0:31

Problem Title

B2-B3, fixed head, 1.0 in

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is stiff clay without free water
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 2 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

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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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= .250000	S= 0.000	90000.0800	.2500000	-1248877.	32182.4978

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = .25000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
345.000	.25000000	-1248877.	32182.49769
327.750	.25000000	-1248823.	32184.80378
310.500	.25000000	-1249273.	32187.43227
293.250	.25000000	-1248720.	32179.03485
276.000	.25000000	-1249092.	32181.91299
258.750	.25000000	-1248631.	32169.43762
241.500	.25000000	-1248753.	32160.29011
224.250	.25000000	-1249087.	32164.53266
207.000	.25000000	-1232446.	31804.84622
189.750	.25000000	-1213728.	31355.04485

The analysis ended normally.

194.925	-.006425	30805.8966	-2804.1428	.0001407	599.8989	29.0446
196.650	-.006178	25051.7465	-2834.7795	.0001451	584.9468	28.1951
198.375	-.005924	20180.8666	-2786.9157	.0001480	570.2459	27.2922
200.100	-.005665	15390.6924	-2740.6568	.0001516	555.7886	26.3413
201.825	-.005401	10678.5143	-2696.0748	.0001538	541.5668	25.3479
203.550	-.005134	6041.4943	-2653.2383	.0001551	527.5717	24.3177
205.275	-.004866	1476.6832	-2612.2057	.0001557	513.7947	23.2564
207.000	-.004597	-3018.9626	-2573.0255	.0001556	518.4494	22.1700
208.725	-.004329	-7448.5634	-2535.7358	.0001547	531.8184	21.0644
210.450	-.004063	-11815.2975	-2500.3643	.0001532	544.9977	19.9460
212.175	-.003801	-16122.3837	-2466.9278	.0001509	557.9870	18.8209
213.900	-.003543	-20373.0618	-2251.2799	.0001480	570.8260	231.2056
215.625	-.003290	-23935.2481	-1900.7208	.0001444	581.5770	175.2406
217.350	-.003045	-26975.3840	-1608.4739	.0001403	590.7525	163.5954
219.075	-.002806	-29528.0453	-1336.1658	.0001357	598.4567	152.1241
220.800	-.002576	-31627.3022	-1083.4527	.0001308	604.7925	140.8765
222.525	-.002355	-33306.5707	-849.9111	.0001256	609.8607	129.8964
224.250	-.002143	-34590.4015	-635.0461	.0001201	613.7598	119.2224
225.975	-.001941	-35534.7640	-438.3010	.0001144	616.5856	108.8879
227.700	-.001748	-36146.1463	-259.0655	.0001086	618.4309	98.9213
229.425	-.001566	-36462.2700	-96.6846	.0001028	619.3850	89.3465
231.150	-.001394	-36511.6183	49.5343	9.6880E-05	619.5339	80.1827
232.875	-.001232	-36321.4578	180.3136	9.1001E-05	618.9600	71.4454
234.600	-.001080	-35917.7923	296.3984	8.5170E-05	617.7417	63.1458
236.325	-.000938	-35325.3286	398.5507	7.9420E-05	615.9535	55.2917
238.050	-.000806	-34567.4521	487.5628	7.3778E-05	613.6662	47.8875
239.775	-.000683	-33666.2141	564.1519	6.8271E-05	610.9462	40.9347
241.500	-.000570	-32642.3261	629.1554	6.2918E-05	607.8559	34.4317
243.225	-.000466	-31515.1643	683.3257	5.7740E-05	604.4541	28.3745
244.950	-.000371	-30302.7808	727.4264	5.2750E-05	600.7949	22.7568
246.675	-.000284	-29021.9220	762.2086	4.7962E-05	596.9292	17.5704
248.400	-.000206	-27680.0530	788.4072	4.3384E-05	592.9034	12.8048
250.125	-.000135	-26315.3878	806.7381	3.9025E-05	588.7606	8.4484
251.850	-7.10E-05	-24926.9238	817.8958	3.4890E-05	584.5398	4.4880
253.575	-1.43E-05	-23504.4808	822.5507	3.0981E-05	580.2769	.9090891
255.300	3.59E-05	-22086.7436	821.3480	2.7301E-05	576.0041	-2.3036
257.025	7.99E-05	-20679.3073	814.9053	2.3849E-05	571.7503	-5.1662
258.750	.000118	-19284.7255	803.8120	2.0623E-05	567.5413	-7.6956
260.475	.000151	-17912.5596	788.6280	1.7621E-05	563.3999	-9.9090
262.200	.000179	-16569.4304	769.8831	1.4838E-05	559.3462	-11.0241
263.925	.000202	-15261.0701	748.0767	1.2268E-05	555.3974	-13.4587
265.650	.000221	-13992.3753	723.6773	9.9072E-06	551.5684	-14.8305
267.375	.000236	-12767.4598	697.1227	7.7472E-06	547.8714	-15.9574
269.100	.000248	-11589.7075	668.8203	5.7812E-06	544.3169	-16.8570
270.825	.000256	-10461.8248	639.1471	4.0013E-06	540.9128	-17.5467
272.550	.000262	-9385.8925	608.4503	2.3992E-06	537.6655	-18.0436
274.275	.000265	-8363.4161	578.0844	9.6657E-07	534.5796	-18.2357
276.000	.000265	-7389.0413	547.4011	-3.0492E-07	531.6388	-20.2668
277.725	.000264	-6474.7878	518.4099	-1.4240E-06	528.8795	-20.3026
279.450	.000260	-5620.7849	477.4793	-2.4003E-06	526.3020	-20.1966
281.175	.000255	-4826.7380	442.8405	-3.2436E-06	523.9055	-19.9643
282.900	.000249	-4091.9779	408.6988	-3.9635E-06	521.6879	-19.6203
284.625	.000242	-3415.4974	375.2347	-4.5694E-06	519.6462	-19.1786
286.350	.000233	-2795.9995	342.6057	-5.0708E-06	517.7765	-18.6521
288.075	.000224	-2231.9332	310.9474	-5.4767E-06	516.0741	-18.0531
289.800	.000214	-1721.5303	280.3752	-5.7958E-06	514.5336	-17.3930
291.525	.000204	-1262.0393	250.9853	-6.0367E-06	513.1492	-16.6822
293.250	.000194	-853.7567	222.9560	-6.2075E-06	511.9146	-15.9305
294.975	.000183	-492.0559	196.0527	-6.3161E-06	510.8229	-15.1467
296.700	.000172	-175.4138	170.6215	-6.3700E-06	509.8673	-14.3387
298.425	.000161	98.5661	146.5987	-6.3762E-06	509.0353	-13.5138
300.150	.000150	332.3314	124.0080	-6.3414E-06	510.3409	-12.6763
301.875	.000139	528.3626	102.8629	-6.2720E-06	510.9325	-11.8378
303.600	.000128	689.1559	83.1678	-6.1737E-06	511.4178	-10.9971
305.325	.000118	817.2086	64.9195	-6.0521E-06	511.8043	-10.1604
307.050	.000107	915.0074	48.1081	-5.9123E-06	512.0995	-9.3311
308.775	9.72E-05	985.0173	32.7284	-5.7589E-06	512.3107	-8.5120
310.500	8.74E-05	1029.6739	18.7309	-5.5963E-06	512.4455	-7.7053
312.225	7.79E-05	1051.3766	6.1230	-5.4283E-06	512.5110	-6.9126
313.950	6.87E-05	1052.4837	-5.1304	-5.2585E-06	512.5148	-6.1348
315.675	5.97E-05	1035.3096	-15.0555	-5.0900E-06	512.4625	-5.3726
317.400	5.11E-05	1002.1226	-23.6793	-4.9255E-06	512.3624	-4.6260
319.125	4.28E-05	955.1452	-31.0285	-4.7675E-06	512.2206	-3.8947
320.850	3.47E-05	896.5547	-37.1287	-4.6181E-06	512.0430	-3.1780
322.575	2.68E-05	828.4851	-42.0043	-4.4788E-06	511.8383	-2.4748
324.300	1.92E-05	753.0305	-45.6775	-4.3512E-06	511.6106	-1.7839
326.025	1.18E-05	672.2469	-48.1680	-4.2361E-06	511.3668	-1.1036
327.750	4.60E-06	588.1664	-49.4927	-4.1344E-06	511.1130	-.4322713
329.475	-2.45E-06	502.7829	-49.6654	-4.0463E-06	510.8553	.2320486
331.200	-9.36E-06	418.0773	-48.6965	-3.9720E-06	510.5987	.8913090
332.925	-1.62E-05	336.0134	-46.5930	-3.9111E-06	510.3520	1.5475
334.650	-2.29E-05	256.5460	-43.3584	-3.8632E-06	510.1182	2.2027
336.375	-2.95E-05	187.6264	-38.9929	-3.8271E-06	509.9041	2.8587
338.100	-3.61E-05	125.2086	-33.4935	-3.8019E-06	509.7158	3.5175
339.825	-4.26E-05	73.2544	-26.8540	-3.7858E-06	509.5590	4.1805
341.550	-4.90E-05	33.7378	-19.0660	-3.7772E-06	509.4397	4.8491
343.275	-5.56E-05	8.6495	-10.1187	-3.7730E-06	509.3640	5.5245
345.000	-6.21E-05	0.0000	0.0000	-3.7731E-06	509.3279	6.2073

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00000444
Maximum bending moment	=	-1248877. lbs-in
Maximum shear force	=	32182.49778 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	=	3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

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In	in	lbs-in	lbs	Rad.	lbs/in**2	lbs/in
0.000	.250000	-1248877.	32182.4978	0.0000	4278.5032	-307.9537
1.725	.249826	-1193809.	31645.6668	-.0001972	4112.3032	-311.1035
3.450	.249320	-1139637.	31106.5651	-.0003855	3948.8868	-314.1475
5.175	.248496	-1086372.	30562.1255	-.0005652	3788.1256	-317.0869
6.900	.247370	-1034022.	30012.7049	-.0007363	3630.1298	-319.9225
8.625	.245956	-982595.	29458.4817	-.0008991	3474.9290	-322.6552
10.350	.244268	-932111.	28899.6328	-.0010537	3322.5515	-325.2856
12.075	.242321	-882568.	28336.3340	-.0012001	3173.0249	-327.8145
13.800	.240127	-833978.	27768.7602	-.0013387	3026.3755	-330.2421
15.525	.237702	-786350.	27197.0857	-.0014695	2882.6288	-332.5689
17.250	.235058	-739692.	26621.4843	-.0015927	2741.8094	-334.7951
18.975	.232207	-694012.	26042.1292	-.0017084	2603.9408	-336.9209
20.700	.229164	-649316.	25459.1935	-.0018168	2469.0455	-338.9465
22.425	.225939	-605613.	24872.8501	-.0019181	2337.1450	-340.8719
24.150	.222546	-562910.	24283.2718	-.0020124	2208.2600	-342.6971
25.875	.218996	-521211.	23690.6315	-.0020999	2082.4102	-344.4220
27.600	.215302	-480525.	23095.1023	-.0021808	1959.6140	-346.0466
29.325	.211473	-440856.	22496.8575	-.0022552	1839.8893	-347.5706
31.050	.207521	-402210.	21896.0707	-.0023232	1723.2527	-348.9938
32.775	.203458	-364593.	21292.9161	-.0023851	1609.7199	-350.3160
34.500	.199293	-328009.	20687.5680	-.0024410	1499.3056	-351.5368
36.225	.195036	-292463.	20082.6374	-.0024911	1392.0236	-349.8321
37.950	.190698	-257951.	19480.0687	-.0025355	1287.0612	-347.8707
39.675	.186289	-224467.	18882.5412	-.0025745	1186.8034	-345.8423
41.400	.181816	-192007.	18287.7695	-.0026081	1088.8346	-343.7480
43.125	.177291	-160564.	17696.6664	-.0026365	993.9384	-341.5890
44.850	.172720	-130134.	17109.3426	-.0026600	902.0978	-339.3662
46.575	.168114	-100711.	16525.9071	-.0026786	813.2951	-337.0808
48.300	.163478	-72288.3534	15946.4673	-.0026926	727.5120	-334.7335
50.025	.158824	-44859.7864	15371.1291	-.0027021	644.7296	-332.3253
51.750	.154157	-18418.9705	14799.9970	-.0027072	564.9283	-329.8568
53.475	.149485	7040.7769	14233.1743	-.0027081	530.5877	-327.3289
55.200	.144814	31526.3397	13670.7631	-.0027050	604.4078	-324.7421
56.925	.140152	55044.8018	13112.8644	-.0026980	675.4691	-322.0970
58.650	.135506	77603.4415	12559.5784	-.0026873	743.5535	-319.3941
60.375	.130881	99209.7452	12011.0043	-.0026730	808.7637	-316.6338
62.100	.126284	119871.	11467.2408	-.0026553	871.1227	-313.8166
63.825	.121721	139596.	10928.3858	-.0026344	930.6544	-310.9427
65.550	.117196	158392.	10394.5370	-.0026103	987.3830	-308.0124
67.275	.112715	176260.	9865.7915	-.0025833	1041.3334	-305.0258
69.000	.108283	193231.	9342.2469	-.0025535	1092.5312	-301.9831
70.725	.103905	209291.	8823.9984	-.0025210	1141.0022	-298.8841
72.450	.099586	224457.	8311.1446	-.0024860	1186.7733	-295.7290
74.175	.095329	238737.	7803.7821	-.0024486	1229.8715	-292.5174
75.900	.091138	252140.	7302.0085	-.0024090	1270.3246	-289.2491
77.625	.087018	264677.	6805.9218	-.0023673	1308.1610	-285.9239
79.350	.082971	276356.	6315.6209	-.0023236	1343.4095	-282.5411
81.075	.079001	287187.	5831.2052	-.0022781	1376.0997	-279.1002
82.800	.075112	297181.	5352.7757	-.0022309	1406.2616	-275.6005
84.525	.071305	306347.	4880.4348	-.0021822	1433.9260	-272.0411
86.250	.067583	314696.	4414.2862	-.0021321	1459.1241	-268.4210
87.975	.063949	322238.	3954.4359	-.0020807	1481.8877	-264.7388
89.700	.060405	328985.	3500.9921	-.0020281	1502.2494	-260.9932
91.425	.056952	334946.	3054.0656	-.0019745	1520.2423	-257.1824
93.150	.053593	340134.	2613.7706	-.0019200	1535.9001	-253.3045
94.875	.050328	344560.	2180.2248	-.0018648	1549.2574	-249.3572
96.600	.047159	348235.	1753.5503	-.0018088	1560.3492	-245.3378
98.325	.044087	351171.	1333.8741	-.0017524	1569.2113	-241.2433
100.050	.041113	353381.	921.3290	-.0016955	1575.8803	-237.0699
101.775	.038238	354876.	516.0546	-.0016384	1580.3935	-232.8135
103.500	.035461	355670.	118.1983	-.0015810	1582.7890	-228.4692
105.225	.032783	355775.	-272.0833	-.0015236	1583.1058	-224.0311
106.950	.030205	355205.	-654.6224	-.0014662	1581.3838	-219.4925
108.675	.027725	353972.	-1029.2307	-.0014089	1577.6636	-214.8452
110.400	.025344	352091.	-1395.7361	-.0013520	1571.9872	-210.0794
112.125	.023061	349576.	-1753.9002	-.0012953	1564.3975	-205.1834
113.850	.020875	346443.	-2103.4943	-.0012391	1554.9386	-200.1430
115.575	.018786	342704.	-2444.2538	-.0011835	1543.6561	-194.9406
117.300	.016792	338377.	-2775.8806	-.0011285	1530.5970	-189.5542
119.025	.014892	333478.	-3098.0335	-.0010743	1515.8099	-183.9564
120.750	.013086	328023.	-3410.3268	-.0010209	1499.3455	-178.1123
122.475	.011370	322029.	-3712.2640	-.0009684	1481.2568	-171.9724
124.200	.009745	315516.	-4003.3135	-.0009170	1461.5892	-165.4763
125.925	.008207	308502.	-4282.7734	-.0008666	1440.4317	-158.5351
127.650	.006755	301005.	-4549.7655	-.0008174	1417.8171	-151.0209
129.375	.005387	293060.	-4760.4223	-.0007695	1393.8234	-93.2189
131.100	.004100	284825.	-4910.9816	-.0007228	1360.9704	-81.3426
132.825	.002893	276341.	-5040.0887	-.0006775	1343.3653	-60.3469
134.550	.001763	267647.	-5145.0823	-.0006336	1317.1255	-53.3649
136.275	.000707	258787.	-5220.3593	-.0005911	1290.3860	-33.8928
138.000	-.000277	249820.	-5231.5679	-.0005501	1263.3226	20.8974
139.725	-.001191	240909.	-5175.8533	-.0005105	1236.4279	43.6992
141.450	-.002038	232122.	-5088.8073	-.0004723	1209.9075	57.2230
143.175	-.002820	223489.	-4981.3664	-.0004355	1183.0834	67.3452
144.900	-.003540	215072.	-4858.1872	-.0004001	1158.4473	75.4713
146.625	-.004200	206863.	-4722.1793	-.0003660	1133.6726	82.2189
148.350	-.004803	198894.	-4575.4284	-.0003333	1109.6207	87.9271
150.075	-.005350	191181.	-4419.5452	-.0003018	1086.3434	92.8071
151.800	-.005844	183740.	-4255.8350	-.0002715	1063.9851	97.0018
153.525	-.006287	176583.	-4153.2703	-.0002425	1042.2841	21.9138
155.250	-.006681	169687.	-4114.0370	-.0002145	1020.8665	23.5740
156.975	-.007027	162456.	-4072.0561	-.0001877	999.6478	25.0996
158.700	-.007328	155496.	-4027.5588	-.0001621	978.6423	26.4915
160.425	-.007586	148611.	-3980.7748	-.0001375	957.8629	27.7509
162.150	-.007803	141805.	-3931.9310	-.0001141	937.3214	28.8795
163.875	-.007980	135082.	-3881.2519	-9.1728E-05	917.0286	29.8789
165.600	-.008119	128443.	-3828.9585	-7.0457E-05	896.9940	30.7511
167.325	-.008223	121894.	-3775.2685	-5.0251E-05	877.2257	31.4983
169.050	-.008293	115434.	-3720.3952	-3.1085E-05	857.7312	32.1229
170.775	-.008330	109068.	-3664.5478	-1.2974E-05	838.5163	32.6277
172.500	-.008337	102796.	-3607.9306	4.1274E-06	819.5863	33.0154
174.225	-.008316	96619.1629	-3550.7429	2.0224E-05	800.9450	33.2892
175.950	-.008268	90539.3089	-3493.1785	3.5330E-05	782.5953	33.4522
177.675	-.008194	84556.7269	-3435.4253	4.9464E-05	764.5392	33.5080
179.400	-.008097	78671.7330	-3377.6653	6.2639E-05	746.7777	33.4601
181.125	-.007978	72884.3321	-3320.0741	7.4872E-05	729.3107	33.3124
182.850	-.007839	67194.2297	-3262.8203	8.6179E-05	712.1373	33.0688
184.575	-.007681	61600.8435	-3206.0660	9.6575E-05	695.2559	32.7334
186.300	-.007508	56103.3157	-3149.9655	.0001061	678.6638	32.3106
188.025	-.007315	50700.5260	-3094.6662	.0001147	662.3576	31.8047
189.750	-.007110	45391.1042	-3040.3071	.0001225	646.3331	31.2203
191.475	-.006892	40173.4449	-2987.0196	.0001294	630.5857	30.5623
193.200	-.006664	35045.7205	-2934.9267	.0001354	615.1097	29.8353

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 213.000 in
Distance from top of pile to bottom of layer = 273.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 273.000 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 105.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-99.00	.07234
2	129.00	.07234
3	129.00	.03623
4	153.00	.03623
5	153.00	.03623
6	213.00	.03623
7	213.00	.03333
8	273.00	.03333
9	273.00	.03622
10	450.00	.03622

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-99.000	6.25000	.00	------	------
2	129.000	6.25000	.00	------	------
3	129.000	6.25000	.00	------	------
4	153.000	6.25000	.00	------	------
5	153.000	.00000	30.00	------	------
6	213.000	.00000	30.00	------	------
7	213.000	5.56000	25.00	------	------
8	273.000	5.56000	25.00	------	------
9	273.000	3.47000	32.00	------	------
10	450.000	3.47000	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 = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = .250 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.000 lbs

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

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = .250000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 90000.000 lbs

Depth X	Deflect. y	Moment M	Shear V	Slope S	Total Stress	Soil Res p

LPILE Plus for Windows, Version 5.0 (5.0.11)

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

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\B2B3\
Name of input data file: B2f6mm.lpd
Name of output file: B2f6mm.lpo
Name of plot output file: B2f6mm.lpp
Name of runtime file: B2f6mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 12:59:40

Problem Title

B2-B3, fixed head, 0.25 in

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 includes automatic computation of pile-top deflection vs. pile embedment length
- 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 = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 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 = 345.00 in
Depth of ground surface below top of pile = -99.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is stiff clay without free water
Distance from top of pile to top of layer = -99.000 in
Distance from top of pile to bottom of layer = 129.000 in

Layer 2 is stiff clay with water-induced erosion
Distance from top of pile to top of layer = 129.000 in
Distance from top of pile to bottom of layer = 153.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 153.000 in
Distance from top of pile to bottom of layer = 213.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement 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 = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 38000.	M= 0.000	90000.0000	.9960326	1079051.	38000.0000

Pile-head Deflection vs. Pile Length

Boundary Condition Type 1, Shear and Moment

Shear = 38000. lbs
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
210.000	.99683260	1079051.	38000.00000
199.500	.99651354	1079058.	38000.00000
189.000	.99686525	1079014.	38000.00000
178.500	.99668206	1078502.	38000.00000
168.000	1.00512460	1076531.	38000.00000
157.500	1.02360803	1071296.	38000.00000
147.000	1.08156806	1056796.	38000.00000
136.500	1.24111123	1025064.	38000.00000
126.000	1.59211583	979363.95552	38000.00000
115.500	2.49672730	925243.23618	38000.00001

The analysis ended normally.

114.450	-.026966	327261.	-13382.9963	-.0006751	2484.7558	369.9128
115.500	-.027641	313473.	-12993.3835	-.0006121	2401.5316	372.2067
116.550	-.026251	300090.	-12601.4964	-.0005518	2320.7492	374.2449
117.600	-.028808	287115.	-12207.5925	-.0004941	2242.4238	376.0484
118.650	-.029289	274548.	-11811.9085	-.0004389	2166.5688	377.6354
119.700	-.029722	262393.	-11414.6633	-.0003861	2093.1961	379.0222
120.750	-.030100	250650.	-11016.0595	-.0003357	2022.3164	380.2230
121.800	-.030427	239322.	-10616.2860	-.0002876	1953.9390	381.2506
122.850	-.030704	228410.	-10215.5183	-.0002416	1888.0719	382.1164
123.900	-.030934	217915.	-9813.9211	-.0001978	1824.7221	382.8306
124.950	-.031119	207838.	-9411.6487	-.0001559	1763.8957	383.4024
126.000	-.031262	198180.	-9008.8464	-.0001160	1705.5974	383.8401
127.050	-.031363	188942.	-8605.6510	-7.7994E-05	1648.8314	384.1511
128.100	-.031425	180123.	-8202.1920	-4.1728E-05	1596.6007	384.3422
129.150	-.031451	171725.	-7798.2263	-1.1543E-06	1545.9076	225.1164
130.200	-.031440	163572.	-7645.8732	2.5793E-05	1496.6933	225.0799
131.250	-.031396	155664.	-7489.6219	5.7163E-05	1448.9586	224.9226
132.300	-.031320	148001.	-7173.5963	8.7002E-05	1402.7033	224.6499
133.350	-.031214	140583.	-6937.9148	.0001154	1357.9264	224.2673
134.400	-.031078	133409.	-6702.6903	.0001423	1314.6263	223.7795
135.450	-.030915	126480.	-6468.0305	.0001678	1272.8004	223.1914
136.500	-.030726	119795.	-6234.0388	.0001920	1232.4457	222.5072
137.550	-.030512	113353.	-6000.8137	.0002149	1193.5584	221.7311
138.600	-.030274	107153.	-5768.4490	.0002366	1156.1339	220.8669
139.650	-.030015	101194.	-5537.0375	.0002571	1120.1672	219.9184
140.700	-.029734	95476.1740	-5306.5637	.0002764	1085.6528	218.0889
141.750	-.029434	89997.8336	-5077.4116	.0002946	1052.5843	217.7817
142.800	-.029116	84757.9259	-4849.3614	.0003118	1020.9551	216.5997
143.850	-.028780	79755.2454	-4622.5900	.0003280	990.7579	215.3458
144.900	-.028427	74988.5024	-4397.1716	.0003432	961.9848	214.0227
145.950	-.028059	70456.3267	-4173.1775	.0003575	934.6276	212.6326
147.000	-.027676	66157.2699	-3950.6769	.0003709	908.6775	211.1780
148.050	-.027280	62089.8083	-3729.7365	.0003835	884.1254	209.6608
149.100	-.026871	58252.3447	-3510.4210	.0003953	860.9617	208.0830
150.150	-.026450	54643.2107	-3292.7932	.0004064	839.1762	206.4462
151.200	-.026018	51260.6688	-3076.9141	.0004168	818.7584	204.7520
152.250	-.025575	48102.9140	-2862.8435	.0004266	799.6975	203.0016
153.300	-.025122	45168.0750	-2702.6837	.0004357	781.9822	102.0646
154.350	-.024660	42344.9235	-2596.1619	.0004443	764.9410	100.8242
155.400	-.024189	39632.1552	-2490.9636	.0004524	748.5662	99.5435
156.450	-.023710	37028.3976	-2387.1513	.0004599	732.8493	98.1942
157.500	-.023223	34532.2114	-2284.7856	.0004670	717.7818	96.7879
158.550	-.022729	32142.0926	-2183.9257	.0004735	703.3545	95.3262
159.600	-.022228	29856.4740	-2084.6289	.0004796	689.5580	93.8106
160.650	-.021722	27673.7271	-1986.9510	.0004853	676.3825	92.2425
161.700	-.021209	25592.1637	-1890.9463	.0004905	663.8177	90.6235
162.750	-.020692	23610.0373	-1796.6677	.0004953	651.8532	88.9548
163.800	-.020169	21725.5451	-1704.1666	.0004998	640.4780	87.2379
164.850	-.019642	19936.8291	-1613.4929	.0005039	629.6809	85.4740
165.900	-.019111	18241.9780	-1524.6952	.0005076	619.4504	83.6644
166.950	-.018576	16639.0281	-1437.8209	.0005111	609.7747	81.8104
168.000	-.018038	15125.9653	-1352.9160	.0005142	600.6415	79.9131
169.050	-.017496	13700.7257	-1270.0254	.0005170	592.0384	77.9737
170.100	-.016952	12361.1977	-1189.1929	.0005196	583.9527	75.9931
171.150	-.016405	11105.2225	-1110.4610	.0005219	576.3714	73.9725
172.200	-.015856	9930.5957	-1033.8712	.0005239	569.2811	71.9127
173.250	-.015305	8835.0682	-959.4643	.0005258	562.6683	69.8148
174.300	-.014752	7816.3474	-887.2798	.0005274	556.5190	67.6796
175.350	-.014197	6872.0981	-817.3564	.0005289	550.8193	65.5079
176.400	-.013641	5999.9437	-749.7320	.0005301	545.5548	63.3005
177.450	-.013084	5197.4665	-684.4438	.0005312	540.7109	61.0581
178.500	-.012526	4462.2094	-621.5280	.0005322	536.2727	58.7814
179.550	-.011967	3791.6759	-561.0204	.0005330	532.2252	56.4711
180.600	-.011407	3183.3315	-502.9560	.0005337	528.5531	54.1277
181.650	-.010846	2634.6038	-447.3693	.0005342	525.2409	51.7518
182.700	-.010285	2142.8835	-394.2940	.0005347	522.2728	49.3439
183.750	-.009723	1705.5250	-343.7637	.0005351	519.6328	46.9043
184.800	-.009161	1319.8469	-295.8114	.0005354	517.3047	44.4335
185.850	-.008599	983.1322	-250.4695	.0005356	515.2723	41.9320
186.900	-.008036	692.6292	-207.7703	.0005358	513.5187	39.3998
187.950	-.007474	445.5518	-167.7457	.0005359	512.0273	36.8375
189.000	-.006911	239.0793	-130.4273	.0005360	510.7810	34.2452
190.050	-.006348	70.3578	-95.0465	.0005360	509.7626	31.6230
191.100	-.005785	-63.5007	-64.0345	.0005360	509.7212	28.9713
192.150	-.005222	-165.4172	-35.0222	.0005360	510.3364	26.2901
193.200	-.004660	-238.3457	-8.8407	.0005359	510.7766	23.5795
194.250	-.004097	-285.2735	14.4793	.0005359	511.0598	20.8396
195.300	-.003534	-309.2204	34.9070	.0005358	511.2044	18.0704
196.350	-.002972	-313.2308	52.4119	.0005358	511.2286	15.2721
197.400	-.002409	-300.4139	66.9631	.0005357	511.1512	12.4445
198.450	-.001847	-273.8634	78.5301	.0005356	510.9910	9.5878
199.500	-.001284	-236.7372	87.0821	.0005356	510.7669	6.7018
200.550	-.000722	-192.2179	92.5885	.0005356	510.4981	3.7865
201.600	-.000160	-143.5204	95.0184	.0005355	510.2042	.8419642
202.650	.000403	-93.8919	94.3412	.0005355	509.9046	-2.1320
203.700	.000965	-46.6122	90.5259	.0005355	509.6192	-5.1353
204.750	.001527	-4.9933	83.5415	.0005355	509.3680	-8.1602
205.800	.002089	27.6202	73.3572	.0005355	509.5046	-11.2305
206.850	.002652	47.8517	59.9420	.0005355	509.6267	-14.3224
207.900	.003214	52.2918	43.2647	.0005355	509.6535	-17.4438
208.950	.003776	37.4992	23.2944	.0005355	509.5642	-20.5949
210.000	.004338	0.0000	0.0000	.0005355	509.3379	-23.7755

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.99683260 in
Computed slope at pile head	=	-.01680133
Maximum bending moment	=	1079051. lbs-in
Maximum shear force	=	38000.00000 lbs
Depth of maximum bending moment	=	55.65000000 in
Depth of maximum shear force	=	0.00000 in
Number of iterations	=	32
Number of zero deflection points	=	2

Summary of Pile-Head Response(s)