GEOTECHNICAL ENGINEERING INVESTIGATION
Proposed Interstate 69 Design/Build Project
Interstate 64 to State Road 68
Gibson and Warrick Counties, Indiana
INDOT Project No. IM-069-0 (004)
INDOT Des. No. 0500436
ATC Project No. 86.00481.0181

Prepared For:

American Structurepoint, Inc.
7260 Shadeland Station
Indianapolis, Indiana 46256-3917

Attention: Mr. Kevin G. Jasinski, P.E.

April 13, 2007

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April 13, 2007

American Structurepoint, Inc.
7260 Shadeland Station
Indianapolis, Indiana 46256-3917

Attn: Mr. Kevin G. Jasinski, P.E.

Re: Geotechnical Engineering Investigation
Proposed Interstate 69 Design/Build Project
Interstate 64 to State Route 68
Gibson and Warrick Counties, Indiana
INDOT Project No. IM-069-0 (004)
INDOT Des. No. 0500436
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Dear Mr. Jasinski:

Submitted herewith is the report of our geotechnical engineering investigation for the referenced project. This study was authorized in accordance with our Proposal-Agreement No. PE-06-0183 (Revised) dated November 27, 2006.

This report contains the results of our field and laboratory testing program, which is in general accordance with current INDOT standards, an engineering interpretation of this data with respect to the available project characteristics and recommendations to aid in the design and construction of the earth-connected phases of this project.

We appreciate the opportunity to be of service to you on this project. If we can be of any further assistance, or if you have any questions regarding this report, please do not hesitate to contact either of the undersigned.

Sincerely,

ATC Associates Inc.

Shawn M. Marcum, P.E.
Senior Project Engineer

THOMAS JAMES STRUEWING
No. 21494

Thomas J. Struewing, P.E.
Principal Engineer

Copies: (3) American Structurepoint, Inc.; Attn: Mr. Kevin G. Jasinski, P.E.
(10) INDOT Office of Geotechnical Engineering; Attn: Mr. Athar A. Kahn, P.E.

SUMMARY OF GEOTECHNICAL ENGINEERING INVESTIGATION

Proposed Interstate 69 Design/Build Project
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Gibson and Warrick Counties, Indiana
INDOT Project No. IM-069-0 (004)
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The following information is a brief summary of the findings and recommendations that are presented in detail in the report for this project and is solely for the purpose of overview. The report should be read in its entirety prior to implementation of the design and construction recommendations for this project. The Executive Summary omits many details, any of which could be crucial to the proper implementation of the recommendations, and the information contained in the Executive Summary should not be used for design and construction of this project.

GENERAL INFORMATION

Plans are being developed by American Structurepoint, Inc. for the construction of a new section of Interstate 69 in Gibson and Warrick Counties, Indiana. The proposed project will begin at Station 1502+42 Line "A", which is at the existing interchange of Interstate 64 and Interstate 164, and will end at Station 1593+65 Line "A", which is just north of State Road 68. The project will also include the realignment of approximately 2,900 ft of State Road 57 and 2,470 ft of Nobles Chapel Road and the construction of ramps from Interstate 69 to and from Interstate 64 and State Road 68. A two-span bridge will be constructed to carry the new alignment of Nobles Chapel Road over Interstate 69 and a new three-span bridge will be constructed to carry State Road 68 over Interstate 69. Mechanically stabilized earth walls will be used to provide grade separation at the end bents of the Nobles Chapel Road Bridge over Interstate 69. Three three-sided, pre-cast concrete culvert structures will be installed for stream crossings (two for the mainline of Interstate 69 and one for the ramp from northbound Interstate 69 to State Road 68). Pre-cast concrete culverts will also be constructed for stream crossings for the westbound Interstate 64 ramp to northbound Interstate 69 and for the on-ramp from State Road 68 to southbound Interstate 69.

PROPOSED BRIDGE STRUCTURES

Considering the project characteristics and the subsurface conditions encountered in the test borings that were drilled at the proposed bridge locations, it is recommended that deep foundations (steel H-piles) be used to support the proposed end bents for Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69). Alternatively, since the leveling pad for the MSE walls for the end bents for this structure will be at or below El 442, it may be desirable to support the end bents of this bridge on spread footings that bear on competent bedrock. It is recommended that deep foundations (steel H-piles) be used to support the proposed end bents and interior piers for Bridge Structure No. 4 (State Road 68 over Interstate 69). Recommendations for use in design of 70 ton and 100 ton piles as well as spread footings have been developed and are included in the associated bridge sections.

PROPOSED PRE-CAST, THREE-SIDED CONCRETE CULVERT STRUCTURES

Five stream crossing structures are currently planned to be pre-cast, three-sided, reinforced concrete culverts. Specific design recommendations for spread footings bearing on bedrock and in the natural cohesive soils are presented in the associated sections.

PROPOSED RETAINING WALLS

There are two locations where mechanically stabilized earth (MSE) retaining walls are proposed for this project, one for each bridge abutment of Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69). It is assumed that the MSE walls will bear at or below about El 442. The MSE wall will vary in height from about 42 ft at Bent No. 1 to about 32 ft at Bent No. 3. It will be necessary to undercut all soils to expose competent bedrock beneath the entire MSE wall section at both end bent locations of Structure No. 1. Our calculations indicate that an allowable bearing pressure of 7,000 lbs/sq.ft (based on a factor of safety of 2.5 for static conditions) can be used for the design of the MSE walls that are planned at the end bents for Bridge Structure No. 1 provided that the MSE walls bear directly on competent bedrock, or on structure backfill or lean concrete that is placed on competent bedrock. Based upon our calculations, it will be necessary to use a reinforcement length that is at least 0.7 times the height of the wall (i.e., L/H = 0.7).

EMBANKMENTS

The project is currently designed with cut slopes and conventional earth embankments with sideslopes that are 3 (horizontal) to 1 (vertical), or flatter. The proposed embankment cross-sections at Station 244+50 Line "D", Station 248+00 Line "D", Station 17+00 Ramp "C" and Station 20+00 Ramp "D" were analyzed to determined the estimated factors of safety relative to slope stability for end-of-construction, long-term and earthquake conditions. Based upon the results of the slope stability analyses performed, it is recommended that the sideslopes of the new embankments be 3 (horizontal) to 1 (vertical), or flatter. However, due to a zone of very soft clay in conjunction with the proposed embankment height between about Station 241+00 to 244+75 on Line D (i.e., the west approach embankment for the State Road 68 bridge over Interstate 69), special measures will be required to modify or improve the subgrade soils in this zone in order to assure suitable factors of safety relative to global stability and also to limit and accelerate settlement of the embankment. Based on settlement calculations for the cross-section near Station 244+30, approximately 11 in. of settlement would be expected to occur due to the weight of the embankment fill, if modification of the foundation soils was not performed. It is our opinion, based on the properties of the soils underlying the proposed embankment, that rammed aggregate piers (such as "Geopiers" or "Vibro Piers", or equivalent systems) should be installed to modify and improve the natural soils so that suitable factors of safety relative to slope stability are assured and that settlement is limited.

HIGH MAST LIGHT RECOMMENDATIONS

Lateral foundation analyses were performed using the computer program LPILE Plus 3.0 for selected representative high mast light tower locations based on the INDOT standard high mast light drilled shaft foundation. The analyses indicate that all of the proposed high mast lights can be supported on the INDOT standard foundation, except for the towers designated herein as TL-20 and TL-21, which our analyses indicate should extend to bear on bedrock at depths of 25 ft and 35 ft, respectively. The analyses indicate that the lateral deflection at the top of the drilled shaft foundations will not exceed about 1 in. under the assumed loading conditions.

ROADWAY RECOMMENDATIONS

Based on the general consistency of the soils that were encountered in the test borings and our experience on other projects with similar soil conditions, it is anticipated that significant subgrade problems may be encountered in much of the pavement areas that are in cut or at-grade sections. It is suggested that an undistributed quantity of chemical modification be included in the contract to be used where determined to be necessary to provide a suitable foundation for the pavement. Based upon the soil types that were encountered in the test borings, the currently planned cross-sections and the expected schedule for this project, it is possible that approximately 75 percent of the subgrade could require chemical modification.

It is recommended that Type IA Subgrade Treatment in accordance with INDOT Standard Specifications Section 207.04 be used for the Interstate 69 mainline and ramps, State Road 68 and State Road 57 pavement subgrade in conjunction with a resilient modulus value of 6,000 lbs/sq.in. It is recommended that Type III Subgrade Treatment be used for the realignment of Nobles Chapel Road, Old Nobles Chapel Road, Old State Road 57 and the local access road in conjunction with a resilient modulus value of 3,300 lbs/sq.in.

Adequate drainage should be provided at the site to minimize any increase in moisture content of the subgrade soils. Adequate drainage should be provided at the site with outlets at regular intervals to minimize any increase in moisture content of the subgrade soils. Subsurface drains are recommended for this project. Filter fabric will be needed due to the silty nature of the subgrade soils. The drainage ditches should be cut prior to any other construction work beginning on this project. This will help to reduce the moisture within the subgrade soils, which are inherently wet.

Report Prepared By:	Report Reviewed By:
Shawn M. Marcum, P.E.	Thomas J. Struewing, P.E.
Project Engineer	Principal Engineer

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1.0 INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the proposed roadway and bridge construction for a new section of Interstate 69 from Interstate 64 to State Road 68 in Gibson and Warrick Counties, Indiana (see Figure 1 in Appendix A). The proposed roadway alignment is shown on the Vicinity Map (see Figure 2 in Appendix A).

This investigation was performed to characterize and evaluate the suitability of the soils beneath the project site surface and to develop recommendations relative to pavement design, roadway subgrade treatment, support of the proposed fill sections and bridge foundations. The investigation consisted of an exploratory drilling and sampling program, laboratory testing of soil samples obtained from the test boring locations, engineering analyses and preparation of this report.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either express or implied. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

2.0 PROJECT DESCRIPTION

Plans are being developed by American Structurepoint, Inc. for the construction of a new section of Interstate 69 in Gibson and Warrick Counties, Indiana. The proposed project will begin at Station 1502+42 Line “A”, which is at the existing interchange of Interstate 64 and Interstate 164, and will end at Station 1593+65 Line “A”, which is just north of State Road 68. The project will also include the realignment of approximately 2,900 ft of State Road 57 and 2,470 ft of Nobles Chapel Road and the construction of ramps from Interstate 69 to and from Interstate 64 and State Road 68. A two-span bridge will be constructed to carry the new alignment of Nobles Chapel Road over Interstate 69 and a new three-span bridge will be constructed to carry State Road 68 over Interstate 69. Mechanically stabilized earth walls will be used to provide grade separation at the end bents of the Nobles Chapel Road Bridge over Interstate 69. Three three-sided, pre-cast concrete culvert structures will be installed for stream crossings (two for the mainline of Interstate 69 and one for the ramp from northbound Interstate 69 to State Road 68). Pre-cast concrete culverts will also be constructed for stream crossings for the westbound Interstate 64 ramp to northbound Interstate 69 and for the on-ramp from State Road 68 to southbound Interstate 69.

The following tables summarize the proposed roadway sections and the proposed bridge structures as currently planned:

SUMMMARY OF ROADWAY SEGMENTS

Roadway	Line	Begin Station	End Station	Length, ft
Interstate 69	A	1502+42	1593+65	9,123
State Road 68	D	230+70	262+60	3,190
State Road 57	PR-C	88+16	117+00	2,884
Old State Road 57	S-2-C	44+34	50+00	566
Nobles Chapel Road	S-2-A-PR	19+67	45+32	2,565
Old Nobles Chapel Road	T-1-A	19+66	23+00	334
Ramp - Interstate 64 Westbound to Interstate 69 Northbound	A-1	10+00	25+86	1,586
Ramp - Interstate 69 Southbound to Interstate 64 Westbound	B-1	14+00	29+45	1,545
Local Access Road off of State Road 68	LSR3	1+75	10+89	914
Ramp - State Road 68 to Interstate 69 Northbound	Ramp A	1+12	19+76	1,864
Ramp - Interstate 69 Northbound to State Road 68	Ramp B	5+01	22+11	1,710
Ramp - State Road 68 to Interstate 69 Southbound	Ramp C	1+12	19+92	1,880
Ramp - Interstate 69 Southbound to State Road 68	Ramp D	5+00	22+41	1,741

SUMMMARY OF BRIDGE STRUCTURES

Structure No.	Roadway	Location	Type of Structure
1	Nobles Chapel Road	Station 37+63 Line S-2-A-PR	Two-Span Bridge
2	Interstate 69	Station 1561+83 Line A	Three-sided pre-cast concrete culvert
3	Interstate 69	Station 1590+11 Line A	Three-sided pre-cast concrete culvert
4	State Road 68	Station 246+64 Line D	Three-span bridge
5	Ramp - Interstate 69 Northbound to State Road 68	Station 16+45 Ramp B	Three-sided pre-cast concrete culvert

Most of the mainline Interstate 69 alignment will require moderate cuts, generally less than about 15 ft deep, or is near the existing grade. There will be some fill areas where the embankments will generally be less than about 8 ft high, except north of about Station 1594+00 Line "A" (just north of State Road 68), which will require up to about 12 ft of fill. Fill heights of about 15 ft, 17 ft, 10 ft and 27 ft will be needed for Ramp A, Ramp B, Ramp C and Ramp D, respectively. Ramp B will also require a 17 ft cut and Ramp C will require cuts as deep as 15 ft. The approach embankments for the Nobles Chapel Road Bridge and the State Road 68 Bridge will be as high as about 24 ft and 27 ft, respectively.

3.0 PURPOSE AND SCOPE OF WORK

The purpose of this study was to determine the general subsurface conditions and characteristics of the proposed roadway alignment by drilling test borings and to evaluate these with respect to roadway construction and bridge structure support for the proposed project. In addition, the site has been evaluated with respect to potential construction problems and recommendations are included that address matters of earthwork and quality control during construction.

3.1 Field Investigation

The subsurface conditions for the proposed roadway and bridge construction for Interstate 69 project were investigated by ATC Associates Inc. (ATC) during the period of January 3, 2007 to January 25, 2007. Drilling was performed with all-terrain-vehicle and truck mounted drilling equipment using hollow-stem augers to advance the boreholes. Where split-spoon samples were taken, they were obtained by using standard penetration test (SPT) procedures (American Association of State Highway and Transportation Officials - AASHTO T 206), generally at 2.5 ft and 5.0 ft intervals at the locations indicated on the Test Boring Logs. The bedrock beneath the overburden soil was cored to depths of 5.0 to 13.7 ft below the auger refusal depths in selected borings and bedrock soundings were performed at the selected bridge locations.

Subsequent to drilling activities and obtaining 24-hour water level measurements at selected locations, each test borehole was backfilled in accordance with the specifications set forth by the INDOT document “Exhibit C” and the INDOT “Aquifer Protection Guidelines”.

The number, locations and depths of the borings were selected by ATC and most of the soil boring locations were staked in the field by Bernarndin Lochmueller & Associates, with the remaining boring locations staked by ATC. Bernarndin Lochmueller & Associates provided the majority of the ground surface elevations at the staked boring locations and the remaining ground surface elevations were estimated from roadway plans and cross-sections generated by American Structurepoint, Inc. The borings were drilled at the locations noted on the Test Borings Logs in Appendix B.

Logs of all borings, which show visual descriptions of all soil strata encountered using the AASHTO classification system, are included in Appendix B. Sampling information and other pertinent field data and observations are also included on the boring logs. In addition, a sheet defining the terms and symbols used on the logs and explaining the standard penetration test (SPT) procedure is provided immediately preceding the boring logs in Appendix B.

3.2 Laboratory Investigation

The disturbed soil samples were visually classified by an engineer. The soils were classified in accordance with the AASHTO Soil Classification System and the visual classification verified or modified based upon the results of laboratory tests. Final boring logs were subsequently prepared and are included in Appendix B. Soil index property tests including natural moisture content (AASHTO T265), grain size distribution and analyses (AASHTO T88), Atterberg limit determinations (AASHTO T89 and T90), organic content tests (AASHTO T267) and soil pH (AASHTO T200) were performed on representative samples. A resilient modulus test (AASHTO T307) was performed on a representative bag sample. Unconfined compressive strength tests (AASHTO T208) were performed on representative split-spoon and Shelby tube samples and a consolidation test (AASHTO T216) was performed on representative Shelby tube sample. The results of all laboratory tests are included on the boring logs in Appendix B and/or on respective plots or summary sheets in Appendix C and D.

4.0 GENERAL SITE CONDITIONS

4.1 Regional and Site Geology

The project site is located at the southern edge of the Indiana physiographic unit known as the Wabash Lowlands near the border of the Booneville Hills Section of the Indiana physiographic unit known as the Southern Hills and Lowlands Region. The Wabash Lowlands is described as an area of broad terraced valleys and low till covered hills and the Booneville Hills unit is described as an area of bedrock hills of moderate relief. According to geologic mapping, the area is underlain by the lower part of the Mcleansboro Bedrock Group consisting of Pennsylvanian age shale, sandstone and limestone and it appears that the bedrock surface varies from about 0 ft to 50 ft below the existing ground surface. The overburden deposits typically consist of silty clay loam, silty clay and silt.

4.2 Subsurface Conditions

The general subsurface conditions at the site were investigated by drilling eighty-five (85) test borings (sixty-one (61) roadway borings and twenty-four (24) structure borings) to depths ranging from 10.0 to 44.2 ft below the existing ground surface and drilling seven bedrock soundings. The subsurface conditions disclosed by the field investigation are summarized in the following paragraphs. Detailed descriptions of the subsurface conditions encountered in each test boring are presented on the Test Boring Logs in Appendix B. It should be noted that the stratification lines shown on the soil boring logs represent approximate transitions between material types. In-situ stratum changes could occur gradually or at slightly different depths and variations in the soil stratigraphy and ground water levels should be expected across this site. The consistencies of the cohesive soils and the densities of the granular soils were estimated based on the results of the standard penetration test (ASTM D-1586).

The roadway borings drilled for this project (RB-1 through RB-61) typically encountered medium stiff to stiff silty clay loam, silty clay and silt overlying weathered shale and sandstone bedrock. Softer zones were encountered throughout the site. An area of very moist, very soft silt was encountered in Borings Nos. RB-57, RB-58, RB-59 and RB-60, which are located north of State Road 68 and extends to depths varying from about 3.5 ft to 6.0 ft below the existing ground surface. Auger refusal was encountered on bedrock in about half of the borings and was encountered just below the ground surface in some borings and deeper than the termination depth of 30 ft in other borings.

The structure borings drilled for this project encountered similar subsurface conditions as described above. The bedrock surface in the structure test borings ranged from about 6.0 ft to 38.5 ft below the existing ground surface. The rock coring for the structures revealed weathered shale, sandstone and limestone bedrock below the overburden silty clay loam, silty clay and silt soils. Rock Quality Designations (RQD) values were calculated based on the condition of the cored bedrock samples and ranged from about 16 to 100 percent.

4.3 Ground Water Conditions

Ground water observations were made during drilling operations (by noting the depth of water on the drilling tools), in the open boreholes following withdrawal of the drilling augers and at 24 hours after the completion of drilling activities. Free ground water was noted in sixty-three (63) of the eighty-five (85) test borings drilled for this project, however; it should be noted that the 24-hour water level readings in many of the borings were influenced due to the introduction of water to facilitate the rock coring procedures and the cave depth of the borehole. Ground water was encountered as shallow as about 1.0 ft and as deep as about 21.0 ft. It appears that many of the 24-hour water level readings were affected by the wet weather conditions at the time of drilling.

It should be noted that short term ground water level readings are not necessarily a reliable indication of the ground water level and that fluctuations in the level of the ground water will occur due to variations in rainfall and other factors not evident at the time of our investigation. Water level readings were made in the drill holes at the times and under the conditions stated on the boring logs in Appendix B.

4.4 Seismic Consideration

Based on INDOT Design Manual Section 60-3.06, the project site lies within an area where the Acceleration Coefficient (A) is 0.10. As per Section 3 of AASHTO LRFD Bridge Design Specifications, 3rd Edition, 2004 and the 2006 Interim Revisions, Table 3.10.4-1, the seismic performance zone for an acceleration coefficient of 0.10 would be Seismic Zone 2. As per Section 3.10.5, it is our opinion that the subsurface materials encountered at the project site closely resemble Type I.

5.0 DESIGN RECOMMENDATIONS

The following bridge structure, roadway, earth embankment and retaining wall design recommendations have been developed on the basis of the previously described project characteristics (Section 2.0) and subsurface conditions (Section 4.0). If there is any change in these project criteria, including changes in the roadway alignments and profile grades, changes in structure type and locations (including the bridge end bent locations) or changes in embankment configurations or changes in seismic considerations, a review should be made by this office.

5.1 Bridge Structure Foundations

Considering the project characteristics and the subsurface conditions encountered in the test borings that were drilled at the proposed bridge locations, it is recommended that deep foundations (steel H-piles) be used to support the proposed end bents for Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69). Alternatively, since the leveling pad for the MSE walls for the end bents for this structure will be at or below El 442, it may be desirable to support the end bents of this bridge on spread footings that bear on competent bedrock. It appears that the bedrock surface is well above El 442 at the west end bent, however, it will likely be necessary to extend the footings well below El 442 (probably to El 430) at the east end bent location. The interior pier for Bridge Structure No. 1 can be supported on either a spread footing bearing on shale bedrock or on steel H-piles. It will likely be necessary to pre-core into the shale bedrock in order to attain the minimum 10 ft long piles as required for lateral stability since the shale bedrock will be relatively shallow below the proposed grade of the mainline Interstate 69 alignment at this location. It is recommended that deep foundations (steel H-piles) be used to support the proposed end bents and interior piers for Bridge Structure No. 4 (State Road 68 over Interstate 69). General bridge foundation recommendations that apply to both bridge structures are presented in the following paragraphs and specific design recommendations for the individual bridges are presented in the following report sections.

Based on INDOT Design Manual Section 60-3.06, the project site lies within an area where the Acceleration Coefficient (A) is 0.10. As per Section 3 of AASHTO LRFD Bridge Design Specifications, 3rd Edition, 2004 and the 2006 Interim Revisions, Table 3.10.4-1, the seismic performance zone for an acceleration coefficient of 0.10 would be Seismic Zone 2. As per Section 3.10.5, it is our opinion that the subsurface materials encountered at the project site closely resemble Type I.

All driven piles for this project shall be spaced at least 6 ft apart, center-to-center. It is recommended that a pile driver analyzer (PDA) in accordance with the INDOT Standard Specifications Section 701.06(c) be used to establish driving criteria and to verify pile capacities for the piles on this project. The actual pile tip elevations must be determined based on an evaluation of the results of the PDA initial drive, the restrike analysis and the CAPWAP analyses. Restrike of the piles should be done after 7 days. A minimum of at least two PDA tests should be performed for each bridge. One PDA test should be done at one end bent and the other PDA test should be done at the farthest interior pier or the opposite end bent

If the piles are driven prior to construction of the mechanically stabilized earth (MSE) retaining walls, it is important that the piles be protected from damage during construction of the MSE walls. Pile sleeves are required when piles are located inside the reinforced soil mass. If the piles are to be driven after construction of the spill-through slopes, it will be necessary to pre-bore through the embankment fill down to the original ground surface at the pile locations.

All piles shall be at least 10 ft long for lateral stability. It may be necessary to pre-core at some pile locations (such as for the Nobles Chapel Road bridge over Interstate 69) in order for the pile lengths to be at least 10 ft long. If coring is performed to accommodate pile placement, placing of the piles and filling of the core shall be done as per Section 701.09 (a).

The steel H-piles must be fitted with driving tips to facilitate driving the piles to proper bearing on the bedrock. The piles should be installed and monitored in accordance with Section 701 of the INDOT Standard Specifications.

5.1.1 Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69)

The leveling pad for the MSE walls at the end bents for this structure will be at or below El 442. It may be desirable to support the end bents on spread footings that bear on competent bedrock. It appears that the bedrock surface is well above El 442 at the west end bent, however, it will likely be necessary to extend the footings well below El 442 (probably to El 430) at the east end bent location. The interior pier for this two-span bridge can be supported on a spread footing bearing on competent shale bedrock, or on steel H-piles. We are providing two options for this structure:

OPTION 1:

For steel H-piles used for Bridge Structure No. 1 at the end bents and interior pier, we recommend that the piles should be set a minimum of 10.0 ft into competent shale due to lateral stability concerns. It will be necessary to pre-core into shale bedrock in order to attain the minimum 10 ft embedment of piles as required for lateral stability. The elevations for the bottom of the cored holes for the west end bent, the interior pier and the east end bent shall be Elevation 426.0, Elevation 418.0 and Elevation 409.0, respectively. If these recommendations are followed, PDA testing will not be required for this bridge.

OPTION 2:

If MSE walls are not constructed for the end bents and removal and replacement of soft soils is not done as per the discussion in Section 5.3, and the piles are not socketed in to competent bedrock as mentioned above, then these additional recommendations will have to be followed: As discussed in Section 5.4, significant settlement will occur due to the weight of the embankment fill at the end bents for this bridge. Therefore, if the piles are driven prior to construction of the approach embankments, or before the settlement of the approach embankments has essentially ceased, there will be down-drag on the piles. Therefore, down-drag friction has been estimated and is included in the ultimate driving loads in the table below. Also, the designer should analyze these piles for lateral stability with LPILE or COM624P. If the piles are installed subsequent to the construction of the approach embankments and the settlement of the approach embankments has essentially ceased, the ultimate driving loads can be reduced to the factored design loads (i.e., 140 tons for the 70-ton design load and 200 tons for the 100-ton design load). In this case, it will be necessary to pre-bore through the embankment down to the original ground surface, or install the piles through sleeves within the embankments, after it has been verified by instrumentation that the settlement has ceased.

The following tables summarize the estimated pile tip elevations and driving loads for the HP 12x53 piles and HP 12x74 piles for Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69). The estimated H-pile tip elevations at each end bent are based upon the elevations at which auger refusal was encountered in the test borings and soundings performed at the proposed end bents of the bridge (TB-1, TB-1-S, TB-3 and TB-3-S) and are presented in the following table. Given the variation of the bedrock surface as well as variations in the weathering of the upper bedrock, it should be understood that the H-pile tip elevations stated herein are approximate and that the actual pile lengths will vary. It is expected that the piles will penetrate some of the upper, more weathered bedrock.

Estimated Pile Tip Elevations
Bridge Structure No. 1
Nobles Chapel Road over Interstate 69

Allowable Pile Capacity, tons/pile	70	100
Pile Section	HP 12x53	HP 12x74
Estimated Pile Tip Elevation for Bent No. 1	436	436
Estimated Pile Tip Elevation for Bent No. 3	413	413

Loads for Pile Driving
Bridge Structure No. 1
Nobles Chapel Road over Interstate 69
70 and 100 ton Piles

Design Load, tons	70	100
Pile Section	HP 12x53	HP 12x74
Factor of Safety	2.0	2.0
Factored Design Load, tons	140	200
Friction in Scour Zone, tons	N/A	N/A
Down-drag Friction, tons	42	42
Ultimate Driving Load, tons	182	242
Recommended Verification Method	By PDA, INDOT Standard Specifications Section 701.06(c)*	By PDA, INDOT Standard Specifications Section 701.06(c)*

***Restrike after 7 days**

The interior pier for the two-span bridge for Nobles Chapel Road over Interstate 69 can be supported on a spread footing that bears on competent shale bedrock. Since the leveling pad for the MSE walls at the end bents for this structure will be at or below El 442, it may be desirable to support the end bents on spread footings that bear on competent bedrock. It appears that the bedrock surface is well above El 442 at the west end bent, however, it will likely be necessary to extend the footings well below El 442 (probably to El 430) at the east end bent location. Spread footings that bear at a depth of at least 2 ft into competent shale bedrock can be designed for a net allowable bearing pressure of 8,000 lbs./sq.ft. The bedrock below the footing bearing elevation should be inspected as described in Section 6.2. Any unsuitable material (such as loose or soft bedrock and any soil) identified by this inspection should be removed to expose competent bedrock and the inspection procedure repeated at the new bearing surface.

5.1.2 Bridge Structure No. 4 (State Road 68 over Interstate 69)

The end bents and interior piers for Bridge Structure No. 4 (State Road 68 over Interstate 69) should be supported on steel H-piles (INDOT Standard Specifications Section 915.02) driven to bearing on bedrock. Hard driving conditions should be anticipated due to the weathered bedrock above the estimated pile tip elevations.

As discussed below in Section 5.4, significant settlement will occur due to the weight of the embankment fill at the end bents for this bridge. Therefore, if the piles are driven prior to construction of the approach embankments, or before the settlement of the approach embankments has essentially ceased, there will be down-drag on the piles. Therefore, down-drag friction has been estimated and is included in the ultimate driving loads in the table below. If the piles are installed subsequent to the construction of the approach embankments and the settlement of the approach embankments has essentially ceased, the ultimate driving loads can be reduced to the factored design loads (i.e., 140 tons for the 70-ton design load and 200 tons for the 100-ton design load). In this case, it will be necessary to pre-bore through the embankment down to the original ground surface, or install the piles through sleeves within the embankments, after it has been verified by instrumentation that the settlement has ceased.

The following tables summarize the estimated pile tip elevations and driving loads for the HP 12x53 piles and HP 12x74 piles for Bridge Structure No. 4 (State Road 68 over Interstate 69). The estimated H-pile tip elevations at each end bent and interior pier location are based upon the elevations at which auger refusal was encountered in the test borings and soundings performed at the proposed end bent and interior pier locations of the bridge (TB-4, TB-4-S, TB-5, TB-5-S, TB-6, TB-6-S, TB-7 and TB-7-S) and are presented in the following table. Given the variation of the bedrock surface as well as variations in the weathering of the upper bedrock, it should be understood that the H-pile tip elevations stated herein are approximate and that the actual pile lengths will vary. It is expected that the piles will penetrate some of the upper, more weathered bedrock.

Estimated Pile Tip Elevations

Bridge Structure No. 4
State Road 68 over Interstate 69

Allowable Pile Capacity, tons/pile	70	100
Pile Section	HP 12x53	HP 12x74
Estimated Pile Tip Elevation for Bent No. 1	377	377
Estimated Pile Tip Elevation for Pier No. 2	384	384
Estimated Pile Tip Elevation for Pier No. 3	390	390
Estimated Pile Tip Elevation for Bent No. 4	391	391

Loads for Pile Driving
Bridge Structure No. 4
State Road 68 over Interstate 69
70 and 100 ton Piles

Design Load, tons	70	100
Pile Section	HP 12x53	HP 12x74
Factor of Safety	2.0	2.0
Factored Design Load, tons	140	200
Friction in Scour Zone, tons	N/A	N/A
Down-drag Friction, tons	45	45
Ultimate Driving Load, tons	185	245
Recommended Verification Method	By PDA, INDOT Standard Specifications Section 701.06(c)*	By PDA, INDOT Standard Specifications Section 701.06(c)*

***Restrike after 7 days**

5.2 Pre-Cast, Three-Sided, Concrete Culvert Foundations

Structure Nos. 2, 3 and 5 are currently planned to be pre-cast, three-sided, reinforced concrete culverts. It is recommended that spread footings be used to support Structure Nos. 2, 3 and 5. Specific design recommendations for spread footings are presented in the following report sections for Structure Nos. 2, 3 and 5.

5.2.1 Structure No. 2

A new three-sided, pre-cast, reinforced concrete culvert structure will be constructed over an unnamed ditch at about Station 1561+83 Line "A". Based on the results of Boring Nos. TB-8 and TB-9, our findings show that the proposed structure can be supported on spread footings provided all soils are removed and that the footings bear on competent bedrock. Bedrock was encountered in the test borings at about El 410.

The bedrock at the base of the footing excavations should be observed to verify that all soils and loose rock are first removed and that the footings will bear on competent bedrock. It is important that positive scour protection be provided to protect the footings and the footing bearing materials from scour. The following table summarizes the recommended design properties for the pre-cast, three-sided reinforced concrete culvert structure. Calculations and design assumptions have been included in Appendix E.

Design Parameters for Pre-Cast, Three-Sided Reinforced Concrete Culvert Structure Foundations
Structure No. 2

Structure Location	Borings	Assumed Bottom of Footing Elevation	Allowable Net Bearing Pressure, lbs/sq.ft*	Minimum Footing Width, ft
Station 1561+83 Line "A"	TB-8 and TB-9	410	8,000	3

* - Assuming footings bear on competent shale bedrock.

Design Parameters for Three-Sided, Pre-cast Concrete Structure Wing Walls
Structure No. 2

Structure Location	Allowable Net Bearing Pressure, lbs/sq.ft*	Assumed Bottom of Footing Elevation	Minimum Footing Width, ft	Angle of Internal Friction of Bearing Bedrock	Friction Factor of Bearing Bedrock	Friction Angle of Backfill Soils**	Ultimate Cohesion of Bearing Bedrock, lbs/sq.ft	Ultimate Adhesion of Bearing Bedrock, lbs/sq.ft
Station 1561+83 Line “A”	8,000	410	3	0	0.33	17°	4,000	1,000

* - Assuming footings bear on competent shale bedrock.
** - Assuming structural fill material.

It is extremely important that the materials at the base of the footing excavations for the pre-cast, three-sided reinforced concrete culvert structure and wing walls be carefully inspected to verify that the footings bear on competent bedrock and that all soil and loose bedrock are removed at the footing locations. Recommendations for inspection of the materials at the bases of the footings are provided in the Section 6.2.

The backfill around the three-sided pre-cast reinforced concrete culvert structure should consist of structure backfill placed and compacted in accordance with Section 211 of the INDOT Standard Specifications. When the fill reaches the top of the structure, two lifts of structure backfill should be placed over the structure before compacting. The backfill level should be maintained at or near the same level on both sides of the structure at all times and the fill on either side should not be higher than one lift thickness above the other side. Only light compaction equipment should be used until the fill is at least 2 ft above the top of the structure. The operation of compaction equipment should be in accordance with the manufacturer’s specifications.

5.2.2 Structure No. 3

A new three-sided, pre-cast, reinforced concrete culvert structure will be constructed over an unnamed ditch at about Station 1590+11 Line "A". Based on the results of Boring Nos. TB-10 and TB-11, it is our opinion that the soft natural soils that were encountered below the anticipated bearing elevation (El 399) are not suitable to support the structure without the risk of unacceptable differential settlement along the structure. The proposed structure can be supported on spread footings provided all soils are first removed to expose competent bedrock and that the footing bearing elevation is reestablished with flowable backfill in accordance with INDOT Standard Specifications Section 213.

The bedrock at the base of the undercut footing excavations should be observed to verify that all soils and loose rock are first removed. The undercut excavation should then be backfilled with flowable backfill in accordance with INDOT Standard Specifications Section 213. It is important that positive scour protection be provided to protect the footings and the footing bearing materials from scour. The following table summarizes the recommended design properties for the pre-cast, three-sided reinforced concrete culvert structure. Calculations and design assumptions have been included in Appendix E.

Design Parameters for Pre-Cast, Three-Sided Reinforced Concrete Culvert Structure Foundations
Structure No. 3

Structure Location	Borings	Assumed Bottom of Footing Elevation	Allowable Net Bearing Pressure, lbs/sq.ft*	Minimum Footing Width, ft
Station 1590+11, Line "A"	TB-10 and TB-11	399	5,000	3

* - Assuming flowable backfill material is placed over competent bedrock.

Design Parameters for Three-Sided, Pre-cast Concrete Structure Wing Walls
Structure No. 3

Structure Location	Allowable Net Bearing Pressure*, lbs/sq.ft	Assumed Bottom of Footing Elevation	Minimum Footing Width, ft	Angle of Internal Friction of Bearing Material*	Friction Factor of Bearing Material*	Friction Angle of Backfill Soils**	Ultimate Cohesion of Bearing Material, lbs/sq.ft	Ultimate Adhesion of Bearing Material, lbs/sq.ft*
Station 1590+11, Line “A”	5,000	401	3	0	0.33	17°	5,000	2,500

* - Assuming flowable backfill material is placed over competent bedrock.
** - Assuming structure backfill material

It is extremely important that the materials at the base of the footing excavations for the pre-cast, three-sided reinforced concrete culvert structure and wing walls be carefully inspected to verify that the all soils are removed to expose competent bedrock and that the footings bear on flowable backfill placed on the exposed bedrock. Recommendations for inspection of the footing excavations are provided in Section 6.2.

The backfill around the pre-cast, three-sided reinforced concrete culvert structure should consist of structure backfill placed and compacted in accordance with Section 211 of the INDOT Standard Specifications. When the fill reaches the top of the structure, two lifts of structure backfill should be placed over the structure before compacting. The backfill level should be maintained at or near the same level on both sides of the structure at all times and the fill on either side should not be higher than one lift thickness above the other side. Only light compaction equipment should be used until the fill is at least 2 ft above the top of the structure. The operation of compaction equipment should be in accordance with the manufacturer’s specifications.

5.2.3 Structure No. 5

A new three-sided, pre-cast, reinforced concrete culvert structure will be constructed over an unnamed ditch at about Station 16+45 Ramp B. Based on the results of Boring Nos. TB-12 and TB-13, our findings show that the proposed structure can be supported on spread footings provided any loose or soft natural soils or soils containing concentrations of organic material are removed and replaced with compacted structure backfill.

The soils at the base of the footing excavations should be observed to verify that any unsuitable soils are first removed and replaced with structure backfill. It is important that positive scour protection be provided to protect the bearing soils from scour. The following table summarizes the recommended design properties for the pre-cast, three-sided, reinforced concrete culvert structure. Calculations and design assumptions have been included in Appendix E.

Design Parameters for Pre-cast Three-Sided Reinforced Concrete Culvert Structure Foundations
Structure No. 5

Structure Location	Borings	Assumed Bottom of Footing Elevation	Allowable Net Bearing Pressure, lbs/sq.ft	Minimum Footing Width, ft
Station 16+45 Ramp B	TB-12 and TB-13	400	2,800	3

Design Parameters for Pre-cast Three-Sided Reinforced Concrete Culvert Structure Wing Walls
Structure No. 5

Structure Location	Allowable Net Bearing Pressure, lbs/sq.ft	Assumed Bottom of Footing Elevation	Minimum Footing Width, ft	Angle of Internal Friction of Bearing Soils	Friction Factor of Bearing Soils	Friction Angle of Backfill Soils*	Ultimate Cohesion of Bearing Soils, lbs/sq.ft	Ultimate Adhesion of Bearing Soils, lbs/sq.ft
Station 16+45 Ramp B	2,800	400	3	0	0.33	17°	1,500	800

* - Assuming structure backfill material.

It is extremely important that the materials at the base of the footing excavations for the three-sided pre-cast reinforced concrete culvert structure and wing walls be carefully inspected to verify that suitable bearing soils exist at the design bearing elevation. Any organic material, soft natural soils or otherwise unsuitable material must be undercut and replaced with compacted structure backfill beneath the footings. Recommendations for inspection of the soils at the bases of the footings are provided in Section 6.2.

The backfill around the pre-cast, three-sided reinforced concrete culvert structure should consist of structure backfill placed and compacted in accordance with Section 211 of the INDOT Standard Specifications. When the fill reaches the top of the structure, two lifts of structure backfill should be placed over the structure before compacting. The backfill level should be maintained at or near the same level on both sides of the structure at all times and the fill on either side should not be higher than one lift thickness above the other side. Only light compaction equipment should be used until the fill is at least 2 ft above the top of the structure. The operation of compaction equipment should be in accordance with the manufacturer’s specifications.

5.2.4 Three-sided, Pre-cast Concrete Culvert Structure, Station 14+05 Ramp "A-1"

A new three-sided, pre-cast, reinforced concrete culvert structure will be constructed over an existing drainage ditch at about Station 14+05 Ramp "A-1". Based on the results of Boring Nos. TB-25 and TB-26, our findings show that the proposed structure can be supported on spread footings provided all soils are removed and that the footings bear on competent bedrock. Bedrock was encountered in the test borings at about El 441 to 442.

The bedrock at the base of the footing excavations should be observed to verify that all soils and loose rock are first removed and that the footings will bear on competent bedrock. It is important that positive scour protection be provided to protect the footings and the footing bearing materials from scour. The following table summarizes the recommended design properties for the pre-cast, three-sided reinforced concrete culvert structure. Calculations and design assumptions have been included in Appendix E.

Design Parameters for Pre-Cast, Three-Sided Reinforced Concrete Culvert Structure Foundations
Station 14+05 Ramp "A-1"

Structure Location	Borings	Assumed Bottom of Footing Elevation	Allowable Net Bearing Pressure, lbs/sq.ft*	Minimum Footing Width, ft
Station 14+05 Ramp "A-1"	TB-25 and TB-26	441	8,000	3

* Assuming footings bear on competent shale bedrock.

Design Parameters for Three-Sided, Pre-cast Concrete Structure Wing Walls Station 14+05 Ramp “A-1”

Structure Location	Allowable Net Bearing Pressure, lbs/sq.ft*	Assumed Bottom of Footing Elevation	Minimum Footing Width, ft	Angle of Internal Friction of Bearing Bedrock	Friction Factor of Bearing Bedrock	Friction Angle of Backfill Soils**	Ultimate Cohesion of Bearing Bedrock, lbs/sq.ft	Ultimate Adhesion of Bearing Bedrock, lbs/sq.ft
Station 14+05 Ramp “A-1”	8,000	441	3	0	0.33	17°	4,000	1,000

* - Assuming footings bear on competent shale bedrock.
** - Assuming structure backfill material.

It is extremely important that the materials at the base of the footing excavations for the pre-cast, three-sided reinforced concrete culvert structure and wing walls be carefully inspected to verify that the footings bear on competent bedrock and that all soil and loose bedrock are removed at the footing locations. Recommendations for inspection of the materials at the bases of the footings are provided in the Section 6.2.

The backfill around the three-sided pre-cast reinforced concrete culvert structure should consist of structure backfill placed and compacted in accordance with Section 211 of the INDOT Standard Specifications. When the fill reaches the top of the structure, two lifts of structure backfill should be placed over the structure before compacting. The backfill level should be maintained at or near the same level on both sides of the structure at all times and the fill on either side should not be higher than one lift thickness above the other side. Only light compaction equipment should be used until the fill is at least 2 ft above the top of the structure. The operation of compaction equipment should be in accordance with the manufacturer’s specifications.

5.2.5 Three-sided, Pre-cast Concrete Culvert Structure, Station 8+92, Ramp "C"

A new three-sided, pre-cast, reinforced concrete culvert structure will be constructed over an unnamed ditch at about Station 8+92 Ramp C. Based on the results of Boring Nos. TB-14 and TB-15, our findings show that the proposed structure can be supported on spread footings provided any loose or soft natural soils or soils containing concentrations of organic material are removed and replaced with compacted structure backfill.

The soils at the base of the footing excavations should be observed to verify that any unsuitable soils are first removed and replaced with structure backfill. It is important that positive scour protection be provided to protect the bearing soils from scour. The following table summarizes the recommended design properties for the pre-cast, three-sided, reinforced concrete culvert structure. Calculations and design assumptions have been included in Appendix E.

Design Parameters for Pre-cast Three-Sided Reinforced Concrete Culvert Structure Foundations
Station 8+92 Ramp C

Structure Location	Borings	Assumed Bottom of Footing Elevation	Allowable Net Bearing Pressure, lbs/sq.ft	Minimum Footing Width, ft
Station 8+92 Ramp C	TB-14 and TB-15	406	1,900	3

Design Parameters for Pre-cast Three-Sided Reinforced Concrete Culvert Structure Wing Walls
Structure No. 5

Structure Location	Allowable Net Bearing Pressure, lbs/sq.ft	Assumed Bottom of Footing Elevation	Minimum Footing Width, ft	Angle of Internal Friction of Bearing Soils	Friction Factor of Bearing Soils	Friction Angle of Backfill Soils*	Ultimate Cohesion of Bearing Soils, lbs/sq.ft	Ultimate Adhesion of Bearing Soils, lbs/sq.ft
Station 8+92 Ramp C	1,900	406	3	0	0.33	17°	1,000	500

* - Assuming structure backfill material.

It is extremely important that the materials at the base of the footing excavations for the three-sided pre-cast reinforced concrete culvert structure and wing walls be carefully inspected to verify that suitable bearing soils exist at the design bearing elevation. Any organic material, soft natural soils or otherwise unsuitable material must be undercut and replaced with compacted structure backfill beneath the footings. Recommendations for inspection of the soils at the bases of the footings are provided in Section 6.2.

The backfill around the pre-cast, three-sided reinforced concrete culvert structure should consist of structure backfill placed and compacted in accordance with Section 211 of the INDOT Standard Specifications. When the fill reaches the top of the structure, two lifts of structure backfill should be placed over the structure before compacting. The backfill level should be maintained at or near the same level on both sides of the structure at all times and the fill on either side should not be higher than one lift thickness above the other side. Only light compaction equipment should be used until the fill is at least 2 ft above the top of the structure. The operation of compaction equipment should be in accordance with the manufacturer’s specifications.

5.3 Mechanically Stabilized Earth Retaining Walls

There are two locations where mechanically stabilized earth (MSE) retaining walls are proposed for this project, one for each bridge abutment of Bridge Structure No. 1 (Nobles Chapel Road over Interstate 69). It is assumed that the MSE walls will bear at or below about El 442, which is below the bedrock surface encountered in Boring No. TB-1 drilled at Bent No. 1 and about 8 ft above the bedrock surface encountered in Boring No. TB-3 drilled at Bent No. 3. The MSE wall will vary in height from about 42 ft at Bent No. 1 to about 32 ft at Bent No. 3. While the proposed retaining walls for these structures may be constructed with a mechanically stabilized earth system, it is important that the bridge deck and girders be supported on driven steel H-pile foundations or spread footings as described in Section 5.1. The internal design of the MSE walls, which is beyond the scope of this study, depends on the nature of the soil and reinforcing material that will be used in the embankments as well as the construction procedures to be utilized. The MSE retaining wall design should include analyses pertaining to the pullout of the reinforcing elements, tensile overstress of the elements, wall/element connections and possible corrosion of the elements. It is essential that the subgrade below the retained embankments be prepared as described in this report section and that the walls be properly designed for internal stability. It will be necessary to either properly abandoned any underground utilities below or adjacent to the proposed MSE walls or to verify that the utilities can support the increase in pressure due to the weight of the MSE wall.

The MSE wall section for End Bent No. 1 of Bridge Structure No. 1 (maximum wall height of 41 ft) has been analyzed to determine that adequate factors of safety relative to sliding (FS > 1.5), overturning (FS > 2.0), global stability (FS > 1.3) and bearing capacity failure (FS > 2.5) for static conditions are satisfied and that adequate factors of safety relative to sliding (FS > 1.1), overturning (FS > 1.5), global stability (FS > 1.1) and bearing capacity failure (FS > 1.9) for earthquake conditions are satisfied. The external stability calculations are included in Appendix E. It will be necessary to undercut all soils to expose competent bedrock beneath the entire MSE wall section at both end bent locations of Structure No. 1. At Bent No. 3, this will require removal of at least 8 ft of soil (or more) and replacement of the soil with structure backfill or lean concrete. If structure backfill will be used to replace the undercut cohesive soils, the base of the undercut excavation should be made wider by extending the excavation outward at least 4 ft in each direction. Our calculations indicate that an allowable bearing pressure of 7,000 lbs/sq.ft (based on a factor of safety of 2.5 for static conditions) can be used for the design of the MSE walls that are planned at the end bents for Bridge Structure No. 1 provided that the MSE walls bear directly on competent bedrock, or on structure backfill or lean concrete that is placed on competent bedrock. Based upon our calculations, it will be necessary to use a reinforcement length that is at least 0.7 times the height of the wall (i.e., L/H = 0.7). The calculations are based on the assumption that the top of the leveling pad (i.e., bottom of the reinforced zone) will be located at a depth of at least 3 ft below the final grade.

In the zones of the MSE embankments that are immediately adjacent to the bridge end bents (in front of the end bents), reinforcing elements should be placed perpendicular to the end bents to eliminate lateral earth pressure on the end bents. It is recommended that the reinforced zone for the MSE walls at the end bents be the same as for the maximum height MSE wall since these MSE walls have loading commensurate with the full embankment height even though they extend only slightly above the level of the bottom of the bridge end bents.

After rough grade has been established at the wall locations and prior to the placement of fill, the exposed subgrade should be carefully inspected by probing and testing as needed. Any soil and other unsuitable materials such as loose bedrock should be removed and replaced with structure backfill in accordance with INDOT Standard Specification Section 211. It is recommended that only structure backfill (angle of internal friction $\geq$ 34° and a unit weight of approximately 125 lbs./cu.ft) according to INDOT Standard

Specifications Section 904 and INDOT recurring special provisions for MSE walls Section 731-R-202 should be used for fill within the reinforced zone of the MSE walls.

If the piles are driven prior to construction of the mechanically stabilized earth (MSE) retaining walls, it is important that the piles be protected from damage during construction of the MSE walls. Pile sleeves are required when piles are located inside the reinforced soil mass. If the piles are to be driven after construction of the spill-through slopes, it will be necessary to pre-bore through the embankment fill down to the original ground surface at the pile locations. Based on the bearing elevation of the MSE walls, it may be necessary to pre-bore the bedrock in order to obtain the minimum pile length of 10 ft below the base of the MSE wall.

Care should be taken to assure that the embankment fill and reinforcing elements are properly placed and installed. Unless otherwise specified by the MSE wall designer, the reinforcing elements should be placed horizontally on structure backfill material that has been compacted to INDOT Standard Specifications. Care should also be taken not to disturb or damage the reinforcing elements during construction.

5.4 Embankments and Cut Slopes

The project is currently designed with cut slopes and conventional earth embankments with sideslopes that are 3 (horizontal) to 1 (vertical), or flatter. The proposed embankment cross-sections at Station 244+50 Line “D”, Station 248+00 Line “D”, Station 17+00 Ramp “C” and Station 20+00 Ramp “D” were analyzed to determined the estimated factors of safety relative to slope stability for end-of-construction, long-term and earthquake conditions. The following tables summarize the computed factors of safety as well as the required factors of safety for embankments and cut slopes with 3 (horizontal) to 1 (vertical) initial sideslopes based upon stability analyses using the computer program PCSTABL6H. In the case of the cross-section at Station 244+50 Line “D”, additional slope stability analyses were performed using both flatter earth embankment sideslopes and using a toe berm to determine if either of these methods could satisfactorily increase the calculated factors of safety relative to global stability (see Appendix G for the results of the stability analyses using PCSTABL6H).

SUMMARY OF SLOPE STABILITY ANALYSES
STATION 244+50 LINE "D"

Case Analyzed	Embankment Slope Analyzed	Seismic Coefficient	Calculated Factor of Safety	Required Minimum Factor of Safety
End of Construction (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 27 ft high	-----	1.0*	1.2
Earthquake (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 27 ft high	0.1	0.7*	1.1
End of Construction (Total Stress Parameters)	5 (horizontal) to 1 (vertical), 27 ft high	-----	1.3	1.2
Earthquake (Total Stress Parameters)	5 (horizontal) to 1 (vertical), 27 ft high	0.1	0.8*	1.1
End of Construction (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 27 ft high, with toe berm	-----	1.2	1.2
Earthquake (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 27 ft high, with toe berm	0.1	0.8*	1.1

* - Calculated Factor of Safety is less than the required minimum Factor of Safety

SUMMARY OF SLOPE STABILITY ANALYSES
STATION 248+00 LINE "D"

Case Analyzed	**Embankment Slope Analyzed**	**Seismic Coefficient**	**Calculated Factor of Safety**	**Required Minimum Factor of Safety**
End of Construction (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	1.9	1.2
Consolidated-Drained (Effect. Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	2.1	1.3
Earthquake (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	0.1	1.3	1.1

SUMMARY OF SLOPE STABILITY ANALYSES
STATION 17+00 RAMP "C"

Case Analyzed	**Embankment Slope Analyzed**	**Seismic Coefficient**	**Calculated Factor of Safety**	**Required Minimum Factor of Safety**
End of Construction (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	1.6	1.2
Consolidated-Drained (Effect. Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	1.4	1.3
Earthquake (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	0.1	1.2	1.1

SUMMARY OF SLOPE STABILITY ANALYSES
STATION 20+00 RAMP "D"

Case Analyzed	**Embankment Slope Analyzed**	**Seismic Coefficient**	**Calculated Factor of Safety**	**Required Minimum Factor of Safety**
End of Construction (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	1.7	1.2
Consolidated-Drained (Effect. Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	-----	1.4	1.3
Earthquake (Total Stress Parameters)	3 (horizontal) to 1 (vertical), 30 ft high	0.1	1.3	1.1

Based upon the results of the slope stability analyses performed and summarized above (see Appendix G for the results of the slope stability analyses using computer program PCSTABL6H), it is recommended that the sideslopes of the new embankments be 3 (horizontal) to 1 (vertical), or flatter. However, due to a zone of very soft clay in conjunction with the proposed embankment height between about Station 241+00 to 244+75 on Line D (i.e., the west approach embankment for the State Road 68 bridge over Interstate 69), special measures will be required to modify or improve the subgrade soils in this zone in order to assure suitable factors of safety relative to global stability and also to limit and accelerate settlement of the embankment. Based on settlement calculations for the cross-section near Station 244+30, approximately 11 in. of settlement would be expected to occur due to the weight of the embankment fill, if modification of the foundation soils was not performed. Since the estimated settlement is due to consolidation of compressible cohesive soils, it will likely take several months after completion of the embankment for the majority of the settlement to occur, if the subgrade soils are not modified.

It is our opinion, based on the properties of the soils underlying the proposed embankment, that rammed aggregate piers (such as “Geopiers” or “Vibro Piers”, or equivalent systems) should be installed to modify and improve the natural soils so that suitable factors of safety relative to slope stability are assured and that settlement is limited. Because rammed aggregate piers soil modification methods are proprietary, these systems must be designed and drawings stamped by a registered engineer in the State of Indiana retained by the specialty contractor and the rammed aggregate piers must be installed by a specialty contractor with specific experience installing rammed aggregate piers. The design of the embankment foundation soil modification system shall be the responsibility of the contractor, however, the details of the proposed system shall be reviewed by, and subject to approval from, the INDOT Office of Geotechnical Engineering.

The rammed aggregate pier system should be designed to satisfactorily modify the foundation soils beneath the proposed west approach embankment for the State Road 68 bridge in order to support the proposed earth embankment with factors of safety that exceed the required factors of safety for global stability for end-of-construction condition (FS>1.2), the long-term condition (FS>1.3) and earthquake loading (FS>1.1) as noted in the tables above. The analysis under earthquake loading conditions should include a seismic coefficient of at least 0.1. Furthermore, the total settlement of the approach embankment should be limited to less than 3 in. and the settlement should be essentially complete prior to constructing the pavement for the approach embankment. At a minimum, it is recommended that rammed aggregate piers be installed between Station 241+00 and Station 244+75, Line “D” (based upon the bridge end bent location shown on the plans provided), between 60 ft left and 60 ft right of centerline (or beyond these limits if necessary for stability or to control settlement) and should extend to the shale bedrock.

Settlement calculations were also performed for a typical embankment fill section at about Station 20+00 Ramp “D”. The analysis estimates that approximately 4 to 5 in. of settlement will occur at this location. Since the subsurface conditions along the ramps are relatively uniform and the grade change along the ramps occurs gradually, it is expected that the settlement of the embankments for the ramps will be uniform such that it may not be necessary to delay paving of the ramps until the settlement has substantially ceased.

The east approach embankment for the State Road 68 bridge over Interstate 69 (about Station 248+00 to 252+00 Line "D") and the approach embankments for the Nobles Chapel Road bridge over Interstate 69 (about Station 34+00 to 36+30 and about Station 39+00 to 40+00 Line "S-2-A-PR") will be constructed over compressible soils. Although it is apparent based upon slope stability analyses performed for the east approach embankment for the State Road 68 bridge over Interstate 69 that these embankments will have a suitable factor of safety relative to global stability, it appears that the estimated settlements will be unacceptable at these locations. While it is expected that a portion of the settlement that will result from the weight of the new embankments will occur during the construction of the roadway project, some long term settlement must be anticipated. Calculations using compressibility parameters based on the results of a consolidation test performed on a representative sample, as well as published literature, indicate that it will take on the order of about 2 years for 90 percent of the settlement to occur after completion of these embankments. The maximum total settlement at the centerline of the embankment sections are estimated to be in the range of about 9 to 12 in. (settlement estimate calculations are presented in Appendix H). The settlement at the crests (or shoulders) of the embankments will be about half that at the centerline.

Due to the estimated time of consolidation for the proposed approach embankments, it is recommended that wick drains be used to accelerate the dissipation of pore water pressure and consolidation of the compressible silty clay soils that underlie the proposed east approach embankment for the State Road 68 bridge (about Station 248+00 to

252+00 Line “D”) and both of the approach embankments for the Nobles Chapel Road bridge (about Station 34+00 to 36+30 and about Station 39+00 to 40+00 Line “S-2-A-PR”). Wick drains shall not be needed within the reinforced zone if MSE walls are constructed since the soils will be removed from beneath the reinforced zones.

The following table summarizes estimated periods for settlement to occur for various triangular wick drain spacing. These settlement period estimates are based on the assumption that the wick drains will penetrate the entire thickness of the soft to medium stiff silty clay layers. It is estimated that the silty clay extends to depths in the range of about 15 to 19 ft below the existing ground surface. The wick drains should be installed throughout the roadway lengths of the new embankments described above between the toes of the embankments.

Wick Drain Spacing (Triangular Pattern)	**Estimated Time Required for 90% Consolidation**
4 ft	3 weeks
5 ft	1 month
6 ft	2 months
8 ft	3 months

It is important that the settlement plates be installed and monitored as presented in the INDOT Standard Specifications Section 204.03 to establish when the settlement has substantially ceased. The settlement plates should be located at least every 100 ft (with one of the settlement plates located at the highest embankment section for each embankment) along the centerline of the proposed east approach embankment for the State Road 68 bridge (about Station 248+00 to 252+00 Line “D”) and the approach embankments for the Nobles Chapel Road bridge (about Station 34+00 to 36+30 and about Station 39+00 to 40+00 Line “S-2-A-PR”, within approximately 100 to 130 ft of the end bents). It is recommended that paving be delayed until the settlement is less than 0.02 ft for four consecutive weeks. It is also recommended that fill for embankments higher than about 15 ft be placed and completed as early as possible since these zones will experience the greatest settlements.

Cut slopes in natural soil (assuming a maximum soil cut depth of about 18 ft) should be made at 3 (horizontal) to 1 (vertical), or flatter. Where new fill is placed against a slope that is 4 (horizontal) to 1 (vertical) or steeper, benches that are at least 10 ft wide should be made into the existing soils to insure a good bond between the existing soils and the new fill (see Section 203.21 – Embankment on Hillside or Slopes of the INDOT Standard Specifications). The embankments should be constructed in accordance with INDOT Standard Specification Section 203. The bedrock materials encountered in the test borings can be used for constructing the embankments provided that these materials (which consists primarily shale and sandstone) are placed according to INDOT Standard Specifications Section 203.20(b) – Rock and Shale Embankment-Shale, Shale and Soft Rock Mixtures, or Soft Rock. It will probably be possible to excavate some of the weathered shale and sandstone with conventional soil excavation equipment. It should be possible to “rip” at the shale. However, there may be areas where the shale and sandstone are too hard to rip or otherwise remove with conventional earthmoving equipment.

5.5 High-Mast Light Towers

The project will include the installation of four new high mast lights at the interchange for Interstate 69 and Interstate 64 and three high mast lights at the interchange for Interstate 69 and State Road 68. The approximate locations of the high mast lights are summarized in the following table:

HIGH MAST LIGHT LOCATIONS

TOWER DESIGNATION*	STATION	LINE	OFFSET
TL-16	1494+00	“A”	550 Right
TL-17	1494+00	“A”	350 Left
TL-18	1503+00	“A”	210 Right
TL-19	1504+00	“A”	670 Left
TL-20	1582+00	“A”	160 Right
TL-21	1589+00	“A”	450 Left
TL-22	1594+00	“A”	380 Right

* Based on ATC test boring location designations

It is assumed that the proposed high mast light towers will be supported on drilled shaft foundations. The INDOT Standard High Mast Tower Foundation (INDOT Standard Drawing No. E 807-LTFD-07) consists of a 4.0 ft diameter drilled shaft that is 20 ft long with 20 full length #11 reinforcing steel bars. This foundation size, minimum length and reinforcing steel arrangement were used in our analyses. At the time of this study, the specific information regarding the tower heights and loading conditions were not determined. For the purpose of this study it has been assumed that the maximum bending moment, axial force and shear force at the bases of the high mast light towers (i.e., the top of the foundations) will not exceed 500,000 ft-lbs., 8,000 lbs. and 7,000 lbs., respectively, and that the towers can tolerate a maximum pile head deflection of 1.0 in. If the actual loading conditions on any of the high mast lights exceed these values, the foundations should be analyzed based on the specific loading conditions. Furthermore, if the actual high mast light locations vary from those summarized above, additional analyses, and possibly additional test borings, will be required.

Lateral foundation analyses were performed using the computer program LPILE Plus 3.0 for selected representative high mast light tower locations based on the standard high mast light drilled shaft foundation described above, the assumed loading conditions and the test borings that were drilled at the proposed foundation locations. The results of the lateral foundation analyses are included in Appendix I. The analyses indicate that all of the proposed high mast lights summarized in the table above can be supported on the INDOT standard foundation (as described above), except for the towers designated herein as TL-20 and TL-21, which our analyses indicate should extend to bear on bedrock at depths of 25 ft and 35 ft, respectively. The analyses indicate that the lateral deflection at the top of the drilled shaft foundations will not exceed about 1 in. under the assumed loading conditions.

The following table summarizes the locations of the proposed high mast light towers for this project along with the recommended foundation lengths based on the lateral foundation analyses described above. It should be noted that loading conditions have been assumed and that these analyses do not account for any underground utilities that may be located in the vicinity of the high mast light tower foundations. The recommendations contained herein are based on the assumption that any underground utilities that are located near the tower foundations will provide lateral resistance at least as great as the soil conditions used in the models and that the utilities can withstand the loads imparted by the foundations.

RECOMMENDED HIGH MAST TOWER FOUNDATION LENGTHS

TOWER DESIGNATION	STATION	LINE	OFFSET	RECOMMENDED FOUNDATION LENGTH, FT*
TL-16	1494+00	“A”	550 Right	20
TL-17	1494+00	“A”	350 Left	20
TL-18	1503+00	“A”	210 Right	20
TL-19	1504+00	“A”	670 Left	20
TL-20	1582+00	“A”	160 Right	25**
TL-21	1589+00	“A”	450 Left	35**
TL-22	1594+00	“A”	380 Right	20

* Length of drilled shaft below the ground surface based on the INDOT Standard High Mast Tower Foundation (INDOT Standard Drawing No. E 807-LTFD-07).

** TL-20 and TL-21 must extend to bear on bedrock.

The drilled shafts should be designed and constructed in general accordance with ACI 336.3R “Design and Construction of Drilled Shafts”. Temporary steel casing may be required in some cases to prevent caving of the soils into the excavations.

It is recommended that the geotechnical consultant observe the entire drilling operations during the drilled shaft installation process. The inspection of the drilled shaft can be performed without entering the shaft excavations by observing the drilling operations and auger-cuttings throughout the entire length of the shaft excavation. It is important that the shaft excavation and subsurface conditions be monitored until the concrete is placement is complete to verify that the otherwise competent soils are not adversely affected by improper construction methods. It is important that the concrete be placed and the casing removed in such a fashion as to prevent "necking" of the drilled shaft and inclusion of soil and water within the shaft. Unless the excavation is entirely dry, the concrete must be placed by tremie or concrete pump.

If a shaft excavation is to be entered (which is not recommended), all local, state and federal safety regulations, including those regarding confined space entry, should be followed. No open flame should be permitted on the site near the drilled shaft excavation and no personnel should be allowed to enter the excavation until proper safety precautions for confined space entry have been taken. Such precautions should include proper personal protective equipment and monitoring of the excavations for explosive vapors and oxygen deficiency. Additional safety measures may be needed depending upon the specific conditions at the foundation locations, the construction procedures employed and the applicable local, state and federal Occupational Health and Safety Administration (OSHA) Regulations.

The need for some dewatering should be anticipated if the “dry construction” method is to be used. At the time of our investigation, ground water appeared to be above the bases of the shafts at many locations. Thus, ground water seepage should be expected in the drilled shaft excavations. In general, water should not be pumped directly from the excavation since it can cause deterioration of the base of the excavation.

5.6 Pavements

Based on the general consistency of the soils that were encountered in the test borings and our experience on other projects with similar soil conditions, it is anticipated that significant subgrade problems may be encountered in much of the pavement areas that are in cut or at-grade sections. Most of the subgrade soils have high silt contents and even those soils that may currently be relatively firm can easily become unstable during construction when exposed to precipitation and construction traffic. The drainage ditches should be cut prior to any other construction work beginning on this project. This will help to reduce the moisture within the subgrade soils, which are inherently wet. In order to attain a suitable foundation for the pavement subgrade in cut and at-grade areas, the foundation soils may require some modification to reduce the excess moisture content. This can be achieved by performing in-place chemical modification of the exposed subgrade. It is suggested that an undistributed quantity of chemical modification be included in the contract to be used where determined to be necessary to provide a suitable foundation for the pavement. It is not possible to accurately determine beforehand the amount of chemical modification that may be required since this is dependent upon seasonal conditions, construction equipment and methods and the specific soil type encountered at the subgrade level. However, based upon the soil types that were encountered in the test borings, the currently planned cross-sections and the expected schedule for this project, it is possible that approximately 75 percent of the subgrade could require chemical modification.

Based upon the results of the resilient modulus tests conducted for this project, a resilient modulus value of 6,000 lbs/sq.in. is recommended for use in the design of the pavements for Interstate 69 mainline and ramps, State Road 68 and State Road 57. A resilient modulus value of 3,300 lbs/sq.in. is recommended for use in the design of the pavements for Nobles Chapel Road, Old Nobles Chapel Road, Old State Road 57 and the local access road. The results of the resilient modulus tests are included in Appendix D. Due to the presence of high silt content soils, the moisture content during construction shall be controlled within a range of 3 percent below the optimum moisture content to the optimum moisture content. In no case shall the soils be placed and compacted at a moisture content in excess of the optimum moisture content. Recommendations for the removal and replacement of any unsuitable materials that may be encountered during construction are provided in Sections 6.3 and 6.4 of this report.

It is recommended that Type IA Subgrade Treatment in accordance with INDOT Standard Specifications Section 207.04 be used for the Interstate 69 mainline and ramps, State Road 68 and State Road 57 pavement subgrade in conjunction with a resilient modulus value of 6,000 lbs/sq.in. It is recommended that Type III Subgrade Treatment be used for the realignment of Nobles Chapel Road, Old Nobles Chapel Road, Old State Road 57 and the local access road in conjunction with a resilient modulus value of 3,300 lbs/sq.in. Adequate drainage should be provided at the site to minimize any increase in moisture content of the subgrade soils.

Where overlay of the existing pavement (rather than reconstruction) is planned, it is recommended that the existing pavement be inspected for cracking and deterioration prior to the overlay. Any portions of pavement that exhibit such features should be removed and reconstructed according to the guidelines outlined in the following paragraphs.

5.7 Pavement Drainage

Adequate drainage should be provided at the site with outlets at regular intervals to minimize any increase in moisture content of the subgrade soils. Subsurface drains are recommended for this project. Filter fabric will be needed due to the silty nature of the subgrade soils.

The drainage ditches should be cut prior to any other construction work beginning on this project. This will help to reduce the moisture within the subgrade soils, which are inherently wet.

5.8 pH Values

The soil samples tested during the laboratory investigation indicate elevated pH values at some locations. Protective measures should be considered for underground structures.

Summary of Soil pH Values

Boring Number	Depth, ft	pH Value
RB-49	13.5 – 15.0	7.3
RB-57	1.0 – 2.5	6.2
TB-3	8.5 – 10.0	7.6
TB-4	13.5 – 15.0	7.4
TB-4	28.5 – 30.0	8.1
TB-10	13.5 – 15.0	6.9
TB-14	13.5 – 15.0	7.0
TL-21	3.5 – 5.0	5.7
TL-21	6.0 – 7.5	6.4

6.0 GENERAL CONSTRUCTION PROCEDURES AND RECOMMENDATIONS

Since this investigation identified actual subsurface conditions only at the test boring locations, it was necessary for our geotechnical engineers to extrapolate these conditions in order to characterize the entire project site. Even under the best of circumstances, the conditions encountered during construction can be expected to vary somewhat from the test boring results and may, in the extreme case, differ to the extent that modifications to the foundation recommendations become necessary. Therefore, we recommend that ATC be retained as geotechnical consultant through the earth-related phases of this project to correlate actual soil conditions with test boring data, identify variations, conduct additional tests that may be needed and recommend solutions to earth-related problems that may develop.

6.1 Pile Installation

In order to assure that the bridge structure piles are properly installed, it is recommended that a representative of the geotechnical engineer who is independent of the contractor perform continuous inspection during pile installation. An accurate record should be kept of the date, time, depth of penetration, driving resistance and other pertinent data for each pile as well as the characteristics of the pile driver that is used. The pile driver should have sufficient energy to drive the piles to bearing as prescribed in Section 5.1 of this report. To assure proper pile capacity, the driving criteria to be used during production pile driving should be determined based upon the pile hammer and pile section that is used. The driving criteria will be established by the geotechnical engineer at the time of construction once the specific details regarding pile installation have been established. All pile driving should be done in accordance with INDOT Standard Specifications, Section 701.

6.2 Spread Footing Excavations

The bedrock at the base of the spread footing excavations that are designed to bear on bedrock (such as for the interior pier for the Nobles Chapel Road bridge over Interstate 69, Structure No. 2 – Station 1561+83 Line A, Structure No. 3 – Station 1590+11 Line A and the structure for the ditch on Ramp A-1) should be inspected to verify that the footings will bear on competent bedrock or on flowable fill placed on competent bedrock as prescribed in Sections 5.1.1, 5.2.1, 5.2.2 and 5.2.4. If loose bedrock, bedrock that has softened or soil is encountered at the base of the footing excavation, the unsuitable materials should be removed and the footing bearing elevation should be extended to reach competent bedrock, which should then be re-inspected. If the actual footing bearing elevation cannot be lowered, the undercut excavation should be backfilled with concrete to re-establish the design footing bearing elevation.

The soil/rock at the base of each spread footing excavation for the pre-cast concrete arch structures should be inspected by a geotechnical engineer or a qualified soils technician to insure that all loose, soft or otherwise undesirable material (such as organic material, sediment from the streams, etc.) is removed from beneath the footing locations and that the footings will bear on satisfactory material. At the time of such inspection, it will be necessary to make hand auger borings or use a hand penetration device in the base of the foundation excavations in soils to insure that the soils below the base are satisfactory for foundation support. The necessary depth of penetration will be established during inspection.

If soft, loose or otherwise unsuitable materials are encountered at the footing bearing elevation and it is inconvenient to lower the footings, the proposed footing bearing elevations may be re-established by backfilling after the undesirable material has been removed. The undercut excavation beneath each footing should extend to suitable bearing materials and the dimensions of the excavation base should be determined by imaginary planes extending outward and down on a 2 (vertical) to 1 (horizontal) slope from the base perimeter of the footing. The entire excavation should then be refilled with structure backfill, flowable fill or lean concrete. Special care should be exercised to remove any sloughed, loose or soft materials near the base of the excavation slopes. In addition, special care should be taken to "tie-in" the compacted fill with the excavation slopes, with benches as necessary, to insure that no pockets of loose or soft materials will be left in place along the excavation slopes below the foundation bearing level.

Soils and bedrock that are exposed in the bases of all satisfactory footing excavations should be protected against any detrimental change in condition such as from disturbance, rain and freezing. Surface run-off water should be drained away from the excavation and not allowed to pond. If possible, all footing concrete should be placed the same day the excavation is made. If this is not practical, the footing excavations should be adequately protected.

6.3 Site Preparation and Earthwork

All topsoil, wet, soft, loose or otherwise unsuitable surficial bearing soils should be stripped from the project site within the construction limits prior to construction of the roadway. The drainage ditches should be cut prior to any construction work beginning on this project. This will help to reduce the moisture within the subgrade soils, which are inherently wet.

Based on the general consistency of the soils that were encountered in the test borings and our experience on other projects with similar soil conditions, it is anticipated that significant subgrade problems may be encountered in much of the pavement areas that are in cut or at-grade sections. Most of the subgrade soils have high silt contents and even those soils that may currently be relatively firm can easily become unstable during construction when exposed to precipitation and construction traffic. In order to attain a suitable foundation for the pavement subgrade in cut and at-grade areas, the foundation soils may require some modification to reduce the excess moisture content. This can be achieved by performing in-place chemical modification of the exposed subgrade. Furthermore, it is likely that special measures may be required in order to establish a firm foundation on which embankment fill will be placed. In such cases, chemical modification can be used to improve the subgrade soils so that a firm working base is established beneath embankments. It is suggested that an undistributed quantity of chemical modification be included in the contract to be used where determined to be necessary to provide a suitable foundation for the pavement or for the embankments. It is not possible to accurately determine beforehand the amount of chemical modification that may be required since this is dependent upon seasonal conditions, construction equipment and methods and the specific soil type encountered at the subgrade level. However, based upon the soil types that were encountered in the test borings, the currently planned cross-sections and the expected schedule for this project, it is possible that approximately 75 percent of the subgrade could require chemical modification.

Proofrolling of the natural ground surface should be performed in accordance with the INDOT Standard Specifications Section 203.26 within all areas where new fill will be placed. Care should be exercised during grading operations at the site. Due to the nature of the near-surface soils, the traffic of construction equipment, including compaction equipment, may create pumping and general deterioration of the shallower soils, especially if excess surface water is present. The grading, therefore, should be done during a dry season, if possible.

6.4 Placement and Compaction of Engineered Fill

Engineered fill should be placed in lift thicknesses not to exceed about 8 in. and compacted to a minimum of 95 percent of the standard Proctor maximum dry density (AASHTO T99) as specified in the current INDOT Standard Specifications. Due to the presence of high silt content soils, the moisture content during construction shall be controlled within a range of 3 percent below the optimum moisture content to the optimum moisture content. In no case shall the soils be placed and compacted at a moisture content in excess of the optimum moisture content. It is likely that some drying of the fill material will be required before being placed in order to meet the INDOT Standard Specification for fill placement. However, adequate moisture conditioning may be difficult during wet seasons and, during such seasons, a granular material may be necessary to satisfy the minimum compaction requirements.

Where the alignment of the roadway crosses existing drainage ditches, the soft sediment in the base of the channels should be removed and replaced with “B” borrow to a thickness of at least 2 ft above the free ground water level. Backfilling should be done in accordance with Section 203.09 of the INDOT Standard Specifications.

6.5 Fill Sections

It is recommended that the sideslopes of the new embankments be 3 (horizontal) to 1 (vertical), or flatter. Where fill material is placed on existing slopes, benches should be cut into the existing slopes subsequent to fill placement so as to preclude a shear plane from developing at the interface. Benches having a minimum width of 10.0 ft should be cut into the natural slopes and existing embankment side slopes that are 4 (horizontal) to 1 (vertical) or steeper before new engineered fill is placed. These benches should be excavated in accordance with Section 203.21 of the INDOT Standard Specifications.

6.6 Erosion Protection

Highly erodible, granular material (such as “B” borrow) should not be used in proposed ditches or within 12 in. of the required final grade of side slopes. The material required to encase the embankment should be non-erodible, cohesive material free from debris and other deleterious materials and suitable for sustaining vegetation. The final slopes should be seeded or sodded for erosion control. If seeded, the slope should be protected with an erosion control blanket to provide for adequate seed germination and rooting.

All topsoil and any soft sediments should be removed along the entire length of all proposed drainage structures and replaced with engineered fill to an elevation 2.0 ft above the ground water level or to the invert elevation of the proposed structure, whichever is higher. The outer 10 ft of "B” borrow under the ends of the structure should be enveloped with a continuous length of permeable non-woven geotextile. This geotextile should extend the entire width of the excavation. All the soils surrounding the drainage structures should be compacted to at least 95 percent of the maximum dry density as determined in accordance with section 203.24 of the INDOT standard specifications. The soil in the bottom of the excavation, any bedding material, and the structure backfill, should be tested to insure compliance with this density criteria. If during construction, soft soils are encountered at depths that make removal impractical or if 95 percent of the maximum dry density cannot be obtained at the bottom of the excavation or in other areas, this office should be contacted for additional recommendations.

6.7 Construction Dewatering

Based upon the ground water data obtained during drilling operations, it appears that some dewatering will be required in excavations made during construction. In cases where cohesive soils are encountered in the base of excavations, it is expected that such dewatering can be handled by conventional dewatering methods such as pumping from sumps. In cases where a saturated silt layer is encountered in the base of the excavation, it will not be possible to pump water directly from the base of the excavation without causing a quick condition and deterioration of the subgrade soil. In this case, it will be necessary to pump from a sump located adjacent to the excavation or to depress the ground water using wells or well points. A specialty dewatering contractor should be retained to install and maintain the dewatering system. The best dewatering system for each case must be determined at the time of construction based upon actual field conditions.

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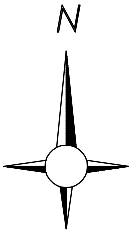
GENERAL CROSS SECTION OF BRIDGE STRUCTURE NO. 1 – Figure 3
GENERAL CROSS SECTION OF BRIDGE STRUCTURE NO. 4 – Figure 4

PROJECT LOCATION SHOWN BY ▬



PROJECT LOCATION MAP

PROPOSED INTERSTATE 69 DESIGN/BUILD PROJECT
INTERSTATE 64 TO STATE ROAD 68
GIBSON AND WARRICK COUNTIES, INDIANA

Project Number: 86.00481.0181

Drn. By: SP

Drawing File: 00481~181B

Ckd. By: SM

Date: 4/07

Scale: NOT TO SCALE

App'd By:

ATC ASSOCIATES INC.

Figure: 1

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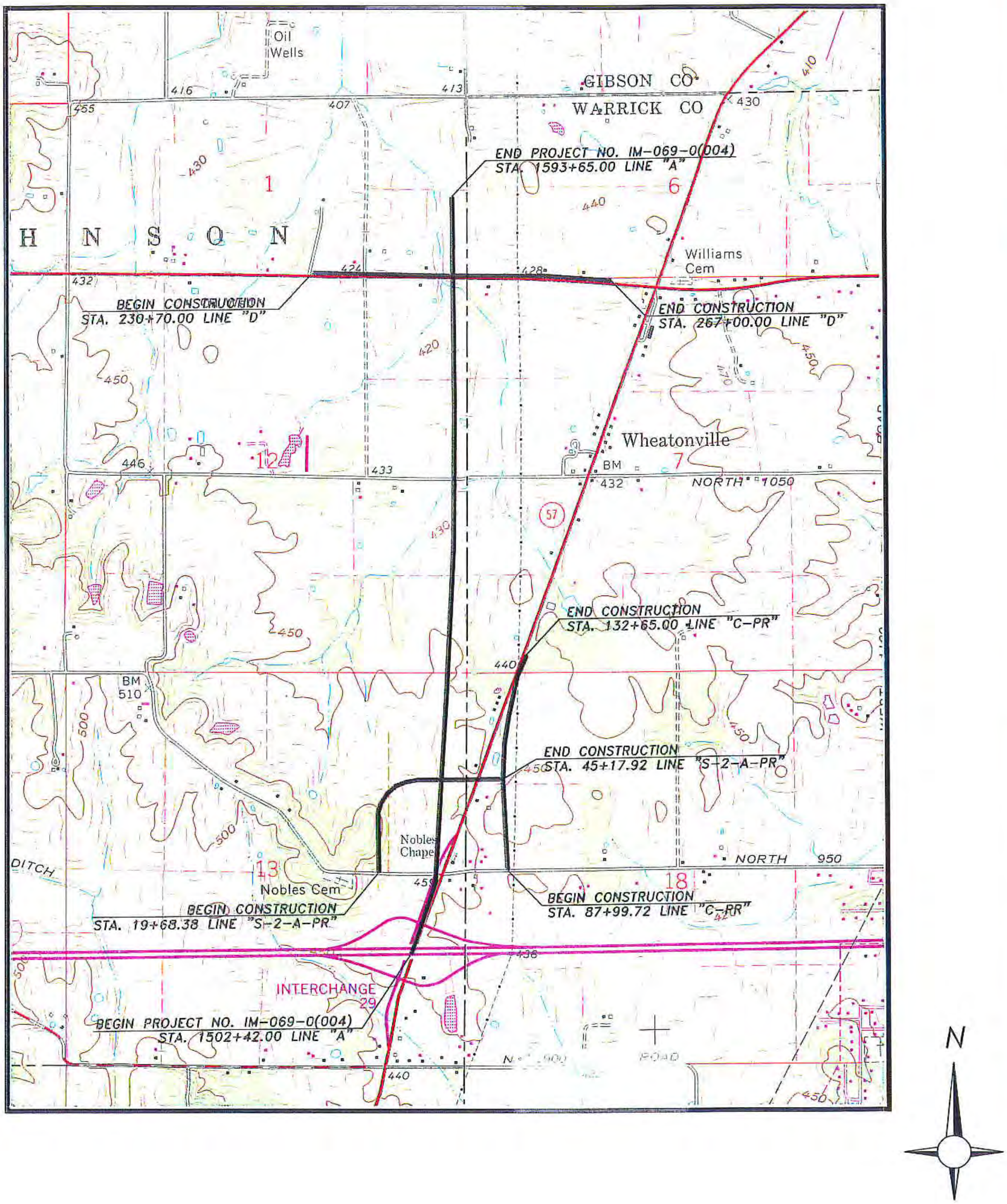

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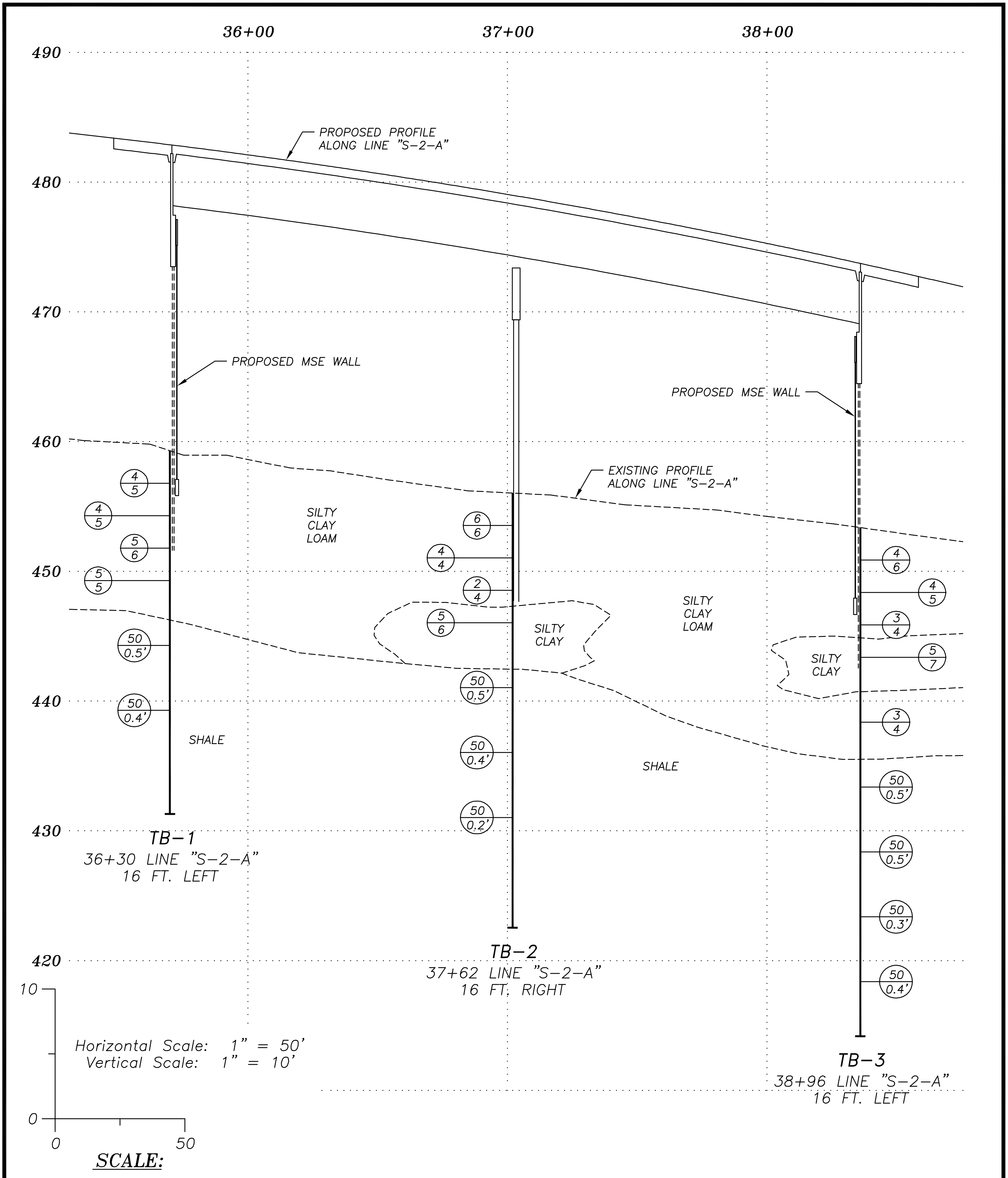
VICINITY MAP

PROPOSED INTERSTATE 69 DESIGN/BUILD PROJECT
INTERSTATE 64 TO STATE ROAD 68
GIBSON AND WARRICK COUNTIES, INDIANA

Project Number: 86.00481.0181		Drn. By: SP
Drawing File: 00481~181B		Ckd. By: SM
Date: 4/07	Scale: 1" = 2000'	App'd By:
ATC ASSOCIATES INC.		Figure: 2



GENERALIZED SUBSURFACE PROFILE

PROPOSED INTERSTATE 69 DESIGN/BUILD PROJECT
INTERSTATE 64 TO STATE ROAD 68
GIBSON AND WARRICK COUNTIES, INDIANA

Project Number: 86.00481.0181
Drn. By: SP
Drawing File: 00481~181B
Ckd. By: SM
Date: 4/07
Scale: AS SHOWN
App'd By:
Figure: 3

ATC ASSOCIATES INC.

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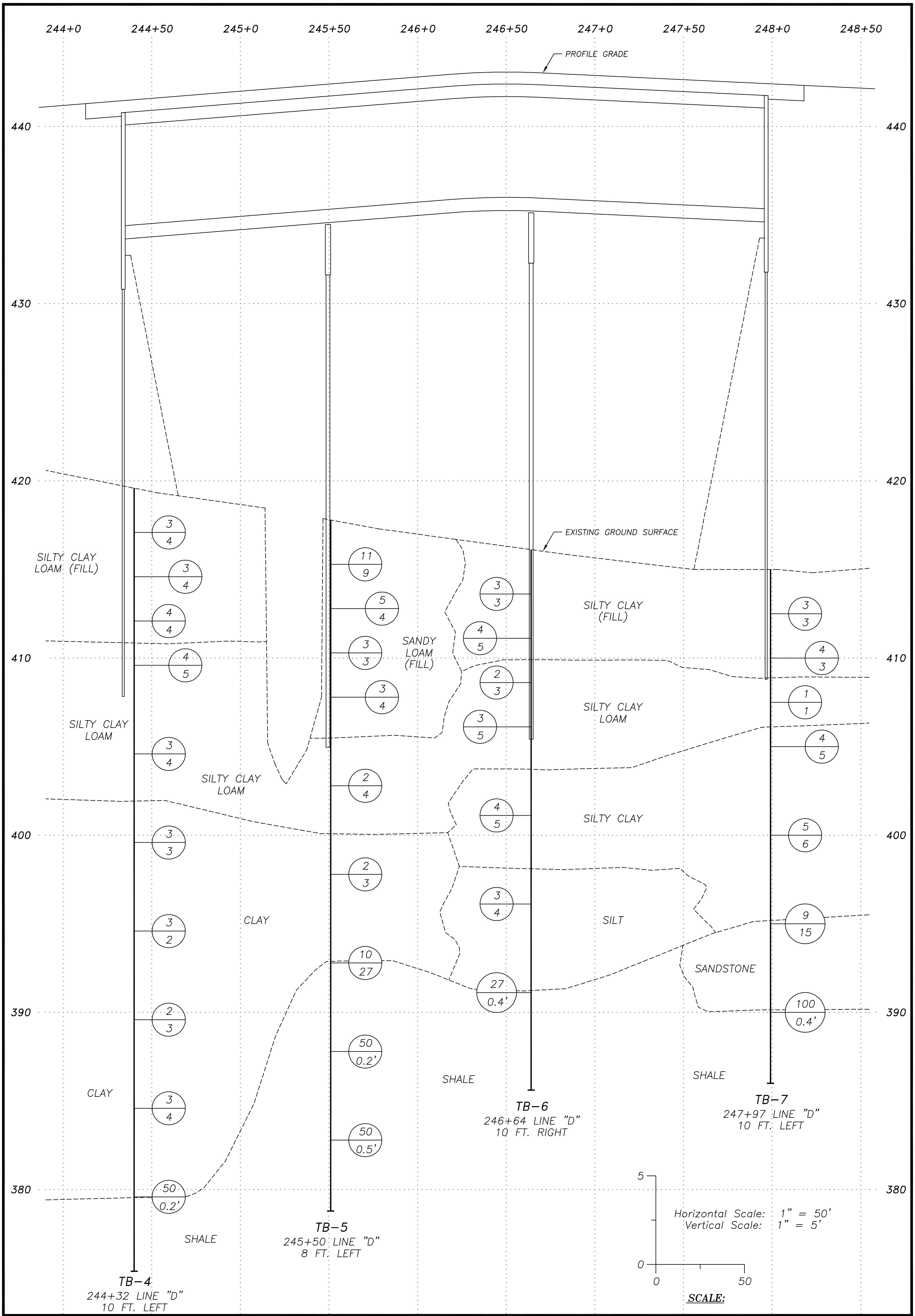

Date: 1/07
Scale: AS SHOWN
Figure: 4

GENERALIZED SUBSURFACE PROFILE

STATE ROAD 68 OVER INTERSTATE 69
PROPOSED INTERSTATE 69 DESIGN/BUILD PROJECT
INTERSTATE 64 TO STATE ROAD 68
GIBSON AND WARRICK COUNTIES, INDIANA

Project Number: 86.00481.0181
Drawing File: 00481~181A-STA246.50

Drn. By: SP
Ckd. By: SM
App'd By:
Ckd. Date:

ATC ASSOCIATES INC.

APPENDIX B

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION
LOGS OF TEST BORINGS - ROADWAY TEST BORINGS (61)
LOGS OF TEST BORINGS - STRUCTURE TEST BORINGS (24)

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON-COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density

Very Loose	-	5 blows/ft or less
Loose	-	6 to 10 blows/ft
Medium Dense	-	11 to 30 blows/ft
Dense	-	31 to 50 blows/ft
Very Dense	-	51 blows/ft or more

Relative Proportions

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

Particle Size Identification

Boulders	-	8 inch diameter or more	
Cobbles	-	3 to 8 inch diameter	
Gravel	-	Coarse	- 1 to 3 inch
		Medium	- ½ to 1 inch
		Fine	- ¼ to ½ inch
Sand	-	Coarse	2.00mm to ¼ inch (dia. of pencil lead)
		Medium	0.42 to 2.00mm (dia. of broom straw)
		Fine	0.074 to 0.42mm (dia. of human hair)
Silt			0.074 to 0.002mm (cannot see particles)

COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency

Very Soft	-	3 blows/ft or less
Soft	-	4 to 5 blows/ft
Medium Stiff	-	6 to 10 blows/ft
Stiff	-	11 to 15 blows/ft
Very Stiff	-	16 to 30 blows/ft
Hard	-	31 blows/ft or more

Plasticity

Degree of Plasticity	Plasticity Index
None to slight	0 – 4
Slight	5 – 7
Medium	8 – 22
High to Very High	over 22

Classification on logs are made by visual inspection of samples.

Standard Penetration Test – Driving a 2.0 in. O.D. 1-3/8 in. I.D. sampler a distance of 1.0 ft into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 in. It is customary for ATC to drive the spoon 6.0 in. to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6.0 in. of penetration on the drill log (example – 6/8/9). The standard penetration test result can be obtained by adding the last two figures (i.e., 8 + 9 = 17 blows/ft). (ASTM D-1586-67).

Strata Changes – In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (——) represents an actually observed change. A dashed line (-----) represents an estimated change.

Ground Water observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs

ATC
ASSOCIATES INC.

ATC ASSOCIATES INC.

7988 Centerpoint Drive, Suite 100
Indianapolis, IN 46256
317-849-4990
Fax 317-849-4278

TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**RB-1**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**1504+00 Line "A"**
	Gibson and Warrick Counties, Indiana	OFFSET	**40 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/17/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/18/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-Truck**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 452	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	451.8	0.2									Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Brown, slightly moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	450.0	2.0		1	SS			2-5-40	17.3	--	
Reddish brown, weathered sandy SHALE				2	SS			50/0.5'		--	
			5	3	SS			50/0.4'		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							☒				
	443.1	8.9		4	SS			50/0.4'		--	Traffic control required
Bottom of Test Boring at 8.9 ft			10								Boring was drilled on edge of shoulder
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools	**None**	ft.
∇ At Completion	**Dry**	ft.
▼ After **24** hours	**Dry**	ft.
☒ Cave Depth	**7.9**	ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-2**

JOB # **86.00481.0181**

STATION **1508+50 Line "A"**

OFFSET **25 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/17/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/18/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-Truck**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 454	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Concrete (Visual)	453.2	0.8										
Dark gray, slightly moist, very stiff, silty clay loam with sand seams (FILL) (Lab No. 2) A-6	451.5	2.5		1	SS	☒	■		7-9-9		--	Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Gray and brown, slightly moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6	448.5	5.5	5	2	SS	☒	■		7-9-12		--	
Gray and brown, moist, medium stiff to very stiff SILT (Lab No. 7) A-4				3	SS	☒	■	▼ ⊠	6-4-3	19.9	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	444.0	10.0	10	4	SS	☒	■		3-3-15	22.8	--	Traffic control required
Bottom of Test Boring at 10.0 ft												INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools		**None** ft.
▽ At Completion		**Dry** ft.
▼ After	**24** hours	**7.2** ft.
⊠ Cave Depth		**7.5** ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-3**
JOB # **86.00481.0181**
STATION **1512+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 457.8	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	457.4	0.4					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and dark brown, moist, soft SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		⊠	2-2-2		1.75	
	454.3	3.5									
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS			3-5-5		2.25	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			5-5-7		3.5	
				4	SS		▽	4-4-7		2.5	
	447.8	10.0	10								
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **9.8** ft.
▼ After **24** hours **0.9** ft.
⊠ Cave Depth **2.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-4**

JOB # **86.00481.0181**

STATION **1516+00 Line "A"**

OFFSET **90 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**

Date Completed **1/12/07**

Drill Foreman **T. Smoot**

Inspector **S. Marcum**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **--** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 458	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	457.7	0.3									Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Brown, moist, stiff, silty clay loam (FILL) (Lab No. 2) A-6	454.5	3.5		1	SS		▼	9-7-6		--	
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	450.0	8.0	5	2 3	SS SS		⊠	5-4-5 4-4-5		2.0 1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	444.5	13.5	10	4	SS			4-5-9		--	
Brown, severely weathered SHALE	443.5	14.5		5	SS			26-50/0.5'		--	
Bottom of Test Boring at 14.5 ft			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

SS	- Driven Split Spoon
ST	- Pressed Shelby Tube
CA	- Continuous Flight Auger
RC	- Rock Core
CU	- Cuttings
CT	- Continuous Tube

Depth to Groundwater

●	Noted on Drilling Tools	**None** ft.
▽	At Completion	**Dry** ft.
▼	After **24** hours	**2.2** ft.
⊠	Cave Depth	**4.0** ft.

Boring Method

HSA	- Hollow Stem Augers
CFA	- Continuous Flight Augers
CA	- Casing Advancer
MD	- Mud Drilling
HA	- Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-5**
JOB # **86.00481.0181**
STATION **1520+00 Line "A"**
OFFSET **80 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 457.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	457.0	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			1-2-4		0.75	
				2	SS			4-6-7	21.3	2.75	
			5				▼				Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			4-6-7		2.75	
				4	SS		⊠	4-5-5	21.8	2.0	
			10								
Brown, severely weathered SHALE	443.8	13.5		5	SS			20-50/0.5'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Bottom of Test Boring at 18.8 ft	438.5	18.8		6	SS			50/0.3'		--	

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **5.9** ft.
- ⊠ Cave Depth **9.6** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-6**

JOB # **86.00481.0181**

STATION **1528+00 Line "A"**

OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 452.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	451.8	0.5					▼				
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-2-4	25.3	0.75	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			3-3-5	26.7	2.0	
			5				🜲				
				3	SS			4-4-5		2.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			4-4-5		2.5	Bulk sample obtained from 1.0 to 5.0 ft
			10								
Dark brown and brown, moist, very stiff SILTY CLAY (Lab No. 1) A-7-6	439.3	13.0									
				5	SS		▽	6-10-12		4.0	
Bottom of Test Boring at 15.0 ft	437.3	15.0	15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **14.8** ft.
- ▼ After **24** hours **0.3** ft.
- 🜲 Cave Depth **5.1** ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**RB-7**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**1532+00 Line "A"**
	Gibson and Warrick Counties, Indiana	OFFSET	**60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/11/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/12/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 452.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	451.7	0.3					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-2-4		2.0	
				2	SS		⊠	3-4-5		1.25	
			5	3	SS			3-4-5		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							●				
				4	SS			4-4-5		--	
			10								
							▽				
	438.0	14.0		5	SS			5-5-20		--	
Brown and dark brown, severely weathered SANDSTONE	437.0	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools	**8.0**	ft.
▽ At Completion	**12.0**	ft.
▼ After **24** hours	**0.7**	ft.
⊠ Cave Depth	**4.7**	ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-8**

JOB # **86.00481.0181**

STATION **1536+00 Line "A"**

OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/11/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/12/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 446.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	446.2	0.3					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, stiff to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS	☒ ■		4-4-7		2.0	
				2	SS	☒ ■		5-5-6		2.0	
			5								
				3	SS	☒ ■		4-4-5		2.25	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							⊠				
	438.0	8.5									
Brown and gray, severely weathered SHALE				4	SS	☒ ■		26-50/0.5'		--	
			10								
				5	SS	☒ ■		36-50/0.4'		--	
	431.5	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.6** ft.
⊠ Cave Depth **7.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-9**
JOB # **86.00481.0181**
STATION **1540+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/11/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/12/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 452.1	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	451.8	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, gray and dark brown, moist medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	2-3-5	27.9	2.5	
				2	SS			2-3-5		2.5	
			5								
				3	SS			4-4-4	22.3	0.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		⊠	4-4-6		2.5	
			10								
	438.6	13.5									
Brown and dark brown, severely weathered SHALE				5	SS			25-36-50/0.5'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	434.1	18.0									
Brown, severely weathered SHALE				6	SS			50/0.5'		--	
	432.1	20.0	20								
Bottom of Test Boring at 20.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **Dry** ft.
▼ After **24** hours **1.4** ft.
⊠ Cave Depth **8.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-10**
JOB # **86.00481.0181**
STATION **1544+00 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 435.4	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	435.1	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	3-3-5		2.5	
				2	SS			4-4-6		2.5	
	429.9	5.5	5								
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS		⊠	5-5-5		1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	426.9	8.5									
Brown and gray, severely weathered SHALE				4	SS			36-43-50		--	
	425.4	10.0									
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.3** ft.
⊠ Cave Depth **6.4** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-11**
JOB # **86.00481.0181**
STATION **1548+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 434.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	433.9	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	2-3-5		3.0	
				2	SS		⊠	6-6-6		2.75	
			5								
				3	SS			5-5-6		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	425.7	8.5									
Brown, moist, medium stiff SILTY CLAY (Lab No.1) A-7-6	424.2	10.0	10	4	SS		▽	4-4-6		2.5	
Bottom of Test Boring at 10.0 ft											
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **9.8** ft.
▼ After **24** hours **1.2** ft.
⊠ Cave Depth **4.6** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-12**
JOB # **86.00481.0181**
STATION **1552+00 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/19/07**
Date Completed **1/20/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 428.6	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	428.3	0.3					▼				
Light brown and light gray, very moist, very soft SILT (Lab No. 7) A-4	425.6	3.0		1	SS		⊠	1-1-2	22.6	1.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, soft SILT (Lab No. 7) A-4	422.6	6.0	5	2	SS			2-2-3	23.5	1.0	
Brown, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6	420.1	8.5		3	SS			5-5-6	20.1	2.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, gray and black, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	415.1	13.5	10	4	SS			5-4-7	27.9	3.0	
Brown and gray, weathered sandy SHALE	413.7	14.9	15	5	SS			34-48-50/0.4'		--	
Bottom of Test Boring at 14.9 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.9** ft.
⊠ Cave Depth **2.3** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-13**
JOB # **86.00481.0181**
STATION **1556+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/19/07**
Date Completed **1/20/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 431.1	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	430.8	0.3					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff to stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS			2-3-5		2.5	
							⊠				
				2	SS			4-5-6		2.5	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			3-5-6		2.0	
				4	SS			4-4-6	23.7	2.5	
			10								
	418.1	13.0									
Brown and black, moist, very stiff SILTY CLAY (Lab No. 4) A-7-6				5	SS			10-10-13		3.5	
	416.1	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.6** ft.
⊠ Cave Depth **2.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-14**
JOB # **86.00481.0181**
STATION **1566+00 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/19/07**
Date Completed **1/20/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 422.8	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	422.3	0.5									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-3-3	25.3	2.0	
				2	SS			4-6-6	23.1	2.75	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			4-4-4		3.0	
	414.8	8.0									
Gray and brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS			4-4-5		3.0	
	412.8	10.0	10								
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.1** ft.
☒ Cave Depth **0.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-15**

JOB # **86.00481.0181**

STATION **1570+00 Line "A"**

OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/19/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/20/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 425.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	424.7	0.5								
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		2-3-4	25.8	2.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
						⊠				
				2	SS		4-4-4	21.4	2.5	
			5							
				3	SS		4-5-5	20.6	3.25	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
-brown and gray below 8.0 ft				4	SS		4-4-4		2.5	
			10							
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	413.2	12.0								
				5	SS		3-3-3		2.25	
	410.2	15.0	15							
Bottom of Test Boring at 15.0 ft										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.1** ft.
⊠ Cave Depth **2.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-16**
JOB # **86.00481.0181**
STATION **1574+00 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/20/07**
Date Completed **1/21/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 426.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	425.8	0.5				▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, gray and dark brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS	⊠	2-4-4	26.6	2.5	
				2	SS		5-4-5		2.5	
			5							
				3	SS		5-5-6	19.4	2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist to very moist, medium stiff to soft SILTY CLAY (Lab No. 1) A-7-6	418.3	8.0								
				4	SS		5-5-5		3.5	
			10							
						●				
				5	SS		3-2-3	30.7	1.75	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Gray, very moist, medium stiff CLAY (Lab No. 5) A-7-6	409.3	17.0								
				6	SS	∇	3-3-3		0.5	
Bottom of Test Boring at 20.0 ft	406.3	20.0	20							

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **13.5** ft.
∇ At Completion **19.8** ft.
▼ After **24** hours **0.1** ft.
⊠ Cave Depth **1.4** ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-17**
JOB # **86.00481.0181**
STATION **1578+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/20/07**
Date Completed **1/21/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 425.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	424.6	0.6				▼				
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		2-4-4		2.5	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
						☒				
				2	SS		6-6-7	23.2	2.75	
			5							
				3	SS		6-6-8		3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		6-6-7	21.0	3.0	
			10							
				5	SS		4-4-5	24.0	3.5	
			15							
						∇				INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown, very moist, very soft CLAY (Lab No. 5) A-7-6	407.2	18.0								
				6	SS	●	2-1-2	27.9	0.5	
Bottom of Test Boring at 20.0 ft	405.2	20.0	20							

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **19.8** ft.
∇ At Completion **16.5** ft.
▼ After **24** hours **0.1** ft.
☒ Cave Depth **2.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-18**

JOB # **86.00481.0181**

STATION **1582+00 Line "A"**

OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/22/07**

Date Completed **1/23/07**

Drill Foreman **T. Smoot**

Inspector **S. Marcum**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **--** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 416.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	416.1	0.2					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, very soft SILTY CLAY (Lab No. 1) A-7-6	415.3	1.0		1	SS			1-1-2	25.2	1.0	
Brown, wet, very soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS			8-5-5	20.4	1.75	
	410.8	5.5	5				⊠				
Brown and gray, slightly moist, medium stiff SILT (Lab No. 9) A-4				3	SS			5-5-5	21.1	0.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	408.3	8.0									
Brown and gray, moist, stiff CLAY (Lab No. 5) A-7-6				4	SS			5-6-6		2.0	
			10								
	405.3	11.0									
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 4) A-7-6							●				
				5	SS			4-4-4		1.75	
	401.3	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **13.0** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **0.8** ft.
- ⊠ Cave Depth **5.4** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-19**
JOB # **86.00481.0181**
STATION **1586+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 411.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	411.2	0.5					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light brown and light gray, very moist, very soft SILT (Lab No. 7) A-4	408.7	3.0		1	SS		⊠	1-1-1	23.5	0.5	
Brown and light brown, slightly moist, medium stiff SILT (Lab No. 7) A-4	405.7	6.0	5	2	SS			4-3-4	21.1	1.5	
Brown and black, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	403.7	8.0		3	SS		∇	4-3-4	21.9	0.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	401.7	10.0	10	4	SS			3-4-5	24.6	3.0	
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **7.5** ft.
▼ After **24** hours **0.6** ft.
⊠ Cave Depth **2.6** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-20**
JOB # **86.00481.0181**
STATION **232+00 Line "D"**
OFFSET **8 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/16/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 429	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.9 ft Asphalt, 1.0 ft Crushed Limestone (Visual)	427.1	1.9		1	SS			7-5-5		--	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS			3-5-3	24.0	1.75	
			5								
				3	SS		▽	5-5-5	13.6	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			5-4-4	22.7	2.5	Traffic control with flagmen required
			10								
							⊠				
	415.5	13.5									
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	414.0	15.0	15	5	SS			5-5-8		2.25	
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **6.0** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **13.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-21**
JOB # **86.00481.0181**
STATION **236+00 Line "D"**
OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 424	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
1.0 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	422.5	1.5								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, stiff to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		5-5-6		--	
				2	SS		6-7-8		3.5	
			5							Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS	▽	5-6-8	21.4	3.5	
				4	SS		3-3-4		1.75	Traffic control with flagmen required
			10							
	411.0	13.0				⊠				
Gray and brown, moist, soft SILTY CLAY LOAM (Lab No. 3) A-6				5	SS		3-2-3	33.7	2.0	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS		2-2-3	25.4	0.5	
	404.0	20.0	20							
Bottom of Test Boring at 20.0 ft										

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **7.0** ft.
- ▼ After **--** hours **--** ft.
- ⊠ Cave Depth **13.1** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-22**
JOB # **86.00481.0181**
STATION **240+00 Line "D"**
OFFSET **8 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**
Date Completed **1/3/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 422	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.5 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	421.0	1.0									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS			3-4-3	21.3	2.0	
				2	SS			4-3-4		--	
			5								
				3	SS			2-4-6	21.8	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		⊠	3-5-6		3.0	Traffic control with flagmen required
			10								
				5	SS			3-3-4	22.5	2.5	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS			3-3-3		0.5	
Bottom of Test Boring at 20.0 ft	402.0	20.0	20								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **9.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-23**

JOB # **86.00481.0181**

STATION **252+00 Line "D"**

OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**

Date Completed **1/3/07**

Drill Foreman **C. Carroll**

Inspector **S. Marcum**

Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **--** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 420	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.7 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	418.8	1.2									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Gray to brown, moist, medium stiff, silty clay with trace crushed limestone (FILL) (Lab No. 1) A-7-6				1	SS			3-4-6	22.5	--	
				2	SS			3-3-3		--	
	414.0	6.0	5								
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS			3-3-6	20.1	1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			3-3-4		3.0	Traffic control with flagmen required
	408.0	12.0	10								
Brown and gray, moist, medium stiff to very stiff SILTY CLAY (Lab No. 1) A-7-6				5	SS			4-4-6	16.1	4.5+	
			15				⊠				INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS			4-7-9		--	
	400.0	20.0	20								
Bottom of Test Boring at 20.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **15.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-24**
JOB # **86.00481.0181**
STATION **256+00 Line "D"**
OFFSET **8 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/15/07**
Date Completed **1/15/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 428

Soil Classification	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	427.7	0.3								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		4-5-5	25.8	3.0	
				2	SS		4-5-6	22.0	3.5	
			5							
				3	SS	●	5-5-6	23.1	2.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		4-4-4		1.0	Traffic control with flagmen required
			10							
						∇				
						⊠				
	415.0	13.0								
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 4) A-7-6				5	SS		5-5-5	23.6	2.25	
	413.0	15.0	15							
Bottom of Test Boring at 15.0 ft										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **6.5** ft.
∇ At Completion **11.5** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **12.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-25**

JOB # **86.00481.0181**

STATION **260+00 Line "D"**

OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/15/07**

Date Completed **1/15/07**

Drill Foreman **T. Smoot**

Inspector **B. Kleeman**

Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **--** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 430	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
1.1 ft Asphalt, 0.9 ft Crushed Limestone (Visual)	428.0	2.0		1	SS			4-4-4		2.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff to stiff SILTY CLAY (Lab No. 1) A-7-6			5	2	SS			4-5-6		2.75	
				3	SS			5-5-6	20.7	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10	4	SS			5-7-7		3.25	Traffic control with flagmen required
							▽ ⊠				
	415.0	15.0	15	5	SS			4-4-6		4.0	
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
▽ At Completion **11.5** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **13.0** ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-26**

JOB # **86.00481.0181**

STATION **88+50 Line "PR-C"**

OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 450.4	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	450.1	0.3								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 1) A-7-6				1	SS		3-3-4	26.4	3.0	
				2	SS		4-4-5		1.5	
			5							Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS		4-5-7		2.0	
	442.4	8.0								
Brown, moist, stiff SILTY CLAY (Lab No. 2) A-6				4	SS		6-6-7		3.0	
			10							
						⊠				
	436.9	13.5								
Brown, weathered SHALE	436.0	14.4		5	SS		36-50/0.4'		--	
Bottom of Test Boring at 14.4 ft										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **12.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-27**

JOB # **86.00481.0181**

STATION **93+00 Line "PR-C"**

OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 450.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	450.4	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and light gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS			2-3-3	19.6	1.0	
				2	SS			4-4-4	23.1	1.5	
			5								
				3	SS			3-3-4	22.1	1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and light gray, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6	442.7	8.0									
				4	SS			5-5-7		2.0	
			10								
							⊠				
Brown, weathered SHALE	437.2 436.7	13.5 14.0		5	SS			50/0.5'		--	
Bottom of Test Boring at 14.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **13.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-28**

JOB # **86.00481.0181**

STATION **97+00 Line "PR-C"**

OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 451.6	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	451.3	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, soft to stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS			2-2-3		1.5	
			5	2	SS			5-5-6	23.6	2.5	
				3	SS			5-6-6	32.8	2.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10	4	SS			6-6-7		2.5	
	438.1	13.5					⊠				
Gray, severely weathered SHALE	437.1	14.5		5	SS			37-50/0.5'		--	
Bottom of Test Boring at 14.5 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **13.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-29**
JOB # **86.00481.0181**
STATION **101+00 Line "PR-C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 444.1	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	443.8	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, soft SILTY CLAY (Lab No. 1) A-7-6				1	SS			1-2-2	26.2	0.25	
	441.1	3.0									
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS			3-3-4	23.0	1.5	
			5								
				3	SS			5-5-6		3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			4-4-4	22.2	3.0	
			10								
							⊠				
	430.6	13.5									
Brown and gray, severely weathered SANDSTONE	430.0	14.1		5	SS			30-50/0.1'		--	
Bottom of Test Boring at 14.1 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **13.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-30**
JOB # **86.00481.0181**
STATION **105+00 Line "PR-C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/18/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 439.8	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	439.5	0.3				▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light gray and brown, very moist, soft SILT (Lab No. 7) A-4	436.8	3.0		1	SS		1-2-2	24.1	0.75	
Brown and light gray, slightly moist, medium stiff SILT (Lab No. 9) A-4	434.3	5.5	5	2	SS		4-4-5		3.5	
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	431.8	8.0		3	SS		4-4-5	22.0	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Reddish brown, moist, hard SILTY CLAY (Lab No. 1) A-7-6	430.3	9.5		4	SS		7-17-20		--	
Reddish brown, severely weathered SANDSTONE	426.3	13.5	10			☒				
Gray, weathered SHALE	425.9	13.9		5	SS		50/0.4'		--	
Bottom of Test Boring at 13.9 ft										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **0.9** ft.
- ☒ Cave Depth **13.5** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-31**
JOB # **86.00481.0181**
STATION **109+00 Line "PR-C"**
OFFSET **20 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/18/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 442	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	441.7	0.3									Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	440.0	2.0		1	SS		▼	4-4-4	20.7	3.0	
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	436.5	5.5	5	2	SS			4-4-4	20.7	2.5	
Reddish brown and gray, moist, medium stiff SILTY CLAY (Lab No. 4) A-7-6				3	SS			4-4-5		2.25	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		⊠	3-3-4		2.5	
	428.5	13.5	10								
Brown, weathered SHALE	427.9	14.1		5	SS			50/0.6'		--	
Bottom of Test Boring at 14.1 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.4** ft.
⊠ Cave Depth **9.7** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-32**
JOB # **86.00481.0181**
STATION **113+00 Line "PR-C"**
OFFSET **12 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/4/07**
Date Completed **1/4/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 439	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
1.1 ft Asphalt, 0.6 ft Crushed Limestone (Visual)	437.3	1.7		1	SS			5-9-10	16.4	--	Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Brown, slightly moist, very stiff, silty clay loam (FILL) (Lab No. 2) A-6	435.5	3.5		2	SS			4-5-6	21.3	3.0	
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	433.5	5.5	5	3	SS			3-4-4	19.5	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	427.0	12.0	10	4	SS		⊠	3-3-4		--	Traffic control required
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	424.0	15.0	15	5	SS			5-6-8		--	
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **12.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-33**
JOB # **86.00481.0181**
STATION **20+00 "S-2-A"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 483.6	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	483.3	0.3									
Brown and dark brown, moist, soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-2-3		2.25	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			2-3-3	26.3	2.5	
			5								
				3	SS		▼	2-3-5		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		⊠	4-5-5	22.0	3.25	
			10								
Brown, gray and dark brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	471.6	12.0									
				5	SS			3-4-8	20.0	3.5	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown, severely weathered SHALE	465.1 464.6	18.5 19.0		6	SS			50/0.5'		--	
Bottom of Test Boring at 19.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **6.2** ft.
⊠ Cave Depth **9.6** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-34**
JOB # **86.00481.0181**
STATION **23+50 "S-2-A"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 490.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	490.3	0.2									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6	489.0	1.5		1	SS			8-10-12		--	
Brown and gray, severely weathered SHALE											
				2	SS			16-22-21		--	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
-reddish brown and gray below 6.0 ft				3	SS			6-10-14		--	
				4	SS			6-7-14		--	
			10								
							▼				
				5	SS			50/0.5'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
							⊠				
				6	SS			37-50/0.4'		--	
			20								
-gray below 22.0 ft											
	466.7	23.8		7	SS			50/0.3'		--	Auger refusal at 23.8 ft
Bottom of Test Boring at 23.8 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **12.8** ft.
⊠ Cave Depth **18.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-35**
JOB # **86.00481.0181**
STATION **27+00 "S-2-A-PR"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 487.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	487.3	0.2									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Dark brown and gray, severely weathered SHALE				1	SS			36-50/0.4'		--	
-gray below 3.0 ft				2	SS			50/0.4'		--	
			5								
				3	SS			50/0.5'		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			50/0.3'		--	
			10								
				5	SS			50/0.3'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	468.8	18.7		6	SS			50/0.2'		--	
Bottom of Test Boring at 18.7 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
☒ Cave Depth **--** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-36**
JOB # **86.00481.0181**
STATION **29+50 "S-2-A-PR"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 477.5

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	477.1	0.4								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, soft to medium stiff SILTY CLAY LOAM (Lab No.2)				1	SS	▼	1-2-2	31.3	0.75	
				2	SS		3-3-5	26.2	1.25	
	472.0	5.5	5							Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, gray and dark brown, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6				3	SS		2-7-7		2.75	
	469.5	8.0								
Brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS	⊠	4-5-6		3.0	
			10							
	464.0	13.5								
Brown and dark brown, severely weathered SHALE				5	SS		30-50/0.5'		--	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS		30-50/0.4'		--	
Bottom of Test Boring at 20.0 ft	457.5	20.0	20							

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **2.8** ft.
- ⊠ Cave Depth **9.2** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-37**
JOB # **86.00481.0181**
STATION **32+00 "S-2-A-PR"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 468.8	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	468.4	0.4								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, gray and dark brown, moist, medium stiff to very stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		2-4-5	27.7	2.25	
				2	SS	▼	6-8-8		3.5	
			5							Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS		6-7-8	20.0	3.5	
	459.8	9.0		4	SS		16-17-35		--	
Brown and gray, severely weathered SHALE										
			10							
						☒				
				5	SS		25-46-50/0.4'		--	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
-gray below 17.0 ft										
	449.4	19.4		6	SS		47-50/0.4'		--	
Bottom of Test Boring at 19.4 ft										Auger refusal at 19.4 ft

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **4.1** ft.
☒ Cave Depth **12.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-38**

JOB # **86.00481.0181**

STATION **43+00 "S-2-A-PR"**

OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 444	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	443.7	0.3									Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Light brown, very moist, soft SILT (Lab No. 7) A-4	441.0	3.0		1	SS		▼	2-2-2		0.5	
Brown, gray and black, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				2	SS			3-3-4		3.0	
			5				⊠				Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	436.0	8.0		3	SS			5-5-5		2.75	
Brown and gray, moist, very stiff SILTY CLAY (Lab No. 4) A-7-6							●				
	433.0	11.0	10	4	SS			3-10-15		2.75	
Gray, severely weathered SHALE	429.0	15.0		5	SS			17-20-50		--	
			15								
Bottom of Test Boring at 15.0 ft											Auger refusal at 15.0 ft
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **8.5** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.3** ft.
⊠ Cave Depth **5.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**RB-39**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**46+00 Line "S-2-C"**
	Gibson and Warrick Counties, Indiana	OFFSET	**10 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/4/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/4/07**	Hammer Drop	**30** in.
Drill Foreman	**C. Carroll**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**--** in.
Boring Method	**HSA-Truck**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 451.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.5 ft Asphalt, 0.5 ft Crushed Limestone	450.3	1.0									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			4-4-5		2.0	
				2	SS			3-4-4		2.0	
	445.8	5.5	5								
Brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS			5-5-7		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							⊠				
	441.3	10.0	10	4	SS			6-7-6		--	Traffic control required
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **8.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-40**
JOB # **86.00481.0181**
STATION **22+00 Line "T-1-A"**
OFFSET **10 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/16/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 467.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.1 ft Asphalt, 0.2 ft Crushed Limestone (Visual)	467.4	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light brown and gray, moist, medium stiff to very stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS			4-5-5		1.5	
			5	2	SS			4-7-10		3.5	
	461.7	6.0									Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown to gray, severely weathered SHALE				3	SS		⊠	20-47-50		--	
				4	SS			26-35-45		--	Traffic control required
	457.7	10.0	10								
Bottom of Test Boring at 10.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **7.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-41**
JOB # **86.00481.0181**
STATION **3+00 Line "LSR3"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 434.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	433.3	0.7									
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS	☒ ■	▼	3-3-4	23.4	2.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS	☒ ■	⊠	4-5-5	22.3	3.0	
			5								
				3	SS	☒ ■		5-5-6		2.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	424.0	10.0		4	SS	☒ ■		4-4-5		2.75	
Bottom of Test Boring at 10.0 ft			10								
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.2** ft.
⊠ Cave Depth **4.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-42**
JOB # **86.00481.0181**
STATION **7+00 Line "LSR3"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 436.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	435.8	0.7									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-3-6		2.5	
							▼				
				2	SS			4-5-6		2.25	
			5								
							⊠				Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			5-6-7		3.0	
Brown and dark brown, moist, very stiff SILTY CLAY (Lab No. 1) A-7-6	428.5	8.0									
				4	SS			9-14-17		4.0	
			10								
Brown, severely weathered SHALE	423.0 422.4	13.5 14.1		5	SS			50/0.6'		--	
Bottom of Test Boring at 14.1 ft											
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.8** ft.
⊠ Cave Depth **6.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-43**
JOB # **86.00481.0181**
STATION **10+00 Line LSR3"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 428.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	427.6	0.7								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, very moist, very soft SILTY CLAY (Lab No. 1) A-7-6	425.3	3.0		1	SS	▼ ⊠	1-1-1	26.3	0.5	
Gray and brown, moist, soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6			5	2	SS		2-2-2	23.7	0.75	
	420.3	8.0		3	SS		2-4-5	19.1	4.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, very moist, very soft SILTY CLAY (Lab No. 1) A-7-6	418.3	10.0	10	4	SS	∇ ●	2-1-2	32.4	2.0	
Bottom of Test Boring at 10.0 ft										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **8.5** ft.
- ∇ At Completion **7.8** ft.
- ▼ After **24** hours **1.3** ft.
- ⊠ Cave Depth **3.0** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-44**
JOB # **86.00481.0181**
STATION **11+00 Ramp "A-1"**
OFFSET **12 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/18/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 454	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	453.7	0.3									Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Brown, moist, medium stiff to very stiff, silty clay loam (FILL) (Lab No. 2) A-6				1	SS			4-4-3		--	
				2	SS			13-10-11		3.0	
	448.5	5.5	5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Concrete fragments (FILL)	447.3	6.7		3	SS			15-50/0.2'		--	Auger refusal at 6.7 ft
Bottom of Test Boring at 6.7 ft											Traffic control required
											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **Dry** ft.
☒ Cave Depth **5.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-44-A**
JOB # **86.00481.0181**
STATION **11+10 Ramp "A-1"**
OFFSET **12 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/18/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 454	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Blank Drill											Ground surface elevation provided by Bernarndin-Lochmueller & Associates
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	445.5	8.5									
Brown, moist, very stiff, silty clay loam (FILL) (Lab No. 2) A-6				1	SS			5-9-8		2.5	
			10								
							☒				
	441.5	12.5									
Gray, wet, very soft SILT (Lab No. 6) A-4				2	SS			2-2-1		0.25	
	439.0	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **Dry** ft.
☒ Cave Depth **12.3** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-45**
JOB # **86.00481.0181**
STATION **15+00 Ramp "B-1"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 458.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	457.6	0.4									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			3-3-4		1.0	
-black streaking noted below 3.0 ft							▼				
				2	SS			3-5-6	25.9	1.25	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS		☒	3-5-5		1.25	
Brown and gray, severely weathered SANDSTONE	448.5	9.5		4	SS			8-10-15		--	
			10								
Brown to gray, severely weathered SHALE	446.0	12.0									
				5	SS			50/0.4'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Bottom of Test Boring at 18.9 ft	439.1	18.9		6	SS			50/0.4'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.9** ft.
☒ Cave Depth **7.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-46**
JOB # **86.00481.0181**
STATION **19+00 Ramp "B-1"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/11/07**
Date Completed **1/12/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 456.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	456.1	0.4					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, very moist, very soft SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			1-0-1	29.0	0.5	
				2	SS			1-2-1	29.6	0.5	
			5				●				Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6	450.5	6.0		3	SS			4-6-6	18.7	3.5	
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	448.5	8.0		4	SS			5-5-5		3.0	
			10				⊠				
Brown to gray, severely weathered SHALE	443.0	13.5		5	SS			50/0.3'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Bottom of Test Boring at 18.7 ft	437.8	18.7		6	SS			50/0.2'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **5.5** ft.
⊻ At Completion **Dry** ft.
▼ After **24** hours **0.4** ft.
⊠ Cave Depth **11.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-47**
JOB # **86.00481.0181**
STATION **23+00 Ramp "B-1"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/17/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 460.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	460.3	0.4									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, hard to stiff SILTY CLAY (Lab No. 1) A-7-6				1	SS		▼	3-14-17		1.75	
				2	SS			9-17-13		4.0	
			5	3	SS			7-7-8		3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, stiff SILTY CLAY (Lab No. 4) A-7-6	452.7	8.0					⊠				
				4	SS			7-7-8		3.5	
			10								
Brown, severely weathered SHALE	447.2	13.5		5	SS			50/0.2'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Gray, weathered SHALE	442.2	18.5		6	SS			50/0.1'		--	
Bottom of Test Boring at 20.0 ft	440.7	20.0	20								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.4** ft.
⊠ Cave Depth **8.4** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-48**
JOB # **86.00481.0181**
STATION **27+00 Ramp "B-1"**
OFFSET **12 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/17/07**
Date Completed **1/18/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 462	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	461.7	0.3									
Brown and gray, slightly moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6	460.5	1.5		1	SS	☒		6-16-22		4.0	Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
Gray, severely weathered SHALE				2	SS	☒		32-42-50		--	
			5	3	SS	☒	▼	23-35-48		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, weathered SHALE	454.0	8.0		4	SS	☒		23-34-50		--	
			10				⊠				
				5	SS	☒		50/0.3'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS	☒		50/0.3'		--	
Bottom of Test Boring at 20.0 ft	442.0	20.0	20								

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **5.9** ft.
⊠ Cave Depth **12.1** ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-49**
JOB # **86.00481.0181**
STATION **7+00 Ramp "B"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/20/07**
Date Completed **1/21/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 430.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	429.7	0.5									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, gray and dark brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS	☒ ■		2-3-4	27.6	1.5	
							▼				
				2	SS	☒ ■		3-3-4	24.9	1.75	
			5								
				3	SS	☒ ■		3-4-5		2.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS	☒ ■		5-5-5	24.0	2.25	
			10								
							⊠				
	418.2	12.0									
Brown, very moist, stiff SILT (Lab No. 6) A-4				5	SS	☒ ■		5-5-6		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	413.2	17.0									
Gray, very moist, soft to very soft CLAY (Lab No. 5) A-7-6				6	SS	☒ ■		3-2-3	29.5	2.0	
			20								
							▽				
				7	SS	☒ ■		1-1-2	36.2	0.75	
	405.2	25.0	25								
Bottom of Test Boring at 25.0 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **22.0** ft.
- ▼ After **24** hours **2.4** ft.
- ⊠ Cave Depth **11.1** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-50**
JOB # **86.00481.0181**
STATION **10+00 Ramp "B"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/22/07**
Date Completed **1/23/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 429.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	429.2	0.3									
Brown and dark brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			3-4-5	22.3	--	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			4-5-6		--	
			5				▼				
				3	SS			4-5-6	18.2	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			5-5-8		--	
			10								
	417.5	12.0									
Brown, wet, medium stiff SILT (Lab No. 6) A-4				5	SS		☒	4-3-5		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	412.5	17.0									
Gray, very moist, soft CLAY (Lab No. 5) A-7-6				6	SS			3-3-2	29.3	--	
			20								
	407.5	22.0									
Gray, wet, very soft SILT (Lab No. 6) A-4				7	SS			2-1-2		--	
	404.5	25.0	25								
Bottom of Test Boring at 25.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **5.5** ft.
☒ Cave Depth **14.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-51**
JOB # **86.00481.0181**
STATION **14+00 Ramp "B"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/22/07**
Date Completed **1/23/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 413.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	412.3	0.7					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and dark brown, very moist to moist, very soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			1-2-1	28.5	0.5	
				2	SS		⊠	3-3-3	20.6	0.75	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
-brown and gray below 6.0 ft				3	SS			2-4-6		2.0	
				4	SS			4-4-4	22.7	2.5	
			10								
Brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	401.0	12.0									
				5	SS			4-6-6		3.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, severely weathered SHALE	394.5	18.5									
Bottom of Test Boring at 18.9 ft	394.1	18.9		6	SS			50/0.4'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.6** ft.
⊠ Cave Depth **4.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-52**

JOB # **86.00481.0181**

STATION **20+00 Ramp "B"**

OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 417.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	416.2	0.8									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light gray and brown, very moist, soft SILT (Lab No. 7) A-4	414.0	3.0		1	SS		▼	1-2-2	21.7	1.0	
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				2	SS			1-3-4	24.6	0.25	
			5	3	SS		☒	3-4-4		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			5-5-5		2.75	
	404.0	13.0	10								
Brown and light brown, slightly moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6	399.0	18.0	15	5	SS			7-7-7		3.5	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Dark brown and gray, moist, stiff SILTY CLAY (Lab No. 4) A-7-6	397.0	20.0	20	6	SS			5-6-7		4.0	
Bottom of Test Boring at 20.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.1** ft.
☒ Cave Depth **6.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-53**
JOB # **86.00481.0181**
STATION **3+00 Ramp "C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 425.1

Soil Classification	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	424.4	0.7									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	4-5-5	26.8	1.5	
				2	SS			2-4-6		3.0	
			5								
				3	SS			5-5-6	19.3	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		⊠	6-6-7		2.25	
			10								
	413.1	12.0									
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				5	SS			3-3-4	29.4	2.75	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	407.1	18.0									
Brown, wet, soft SILT (Lab No. 6) A-4				6	SS			3-2-2		1.5	
	405.1	20.0	20								
Bottom of Test Boring at 20.0 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **2.6** ft.
- ⊠ Cave Depth **9.8** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-54**
JOB # **86.00481.0181**
STATION **7+00 Ramp "C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 415.4	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	414.7	0.7					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light brown and light gray, very moist, very soft SILT (Lab No. 7) A-4				1	SS	☒ ■		2-2-1	23.6	0.75	
				2	SS	☒ ■		1-2-1	25.3	0.5	
	409.9	5.5	5								
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS	☒ ■	▽ ⊠	3-3-4	20.3	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS	☒ ■	●	4-4-3	27.5	3.5	
			10								
	402.4	13.0									
Gray, wet, medium stiff SILT (Lab No. 6) A-4				5	SS	☒ ■		3-3-3		1.75	
	400.4	15.0	15								
Bottom of Test Boring at 15.0 ft											INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **8.5** ft.
▽ At Completion **6.0** ft.
▼ After **24** hours **0.8** ft.
⊠ Cave Depth **6.2** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-55**
JOB # **86.00481.0181**
STATION **13+00 Ramp "C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started	**1/20/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/21/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 419.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	419.2	0.5					▼				
Brown and dark brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-3-5		2.25	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			4-5-5	18.2	3.0	
			5								
				3	SS			4-4-6		3.25	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	411.7	8.0									
				4	SS			5-6-6	20.1	3.0	
			10								
Brown, gray and dark brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	407.7	12.0									
				5	SS			4-6-4	20.1	2.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	402.7	17.0					⊠				
				6	SS			4-6-8		2.5	
Bottom of Test Boring at 20.0 ft	399.7	20.0	20								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

●	Noted on Drilling Tools	**None** ft.
∇	At Completion	**Dry** ft.
▼	After **24** hours	**0.3** ft.
⊠	Cave Depth	**17.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-56**
JOB # **86.00481.0181**
STATION **17+00 Ramp "C"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/20/07**
Date Completed **1/21/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 428.1	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	427.6	0.5					▼				
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		⊠	2-4-5		1.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
			5	2	SS			3-3-5	35.6	1.75	
				3	SS			4-3-4		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10	4	SS			5-4-4	21.4	2.0	
			15	5	SS		▽	3-3-3	29.1	2.0	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	411.1	17.0									
Brown and gray, very moist, soft SILTY CLAY (Lab No. 1) A-7-6			20	6	SS		●	2-2-2	36.9	2.5	
	406.1	22.0									
Gray, very moist, very soft CLAY (Lab No. 5) A-7-6			25	7	SS			0-0-1	53.9	0.25	
	401.1	27.0									
Gray and dark brown, moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6 Bottom of Test Boring at 30.0 ft	398.1	30.0		8	SS			8-10-10		3.0	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **19.8** ft.
▽ At Completion **16.0** ft.
▼ After **24** hours **0.1** ft.
⊠ Cave Depth **2.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-57**
JOB # **86.00481.0181**
STATION **3+50 Ramp "A"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 417.8	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	417.3	0.5					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and light gray, very moist, very soft SILT (Lab No. 7) A-4				1	SS	☒		1-0-1	27.5	--	
	414.8	3.0									
Light gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS	☒	⊠	3-3-3		--	
			5								
				3	SS	☒		5-5-6		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	409.8	8.0									
Brown, slightly moist, stiff to very stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS	☒		5-5-7	22.5	--	
			10								
				5	SS	☒		5-7-9		4.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	399.3	18.5									
Gray, weathered SHALE	398.2	19.6		6	SS	☒		23-50/0.6'		--	
Bottom of Test Boring at 19.6 ft											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools	**None**	ft.
▽ At Completion	**Dry**	ft.
▼ After **24** hours	**0.9**	ft.
⊠ Cave Depth	**4.0**	ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-58**
JOB # **86.00481.0181**
STATION **20+00 Ramp "D"**
OFFSET **Centerline**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 412.9	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	412.4	0.5					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Light gray and brown, very moist, very soft SILT (Lab No. 7) A-4				1	SS			2-1-2	25.5	0.25	
				2	SS			1-1-2	26.7	0.25	
	407.4	5.5	5								
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS			2-3-3	24.7	1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			3-3-4	22.5	2.5	
			10								
	399.9	13.0					☒				
Gray, wet, soft SILT (Lab No. 6) A-4				5	SS			2-2-2		1.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	394.4	18.5									
Gray, very moist, very soft CLAY (Lab No. 5) A-7-6				6	SS			2-1-2	52.9	0.5	
	392.9	20.0	20								
Bottom of Test Boring at 20.0 ft											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.9** ft.
☒ Cave Depth **12.9** ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-59**
JOB # **86.00481.0181**
STATION **1595+00 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 410.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	409.6	0.4				▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brownish gray, moist, very soft SILT (Lab No. 7) A-4	407.0	3.0		1	SS		2-1-1	26.0	--	
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	404.5	5.5	5	2	SS	⊠	4-3-4	23.0	--	
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS		4-4-4	20.9	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10	4	SS		4-5-5	20.0	--	
	394.0	16.0	15	5	SS		6-8-11		--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, severely weathered SHALE	390.0	20.0	20	6	SS		50/0.1'		--	
Bottom of Test Boring at 20.0 ft										

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.3** ft.
⊠ Cave Depth **4.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **RB-60**
JOB # **86.00481.0181**
STATION **1599+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 409.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	408.5	0.5									
Light gray and brown, very moist, very soft SILT (Lab No. 7) A-4				1	SS			2-1-1	26.7	0.5	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
							☒				
	405.5	3.5									
Brown and gray, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6				2	SS			3-5-6	28.6	1.5	
	403.5	5.5	5								
Brown, moist, medium stiff to stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS			4-3-4	24.2	1.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS			5-5-7		2.5	
			10								
	396.0	13.0									
Gray, moist, hard SILTY CLAY (Lab No. 4) A-7-6							●				
				5	SS			17-19-35		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	390.5	18.5									
Gray, severely weathered SHALE	390.3	18.7		6	SS			50/0.2'		--	
Bottom of Test Boring at 18.7 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **13.5** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.1** ft.
☒ Cave Depth **3.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**RB-61**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**1603+00 Line "A"**
	Gibson and Warrick Counties, Indiana	OFFSET	**60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/18/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/19/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 414.1	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	413.6	0.5									
Brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			3-3-4	24.2	1.5	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			4-6-6		2.0	
			5								
				3	SS			2-4-6	19.4	2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	406.1	8.0									
Brown and gray, moist, stiff to very stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS		▼	4-5-6	21.1	2.75	
			10								
				5	SS		⊠	11-9-12		4.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
-shale fragments noted in Sample No. 6				6	SS			7-9-13		4.5	
	394.1	20.0	20								
Bottom of Test Boring at 20.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **9.6** ft.
⊠ Cave Depth **13.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-1**
JOB # **86.00481.0181**
STATION **36+30 "S-2-A-PR"**
OFFSET **16 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/10/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 459.4	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	459.1	0.3				▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		2-4-5	25.4	--	
				2	SS		3-4-5	27.1	--	
			5							
				3	SS		4-5-6		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
						⊠				
-brown and dark brown below 8.0 ft				4	SS		4-5-5	21.9	2.5	
			10							
	447.4	12.0								
Brown and dark brown, severely weathered SHALE										
				5	SS		36-50/0.5'		--	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS		50/0.4'		--	
			20							
	436.4	23.0								
Gray, hard SHALE				RC-1	RC					Auger refusal at 23.0 ft
			25							Bedrock cored from 23.0 ft to 28.0 ft Recovery = 100% RQD = 96%
	431.4	28.0								
Bottom of Test Boring at 28.0 ft										

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **Dry** ft.
▼ After **24** hours **1.1** ft.
⊠ Cave Depth **8.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-1-S**
JOB # **86.00481.0181**
STATION **36+30 "S-2-A-PR"**
OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/10/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 460	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 23.0 ft (see Boring No. TB-1 for soil/bedrock description)							▼				Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc. Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			5								
			10				⊠				
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20								
	437.0	23.0									
Bottom of Sounding at 23.0 ft											Auger refusal at 23.0 ft

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.8** ft.
⊠ Cave Depth **9.6** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-2**

JOB # **86.00481.0181**

STATION **37+62 "S-2-A-PR"**

OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**

Date Completed **1/10/07**

Drill Foreman **T. Smoot**

Inspector **S. Marcum**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **2.0** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 456.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	455.9	0.3					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, stiff to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-6-6		--	
				2	SS			4-4-4	26.0	0.75	
			5								
				3	SS			2-2-4	23.3	0.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	447.7	8.5									
Brown, gray and dark brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS		⊠	4-5-6	22.0	--	
			10								
	444.2	12.0									
Brown to gray, severely weathered SHALE with sandstone seams				5	SS			50/0.4'		--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS			50/0.4'		--	
			20								
				7	SS			50/0.2'		--	
			25								Auger refusal at 28.5 ft
	427.7	28.5									Bedrock cored from 28.5 ft to 33.5 ft
Dark gray, hard SHALE				RC-1	RC						Recovery = 100% RQD = 76%

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.7** ft.
⊠ Cave Depth **9.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-2**
JOB # **86.00481.0181**
STATION **37+62 "S-2-A-PR"**
OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/10/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Dark gray, hard SHALE	422.7	33.5									
Bottom of Test Boring at 33.5 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.7** ft.
☒ Cave Depth **9.8** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-2-S**
JOB # **86.00481.0181**
STATION **37+62 "S-2-A-PR"**
OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/10/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 456	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 22.0 ft (see Boring No. TB-2 for soil/bedrock description)							▼				Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							⊠				
			10								
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20								
Bottom of Sounding at 22.0 ft	434.0	22.0									Auger refusal at 22.0 ft

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **1.2** ft.
- ⊠ Cave Depth **9.2** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-3**
JOB # **86.00481.0181**
STATION **38+96 "S-2-A-PR"**
OFFSET **16 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 453.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	452.7	0.3				▼				
Gray and brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		4-4-6	29.0	1.5	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS		3-4-5	21.2	--	
			5							
				3	SS		3-3-4	28.6	0.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	445.0	8.0								
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS	⊠	4-5-7	22.5	3.0	
			10							
	441.0	12.0								
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				5	SS		3-3-4	23.1	1.0	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	434.0	19.0								
Dark gray to gray, severely weathered SHALE				6	SS		16-35-50/0.5'		--	
			20							
				7	SS		50/0.5'		--	
			25							
				8	SS		50/0.3'		--	
	423.0	30.0								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.4** ft.
⊠ Cave Depth **9.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.
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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-3**
JOB # **86.00481.0181**
STATION **38+96 "S-2-A-PR"**
OFFSET **16 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Dark gray, weathered SHALE	419.0	34.0									
Dark gray, hard SHALE	413.8	39.2	35	9 RC-1	SS RC			50/0.4'		--	Auger refusal at 34.0 ft Bedrock cored from 34.0 ft to 39.2 ft Recovery = 100% RQD = 100%
Bottom of Test Boring at 39.2 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.4** ft.
☒ Cave Depth **9.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-3-S**

JOB # **86.00481.0181**

STATION **38+96 "S-2-A-PR"**

OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 453	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 40.2 ft (see Boring No. TB-3 for soil/bedrock description)							▼				Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10								
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20				⊠				
			25								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.4** ft.
⊠ Cave Depth **23.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-3-S**
JOB # **86.00481.0181**
STATION **38+96 "S-2-A-PR"**
OFFSET **16 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/10/07**
Date Completed **1/11/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 40.2 ft (see Boring No. TB-3 for soil/bedrock description)			35								
Bottom of Soundig at 40.2 ft	412.8	40.2	40								Auger refusal at 40.2 ft

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.4** ft.
⊠ Cave Depth **23.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-3-T**
JOB # **86.00481.0181**
STATION **38+90 "S-2-A-PR"**
OFFSET **16 Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/24/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **--** lbs.
Hammer Drop **--** in.
Spoon Sampler OD **--** in.
Rock Core Dia. **--** in.
Shelby Tube OD **3.0** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 453	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Blank drill to obtain Shelby tube samples											Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5	1	ST	■					Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	439.0	14.0		2	ST	■					
Bottom of Test Boring at 14.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools -- ft.
▽ At Completion -- ft.
▼ After -- hours -- ft.
⊠ Cave Depth -- ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-4**
JOB # **86.00481.0181**
STATION **244+32 Line "D"**
OFFSET **10 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**
Date Completed **1/3/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 419.3

Soil Classification	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.7 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	418.1	1.2								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Gray and brown, moist, medium stiff, silty clay loam (FILL) (Lab No. 2) A-6				1	SS		4-3-4		2.0	
				2	SS		2-3-4	26.1	--	
			5							
				3	SS		3-4-4		1.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	410.8	8.5								
				4	SS		2-4-5	22.1	--	Traffic control with flagmen required
			10							
				5	SS		3-3-4	35.7	1.5	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Gray, very moist, medium stiff to soft CLAY (Lab No. 5) A-7-6	402.3	17.0								
				6	SS		3-3-3	25.0	0.25	
			20			⊠				
				7	SS		2-3-2	33.2	--	
			25							
	389.3	30.0		8	SS		2-2-3	47.9	0.25	

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **21.0** ft.
- ▼ After **--** hours **--** ft.
- ⊠ Cave Depth **21.1** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-4**
JOB # **86.00481.0181**
STATION **244+32 Line "D"**
OFFSET **10 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**
Date Completed **1/3/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Gray, very moist, medium stiff CLAY (Lab No. 5) A-7-6				9	SS			2-3-4	46.0	--	
			35								
Gray, severely weathered SHALE	380.8	38.5									
Dark gray SHALE	380.1	39.2		10 RC-1	SS RC			19-50/0.2'		--	Auger refusal at 39.2 ft
			40								Bedrock cored from 39.2 ft to 44.2 ft Recovery = 100% RQD = 35%
	375.1	44.2									
Bottom of Test Boring at 44.2 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **21.0** ft.
- ▼ After **--** hours **--** ft.
- ☒ Cave Depth **21.1** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-4-S**
JOB # **86.00481.0181**
STATION **244+32 Line "D"**
OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/16/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 419.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 41.5 ft (see Boring No. TB-4 for soil/bedrock description)			5 10 15 20 25								Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc. Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines Traffic control with flagmen required INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **36.0** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **39.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-4-S**
JOB # **86.00481.0181**
STATION **244+32 Line "D"**
OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/16/07**
Date Completed **1/16/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 41.5 ft (see Boring No. TB-4 for soil/bedrock description)	377.8	41.5	35 40				∇ ⊠				
Bottom of Sounding at 41.5 ft											Auger refusal at 41.5 ft

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **36.0** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **39.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-5**
JOB # **86.00481.0181**
STATION **245+50 Line "D"**
OFFSET **8 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**
Date Completed **1/3/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 417.6	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.8 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	416.3	1.3		1	SS			9-11-9		--	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, slightly moist, medium dense to loose, sandy loam with trace cinders (FILL) (Visual)				2	SS			4-5-4	11.9	--	
			5								
				3	SS			4-3-3		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				4	SS		▽	3-3-4	17.7	--	Traffic control required
			10								
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	404.1	13.5		5	SS			3-2-4	23.6	2.0	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, moist, soft CLAY (Lab No. 5) A-7-6	400.6	17.0					●				
				6	SS			2-2-3	23.6	1.0	
			20								
Brown to gray, severely weathered SHALE	393.6	24.0		7	SS			6-10-27		--	
			25				☒				
				8	SS			35-50/0.2'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **18.0** ft.
▽ At Completion **10.0** ft.
▼ After **--** hours **--** ft.
☒ Cave Depth **25.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-5**
JOB # **86.00481.0181**
STATION **245+50 Line "D"**
OFFSET **8 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/3/07**
Date Completed **1/3/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Brown to gray, severely weathered SHALE	383.6	34.0									
Gray, weathered to slightly weathered SHALE			35	9 RC-1	SS RC			50/0.5'		--	Auger refusal at 34.0 ft Bedrock cored from 34.0 ft to 39.0 ft Recovery = 63% RQD = 40%
	378.6	39.0									
Bottom of Test Boring at 39.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **18.0** ft.
▽ At Completion **10.0** ft.
▼ After **--** hours **--** ft.
☒ Cave Depth **25.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-5-S**

JOB # **86.00481.0181**

STATION **245+65 Line "D"**

OFFSET **8 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/15/07**
Date Completed **1/15/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 417.6	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 27.0 ft (see Boring No. TB-5 for soil/bedrock description)											Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
							▽ ⊠				
			10								Traffic control with flagmen required
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20								
			25								
	390.6	27.0									
Bottom of Sounding at 27.0 ft											Auger refusal at 27.0 ft

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **8.5** ft.
- ▼ After **--** hours **--** ft.
- ⊠ Cave Depth **9.1** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**TB-6**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**246+64 Line "D"**
	Gibson and Warrick Counties, Indiana	OFFSET	**10 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/4/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/4/07**	Hammer Drop	**30** in.
Drill Foreman	**C. Carroll**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**2.0** in.
Boring Method	**HSA-Truck**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 415.7	Stratum Elevation, ft	Stratum Depth, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
1.1 ft Asphalt, 0.3 ft Crushed Limestone (Visual)	414.3	1.4							Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff, silty clay (FILL) (Lab No. 1) A-7-6			1	SS		3-3-3	24.5	2.0	
	410.2	5.5	2	SS		4-4-5		--	
Brown and gray, moist, soft SILTY CLAY LOAM (Lab No. 2) A-6			3	SS		2-2-3	24.2	0.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	403.7	12.0	4	SS	⊠	3-3-5		2.0	Traffic control required
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	398.7	17.0	5	SS		3-4-5	25.6	3.0	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown, very moist, medium stiff SILT (Lab No. 6) A-4	392.2	23.5	6	SS	●	3-3-4		1.75	
Gray, severely weathered SHALE	390.2	25.5	7	SS		27-50/0.4'		--	
Gray, weathered LIMESTONE	389.5	26.2	RC-1	RC					Bedrock cored from 25.5 ft to 30.5 ft Recovery = 96% RQD = 47%
Gray, weathered SHALE									

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools	**23.0**	ft.
▽ At Completion	**Dry**	ft.
▼ After **--** hours	**--**	ft.
⊠ Cave Depth	**10.0**	ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

GEO-STANDARD-STATE 00481-181.GPJ ATCENVGE.GDT 4/12/07

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-6**
JOB # **86.00481.0181**
STATION **246+64 Line "D"**
OFFSET **10 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/4/07**
Date Completed **1/4/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Gray, weathered SHALE	385.2	30.5									
Bottom of Test Boring at 30.5 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **23.0** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
☒ Cave Depth **10.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-6-S**
JOB # **86.00481.0181**
STATION **246+64 Line "D"**
OFFSET **10 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/5/07**
Date Completed **1/5/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 415.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 23.2 ft (see Boring No. TB-6 for soil/bedrock description)											Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10				∇				Traffic control with flagmen required
							⊠				
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20								
	392.5	23.2									
Bottom of Sounding at 23.2 ft											Auger refusal at 23.2 ft

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **10.0** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **12.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-7**
JOB # **86.00481.0181**
STATION **247+97 Line "D"**
OFFSET **10 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/4/07**
Date Completed **1/4/07**
Drill Foreman **C. Carroll**
Inspector **S. Marcum**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 414.7	Stratum Elevation, ft	Stratum Depth, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
0.7 ft Asphalt, 0.5 ft Crushed Limestone (Visual)	413.5	1.2							Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff, silty clay (FILL) (Lab No. 1) A-7-6			1	SS		3-3-3		2.0	
	409.2	5.5	2	SS		3-4-3	28.0	--	
Gray, very moist, very soft SILTY CLAY LOAM (Lab No. 2) A-6	406.7	8.0	3	SS		1-1-1	25.5	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and light brown, moist, medium stiff to stiff SILTY CLAY (Lab No. 1) A-7-6			4	SS	⊻	3-4-5	24.3	--	Traffic control required
			5	SS	⊠	4-5-6	21.1	4.0	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	396.7	18.0							
Brown and gray, severely weathered SANDSTONE			6	SS		6-9-15		--	
	390.7	24.0							
Gray, weathered SHALE -thin limestone seams noted in shale bedrock from 24.0 to 26.0 ft			7 RC-1	SS RC		100/0.4'		--	Bedrock cored from 24.0 ft to 29.0 ft Recovery = 92% RQD = 62%
	385.7	29.0							
Bottom of Test Boring at 29.0 ft									

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
⊻ At Completion **10.1** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **14.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-7-S**
JOB # **86.00481.0181**
STATION **247+97 Line "D"**
OFFSET **10 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/15/07**
Date Completed **1/15/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-Truck**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 414.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Sounding Blank drill to 23.5 ft (see Boring No. TB-7 for soil/bedrock description)											Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10								Traffic control with flagmen required
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			20								
	391.2	23.5									
Bottom of Sounding at 23.5 ft											Auger refusal at 23.5 ft

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
∇ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
⊠ Cave Depth **--** ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-8**
JOB # **86.00481.0181**
STATION **1561+00 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/19/07**
Date Completed **1/20/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 419.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Brown, moist, soft SILT (Lab No. 7) A-4	416.0	3.0		1	SS	∇ ▼	1-1-2	25.9	1.0	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and black, slightly moist, stiff SILTY CLAY (Lab No. 2) A-6	413.0	6.0	5	2	SS		7-6-6		2.0	
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	410.5	8.5		3	SS	⊠	3-3-4	23.1	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, weathered SHALE	405.5	13.5	10	4	SS		37-42-50/0.5'		--	
Gray, weathered SHALE			15	5	SS		32-50/0.5'		--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	396.0	23.0	20	6	SS		20-20-31		--	Auger refusal at 23.0 ft
Gray SHALE			25	RC-1	RC					Bedrock cored from 23.0 ft to 25.9 ft Recovery = 97% RQD = 72%
	391.0	28.0		RC-2	RC					Bedrock cored from 25.9 ft to 28.0 ft Recovery = 100% RQD = 71%
Bottom of Test Boring at 28.0 ft										

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
∇ At Completion **0.5** ft.
▼ After **24** hours **2.3** ft.
⊠ Cave Depth **7.5** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-9**
JOB # **86.00481.0181**
STATION **1562+30 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/19/07**
Date Completed **1/20/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 419.3	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	418.9	0.4									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Dark brown to brown, very moist, very soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			3-2-2	25.1	0.5	
				2	SS			1-2-1	23.0	1.0	
			5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
				3	SS			4-3-3	20.9	3.0	
							▼				
Brown and gray, severely weathered SHALE	410.8	8.5		4	SS			7-23-34		2.0	
			10								
				5	SS			25-40-50/0.5'		--	
			15				⊠				INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
-gray below 18.0 ft				6	SS			23-32-45		--	
			20								
Gray, weathered SHALE	396.1	23.2		RC-1	RC						Auger refusal at 23.2 ft Bedrock cored from 23.2 ft to 28.2 ft Recovery = 100% RQD = 35%
			25								
-slightly weathered below 26.0 ft											
	391.1	28.2									
Bottom of Test Boring at 28.2 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **8.3** ft.
⊠ Cave Depth **15.4** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-10**
JOB # **86.00481.0181**
STATION **1589+60 Line "A"**
OFFSET **60 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 411.8	Stratum Elevation, ft	Stratum Depth, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	411.3	0.5							Ground surface elevation provided by Bernardin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILT (Lab No. 6) A-4			1	SS		3-4-9	25.3	1.5	
			2	SS	▼	5-5-6		1.5	
			3	SS		4-3-3		2.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	403.3	8.5	4	SS		2-3-3		2.5	
					⊠				
Brown and gray, moist, soft CLAY (Lab No. 5) A-7-6	398.3	13.5	5	SS		2-2-2	22.6	1.0	
									INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Gray, severely weathered SHALE	392.8	19.0	6	SS		13-40-50/0.2'		4.5	
Gray, shaley LIMESTONE	390.7	21.1	RC-1	RC					Auger refusal at 21.1 ft
Gray, weathered SHALE	389.0	22.8							Bedrock cored from 21.1 ft to 26.4 ft Recovery = 100% RQD = 16%
Bottom of Test Boring at 26.4 ft	385.4	26.4							

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **3.9** ft.
⊠ Cave Depth **13.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-11**
JOB # **86.00481.0181**
STATION **1590+60 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/24/07**
Date Completed **1/25/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 408.2	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	407.8	0.4					▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown to gray, very moist, very soft to soft SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			1-1-1	26.5	--	
	402.7	5.5	5	2	SS			2-3-2	24.9	--	
Brown and gray, moist, very soft SILTY CLAY LOAM (Lab No. 3) A-6	400.2	8.0		3	SS			1-1-2	24.5	--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and gray, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6	396.2	12.0	10	4	SS			5-5-5	24.3	--	
Gray, moist, medium stiff SILTY CLAY (Lab No. 4) A-7-6	391.1	17.1	15	5	SS		🜲	3-3-5	27.1	--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown, weathered SANDSTONE	390.1	18.1		RC-1	RC						Auger refusal at 17.1 ft Bedrock cored from 17.1 ft to 22.1 ft Recovery = 96% RQD = 66%
Gray, weathered SHALE	389.2	19.0									
Gray, weathered LIMESTONE	387.7	20.5	20								
Gray, weathered SHALE	386.1	22.1									
Bottom of Test Boring at 22.1 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **--** ft.
▽ At Completion **--** ft.
▼ After **24** hours **1.0** ft.
🜲 Cave Depth **13.0** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-11-T**
JOB # **86.00481.0181**
STATION **1590+65 Line "A"**
OFFSET **60 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/24/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **--** lbs.
Hammer Drop **--** in.
Spoon Sampler OD **--** in.
Rock Core Dia. **--** in.
Shelby Tube OD **3.0** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 408	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Blank drill to obtain Shelby tube samples											Ground surface elevation estimated based upon Plan and Profile Sheets and Cross-Sections provided by American Structurepoint, Inc.
			5	1	ST	■					Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				2	ST	■					
Bottom of Test Boring at 14.0 ft	394.0	14.0									

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools -- ft.
- ▽ At Completion -- ft.
- ▼ After -- hours -- ft.
- ⊠ Cave Depth -- ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-12**
JOB # **86.00481.0181**
STATION **16+45 Ramp "B"**
OFFSET **20 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/24/07**
Date Completed **1/25/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 411.9	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	411.4	0.5									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, very moist, very soft SILT (Lab No. 7) A-4	408.9	3.0		1	SS		▼	1-1-1	23.8	0.5	
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	403.9	8.0	5	2	SS			3-4-4		2.0	
				3	SS		⊠	4-3-5	18.3	2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and dark brown, moist, stiff SILTY CLAY (Lab No. 1) A-7-6	399.9	12.0	10	4	SS			6-5-6		3.5	
Brown, dark brown and reddish brown, moist, very stiff SILTY CLAY (Lab No. 4) A-7-6	392.9	19.0	15	5	SS			7-10-12		4.0	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, severely weathered SHALE	391.8	20.1	20	6	SS			43-50/0.2'		--	
Gray, slightly weathered SANDSTONE	391.2	20.7		RC-1	RC						Auger refusal at 20.1 ft Bedrock cored from 20.1 ft to 25.1 ft Recovery = 100% RQD = 64%
Gray, slightly weathered LIMESTONE	389.4	22.5									
Gray, weathered SHALE	386.8	25.1	25								
Bottom of Test Boring at 25.1 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **--** ft.
- ▽ At Completion **--** ft.
- ▼ After **24** hours **1.2** ft.
- ⊠ Cave Depth **7.6** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-13**

JOB # **86.00481.0181**

STATION **16+45 Ramp "B"**

OFFSET **35 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/22/07**
Date Completed **1/23/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 413.0	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Light brown and brown, very moist, very soft to soft SILT with trace roots (Lab No. 7) A-4				1	SS		▼	1-1-1	31.3	0.5	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
			5	2	SS			1-1-2	24.7	0.5	
				3	SS			1-2-2	25.4	0.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and light gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	404.0	9.0	10	4	SS		⊠	4-3-5	22.0	1.5	
Reddish brown, slightly moist, very stiff SILTY CLAY (Lab No. 4) A-7-6	399.5	13.5	15	5	SS			7-9-14		3.0	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Gray, weathered SHALE	394.5	18.5	20	6	SS			25-50/0.5'		--	
Gray LIMESTONE	389.8	23.2		RC-1	RC						Auger refusal at 23.2 ft Bedrock cored from 23.2 ft to 28.2 ft Recovery = 94% RQD = 48%
Gray SHALE	388.2	24.8	25								
Bottom of Test Boring at 28.2 ft	384.8	28.2									

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.7** ft.
⊠ Cave Depth **9.6** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

Page **1** of **1**

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-14**
JOB # **86.00481.0181**
STATION **8+85 Ramp "C"**
OFFSET **18 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 413.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	413.2	0.5									
Brown with trace gray, very moist, soft SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	2-2-3		--	Ground surface elevation provided by Bernarndin-Lochmueller & Associates
				2	SS			1-2-2		--	
	408.2	5.5	5								
Brown and gray, moist, very soft CLAY (Lab No. 5) A-7-6				3	SS			1-1-2		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	405.7	8.0									
Brown, moist, medium stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS			3-3-4		--	
			10								
	401.2	12.5									
Dark gray, moist, soft SILT (Lab No. 8) A-6				5	SS			2-2-2	28.5	--	
			15								INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	395.2	18.5									
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				6	SS		⌧	3-4-6		2.0	
			20								
	391.2	22.5									
Gray, weathered SHALE				7	SS			50/0.3'		--	
			25								Auger refusal at 28.5 ft Bedrock cored from 28.5 ft to 33.5 ft Recovery = 50% RQD = 50%
	385.2	28.5									
Gray, weathered SHALE				RC-1	RC						

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
⊻ At Completion **Dry** ft.
▼ After **24** hours **1.9** ft.
⌧ Cave Depth **19.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

ATC ASSOCIATES INC.

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-14**

JOB # **86.00481.0181**

STATION **8+85 Ramp "C"**

OFFSET **18 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**

Date Completed **1/24/07**

Drill Foreman **T. Smoot**

Inspector **B. Kleeman**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **2.0** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Gray, weathered SHALE	380.2	33.5									
Bottom of Test Boring at 33.5 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.9** ft.
☒ Cave Depth **19.0** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-15**
JOB # **86.00481.0181**
STATION **8+90 Ramp "C"**
OFFSET **20 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**
Date Completed **1/24/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 413.5	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	413.0	0.5								Ground surface elevation provided by Bernardin-Lochmueller & Associates
Brown and gray, moist, soft SILTY CLAY (Lab No. 1) A-7-6				1	SS	▼	3-2-2		1.0	
	410.5	3.0								
Brown and gray, moist, very soft to soft SILTY CLAY LOAM (Lab No. 2) A-6				2	SS	●	1-1-2		0.5	
			5	3	SS		1-2-2		2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	405.5	8.0								
Brown and gray, moist, soft to medium stiff SILTY CLAY (Lab No. 1) A-7-6				4	SS		2-3-7		1.0	
			10							
	399.5	14.0								
Brown and gray, moist, medium stiff CLAY (Lab No. 5) A-7-6				5	SS		4-3-4		1.5	
			15							INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	395.0	18.5								
Brown and gray, moist, very stiff SILTY CLAY LOAM (Lab No. 2) A-6				6	SS		7-7-9		4.0	
			20			⊠				
	390.0	23.5								
Brown and gray, severely weathered SHALE				7	SS		50/0.1'		--	
			25							Auger refusal at 28.5 ft Bedrock cored from 28.5 ft to 33.5 ft Recovery = 100% RQD = 44%
	385.0	28.5								
Gray, weathered to slightly weathered SHALE				RC-1	RC					

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **4.5** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **2.3** ft.
⊠ Cave Depth **20.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-15**

JOB # **86.00481.0181**

STATION **8+90 Ramp "C"**

OFFSET **20 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/23/07**

Date Completed **1/24/07**

Drill Foreman **T. Smoot**

Inspector **B. Kleeman**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **2.0** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Gray, weathered to slightly weathered SHALE	380.0	33.5									
Bottom of Test Boring at 33.5 ft											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **4.5** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **2.3** ft.
- ☒ Cave Depth **20.9** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-16**

JOB # **86.00481.0181**

STATION **1494+00 Line "A"**

OFFSET **550 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/9/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/9/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**S. Marcum**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 446.4	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	446.2	0.2								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, gray and dark brown, moist, medium stiff to very stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		2-2-5	24.9	--	
				2	SS		7-9-9		2.5	
			5							
				3	SS		7-7-10	18.0	3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
	437.9	8.5								
Brown, severely weathered SHALE				4	SS		50/0.5'		--	
			10							
				5	SS		40-50/0.4'		--	
			15							
										INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				6	SS		50/0.5'		--	
			20							
-gray below 22.0 ft										
				7	SS		50/0.3'		--	
			25							
	417.4	29.0		8	SS		50/0.5'		--	
Bottom of Test Boring at 29.0 ft										

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **--** hours **--** ft.
- ☒ Cave Depth **--** ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-17**
JOB # **86.00481.0181**
STATION **1494+00 Line "A"**
OFFSET **350 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/8/07**
Date Completed **1/9/07**
Drill Foreman **B. Kleeman**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)		0.2									INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	2-3-3	24.3	1.0	
				2	SS			3-5-7	15.9	1.25	
		6.0	5								Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Reddish brown and gray, severely weathered SANDSTONE -brown below 8.0 ft				3	SS			42-50/0.4'		--	
				4	SS		☒	50/0.2'		--	
			10								Auger refusal at 12.3 ft
Gray, slightly weathered SANDSTONE		12.3		RC-1	RC						Bedrock cored from 12.3 ft to 15.4 ft Recovery = 100% RQD = 100%
			15	RC-2	RC						Bedrock cored from 15.4 ft to 20.4 ft Recovery = 100% RQD = 94%
			20	RC-3	RC						Bedrock cored from 20.4 ft to 25.4 ft Recovery = 100% RQD = 100%
Bottom of Test Boring at 25.4 ft		25.4	25								

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.9** ft.
☒ Cave Depth **8.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-18**
JOB # **86.00481.0181**
STATION **1503+00 Line "A"**
OFFSET **210 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/9/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)		0.3									
Brown and dark brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			4-4-4		--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
				2	SS			3-4-4	22.3	--	
		5.5	5								
Brown and gray, moist, stiff SILTY CLAY (Lab No. 1) A-7-6				3	SS			4-6-8		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
		8.5									
Brown and dark brown, severely weathered SHALE				4	SS			32-50/0.5'		--	
			10								
				5	SS			50/0.4'		--	
			15								Auger refusal at 18.2 ft
		18.2									
Gray, weathered to slightly weathered SHALE				RC-1	RC						Bedrock cored from 18.2 ft to 20.1 ft Recovery = 100% RQD = 74%
			20	RC-2	RC						Bedrock cored from 20.1 ft to 25.2 ft Recovery = 99% RQD = 82%
		25.2	25								
Bottom of Test Boring at 25.2 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **--** hours **--** ft.
☒ Cave Depth **--** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-19**
JOB # **86.00481.0181**
STATION **1504+00 Line "A"**
OFFSET **670 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/9/07**
Date Completed **1/10/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)		0.3									INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-4-6	24.0	2.5	
		6.0	5	2	SS			7-8-13		3.25	
Brown, severely weathered SANDSTONE		8.0		3	SS			13-13-16		2.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and dark brown, severely weathered SHALE			10	4	SS		▼	25-35-47		--	
			15	5	SS			50/0.4'		--	
-gray below 18.0 ft			20	6	SS		⊠	50/0.5'		--	
			25	7	SS			50/0.5'		--	
		29.0		8	SS			50/0.5'		--	
Bottom of Test Boring at 29.0 ft											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **8.9** ft.
⊠ Cave Depth **20.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-20**
JOB # **86.00481.0181**
STATION **1582+00 Line "A"**
OFFSET **160 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started	**1/22/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/23/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 418.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	418.2	0.5									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff to stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS			2-3-3		2.0	
				2	SS		▼	5-4-4		2.5	
			5	3	SS			5-5-7		3.0	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown, moist, stiff to medium stiff SILTY CLAY (Lab No. 4) A-7-6	409.7	9.0		4	SS			2-5-6		2.75	
			10				▽				
				5	SS			4-3-4		2.5	
			15								
Gray, moist, soft CLAY (Lab No. 5) A-7-6	400.2	18.5		6	SS			1-2-2		1.0	
Dark gray, very moist SILT (Lab No. 8) A-6	399.7	19.0	20				⊠				
Gray, severely weathered SHALE	394.7	24.0		7	SS			5-20-50/0.5'		4.0	
			25								
	389.2	29.5		8	SS			4-50/0.5'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **11.0** ft.
▼ After **24** hours **3.9** ft.
⊠ Cave Depth **20.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-21**

JOB # **86.00481.0181**

STATION **1589+00 Line "A"**

OFFSET **450 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/22/07**

Date Completed **1/23/07**

Drill Foreman **T. Smoot**

Inspector **B. Kleeman**

Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.

Hammer Drop **30** in.

Spoon Sampler OD **2.0** in.

Rock Core Dia. **--** in.

Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 424.7	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	424.2	0.5								Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Reddish brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6	421.7	3.0		1	SS		2-5-5		3.0	
Brown, very moist, stiff SILT (Lab No. 9) A-4	419.2	5.5	5	2	SS	▼	6-6-7	18.9	3.0	
Brown, moist to slightly moist, stiff to medium stiff SILTY CLAY LOAM (Lab No. 3) A-6	411.7	13.0		3	SS		5-6-6	21.1	2.5	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			10	4	SS		5-5-5	26.4	2.5	
Brown, very moist, very soft to medium stiff SILT (Lab No. 6) A-4	405.1	19.6	15	5	SS		2-1-1	28.2	0.25	
				6	SS		5-4-3	20.9	2.5	
Brown, moist, medium stiff CLAY (Lab No. 5) A-7-6	401.2	23.5	20			⊠				
Gray, very moist, very soft CLAY (Lab No. 5) A-7-6	394.7	30.0	25	7	SS		1-1-1	31.3	0.5	
				8	SS		1-1-1	43.9	0.25	

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- ● Noted on Drilling Tools **None** ft.
- ▽ At Completion **Dry** ft.
- ▼ After **24** hours **3.2** ft.
- ⊠ Cave Depth **22.6** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- CA - Casing Advancer
- MD - Mud Drilling
- HA - Hand Auger

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TEST BORING LOG

CLIENT	**American Structurepoint, Inc.**	BORING #	**TL-21**
PROJECT NAME	**Proposed Interstate 69 Design/Build Project**	JOB #	**86.00481.0181**
PROJECT LOCATION	**Interstate 64 to State Road 68**	STATION	**1589+00 Line "A"**
	Gibson and Warrick Counties, Indiana	OFFSET	**450 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started	**1/22/07**	Hammer Wt.	**140** lbs.
Date Completed	**1/23/07**	Hammer Drop	**30** in.
Drill Foreman	**T. Smoot**	Spoon Sampler OD	**2.0** in.
Inspector	**B. Kleeman**	Rock Core Dia.	**--** in.
Boring Method	**HSA-ATV**	Shelby Tube OD	**--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Gray, moist, very soft CLAY (Lab No. 5) A-7-6	390.2	34.5		9	SS			4-17-26	27.6	--	
Dark gray and brown, severely weathered SANDSTONE	389.7	35.0	35								
Bottom of Test Boring at 35.0 ft											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **3.2** ft.
☒ Cave Depth **22.6** ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**

PROJECT NAME **Proposed Interstate 69 Design/Build Project**

PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TL-22**

JOB # **86.00481.0181**

STATION **1594+00 Line "A"**

OFFSET **380 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/18/07**
Date Completed **1/19/07**
Drill Foreman **T. Smoot**
Inspector **B. Kleeman**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **--** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 415.6

Soil Classification	Stratum Elevation, ft	Stratum Depth, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	415.1	0.5			▼				Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, soft to medium stiff SILTY CLAY LOAM (Lab No. 2) A-6			1	SS		2-2-3		1.5	
			2	SS		4-4-4		2.5	
Brown, moist, stiff SILTY CLAY LOAM (Lab No. 2) A-6	409.6	6.0	3	SS		5-5-7	18.5	2.75	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			4	SS		4-5-6	21.1	2.75	
Brown and gray, moist, very stiff SILTY CLAY (Lab No. 1) A-7-6	404.6	11.0			⊠				
			5	SS		6-9-9		--	
Gray, severely weathered SHALE	397.1	18.5	6	SS		19-20-19		--	
			7	SS		50/0.3'		--	
Bottom of Test Boring at 28.8 ft	386.8	28.8	8	SS		50/0.3'		--	

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **0.9** ft.
⊠ Cave Depth **12.9** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-25**
JOB # **86.00481.0181**
STATION **14+00 Ramp "A-1"**
OFFSET **18 ft Right**

DRILLING and SAMPLING INFORMATION

Date Started **1/8/07**
Date Completed **1/9/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION SURFACE ELEVATION 447	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	446.7	0.3									Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6				1	SS		▼	2-4-4		--	
				2	SS			4-5-9		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
			5								
Brown and dark brown, severely weathered SHALE	441.0	6.0		3	SS			23-50/0.5'		--	
							⊠				
				4	SS			50/0.4'		--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
			10								
Gray, weathered to slightly weathered SHALE	434.0	13.0		RC-1	RC						Auger refusal at 13.0 ft Bedrock cored from 13.0 ft to 15.5 ft Recovery = 100% RQD = 100%
			15								
				RC-2	RC						Bedrock cored from 15.5 ft to 20.5 ft Recovery = 100% RQD = 78%
			20								
				RC-3	RC						Bedrock cored from 20.5 ft to 25.5 ft Recovery = 100% RQD = 76%
			25								
Bottom of Test Boring at 25.5 ft	421.5	25.5									

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **1.3** ft.
⊠ Cave Depth **7.8** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

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TEST BORING LOG

CLIENT **American Structurepoint, Inc.**
PROJECT NAME **Proposed Interstate 69 Design/Build Project**
PROJECT LOCATION **Interstate 64 to State Road 68**
Gibson and Warrick Counties, Indiana

BORING # **TB-26**
JOB # **86.00481.0181**
STATION **14+20 Ramp "A-1"**
OFFSET **27 ft Left**

DRILLING and SAMPLING INFORMATION

Date Started **1/8/07**
Date Completed **1/9/07**
Drill Foreman **T. Smoot**
Inspector **S. Marcum**
Boring Method **HSA-ATV**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2.0** in.
Rock Core Dia. **2.0** in.
Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION

SURFACE ELEVATION 448

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Sample No.	Sample Type	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Moisture Content, %	Pocket Penetrometer PP-tsf	Remarks
Topsoil (Visual)	447.8	0.2							Ground surface elevation provided by Bernarndin-Lochmueller & Associates
Brown and gray, moist, medium stiff SILTY CLAY LOAM (Lab No. 2) A-6			1	SS		3-4-5		--	
	442.0	6.0	2	SS	▼	3-3-5		--	Boring was backfilled in accordance with the INDOT Aquifer Protection Guidelines
Brown and dark brown, severely weathered SHALE			3	SS	⊠	8-20-50		--	INDOT Proj. No. IM-069-0 (004) INDOT Des. No. 0500436
	436.0	12.0	4	SS		50/0.4'		--	Auger refusal at 12.0 ft
Gray, weathered to slightly weathered SHALE			RC-1	RC					Bedrock cored from 12.0 ft to 15.8 ft Recovery = 98% RQD = 98%
			RC-2	RC					Bedrock cored from 15.8 ft to 20.8 ft Recovery = 100% RQD = 100%
	422.2	25.8	RC-3	RC					Bedrock cored from 20.8 ft to 25.8 ft Recovery = 100% RQD = 98%
Bottom of Test Boring at 25.8 ft									

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
● Noted on Drilling Tools **None** ft.
▽ At Completion **Dry** ft.
▼ After **24** hours **3.9** ft.
⊠ Cave Depth **7.1** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
CA - Casing Advancer
MD - Mud Drilling
HA - Hand Auger

APPENDIX C

SUMMARY OF LABORATORY CLASSIFICATION TEST RESULTS
SUMMARY OF SPECIAL LABORATORY TEST RESULTS
GRAIN SIZE DISTRIBUTION CURVES
STANDARD PROCTOR MOISTURE DENSITY RELATIONSHIP TEST RESULTS
UNCONFINED COMPRESSION TEST RESULTS

SUMMARY OF LABORATORY CLASSIFICATION TEST RESULTS

Proposed Interstate 69 Design / Build Project

Interstate 64 to State Road 68

Gibson and Warrick Counties, Indiana

INDOT Des. No. 0500436

INDOT Project No. IM-069-0 (004)500436

ATC Project No.: 86.00481.0181

						Soil Classification		Particle Size Distribution							Atterberg Limits		
Laboratory No.	Boring No.	Station, feet	Offset Centerline, feet	Sample No.	Depth, feet	Textural	AASHTO	Percent passing No. 10 Sieve, %	Percent passing No. 40 Sieve, %	Percent passing No. 200 Sieve, %	Percent Gravel, %	Percent Sand, %	Percent Silt, %	Percent Clay, %	LL	PL	PI
1	TB-3	38+96 Line "S-2-A"	16 Left	SS-4	8.5 - 10.0	Silty Clay	A-7-6 (21)	100.0	96.5	91.6	0.0	8.4	54.3	37.3	42	20	22
2	TB-4	244+32 Line "D"	10 Left	SS-5	13.5 - 15.0	Silty Clay Loam	A-6 (14)	99.8	99.3	94.0	0.2	5.8	66.4	27.6	35	20	15
3	TL-21	1589+00 Line "A"	450 ft Left	SS-3	6.0 - 7.5	Silty Clay Loam	A-6 (19)	100.0	99.9	99.1	0.0	0.9	71.5	27.6	38	20	18
4	TB-10	1589+60 Line "A"	60 ft Right	SS-5	13.5 - 15.0	Silty Clay	A-7-6 (32)	100.0	100.0	98.9	0.0	1.1	61.2	37.7	50	20	30
5	TB-4	244+32 Line "D"	10 Left	SS-8	28.5- 30.0	Clay	A-7-6 (39)	100.0	99.6	98.5	0.0	1.5	40.6	57.9	59	24	35
6	RB-49	7+00 Ramp B	Centerline	SS-5	13.5 - 15.0	Silt	A-4 (4)	100.0	100.0	99.4	0.0	0.6	84.8	14.6	27	22	5
7	RB-57	3+50 Ramp A	Centerline	SS-1	1.0 - 2.5	Silt	A-4 (3)	96.1	93.7	92.2	3.9	3.9	85.1	7.1	27	23	4
8	TB-14	8+85 Ramp C	18 ft Right	SS-5	13.5 - 15.0	Silt	A-6 (13)	100.0	100.0	99.5	0.0	0.5	83.2	16.3	35	23	12
9	TL-21	1589+00 Line "A"	450 ft Left	SS-2	3.5 - 5.0	Silt	A-4 (5)	100.0	99.4	98.0	0.0	2.0	85.3	12.7	26	20	6
10	RB-6	1528+00 Line "A"	60 ft Right	Bulk	1.0 - 5.0	Silty Clay Loam	A-6 (14)	99.7	98.7	96.9	0.3	2.8	71.2	25.7	33	19	14

SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Proposed Interstate 69 Design/Build Project
Interstate 64 to State Road 68
Gibson and Warrick Counties, Indiana
INDOT Project No. IM-069-0 (004)
INDOT Des. No. 0500436
ATC Project No. 86.00481.0181

Boring Number	**Laboratory Number**	**Sample Number**	**Depth, ft**	**Blow count, "N"**	**Natural Moisture Content, %**	**Undrained Shear Strength, lbs./sq.ft**	**Dry Density, lbs./cu.ft**	**pH**	**Atterberg Limts**		
									LL	**PL**	**PI**
RB-1	1	1	1.0 - 3.5	7	17.3						
RB-2	7	3	6.0 - 7.5	7	19.9	2510	106.6				
	7	7	8.5 - 1.0	18	22.8						
RB-5	2	2	3.5 - 5.0	13	21.3						
	2	4	8.5 - 10.0	10	21.8						
RB-6	2	1	1.0 - 2.5	6	25.3						
	2	2	3.5 - 5.0	8	26.7						
	10	Bag	1.0 - 5.0	--	--				33	19	14
RB-9	2	1	1.0 - 2.5	8	27.9						
	2	3	6.0 - 7.5	8	22.3						
RB-12	7	1	1.0 - 2.5	3	22.6						
	7	2	3.5 - 5.0	5	23.5						
	2	3	6.0 - 7.5	11	20.1	2520	107.3				
	1	4	8.5 - 10.0	11	27.9						
RB-13	1	4	8.5 - 10.0	10	23.7	2390	99.8				
RB-14	2	1	1.0 - 2.5	6	25.3						
	2	2	3.5 - 5.0	12	23.1						
RB-15	2	1	1.0 - 2.5	7	25.8						
	2	2	3.5 - 5.0	8	21.4						
	2	3	6.0 - 7.5	10	20.6						
RB-16	2	1	1.0 - 2.5	8	26.6						
	2	3	6.0 - 7.5	11	19.4						

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
RB-16	1	5	13.5 - 15.0	5	30.7						
RB-17	2	2	3.5 - 5.0	13	23.2						
	2	4	8.5 - 10.0	13	21.0						
	2	5	13.5 - 15.0	9	24.0						
	5	6	18.5 - 20.0	3	27.9						
RB-18	1	1	1.0 - 2.5	3	25.2						
	2	2	3.5 - 5.0	10	20.4						
	9	3	6.0 - 7.5	10	21.1						
RB-19	7	1	1.0 - 2.5	2	23.5						
	7	2	3.5 - 5.0	7	21.1	1190	103.2				
	2	3	6.0 - 7.5	7	21.9						
	2	4	8.5 - 10.0	9	24.6	1410	102.9				
RB-20	2	2	3.5 - 5.0	8	24.0						
	2	3	6.0 - 7.5	10	13.6	1050	111.9				
	2	4	8.5 - 10.0	8	22.7	1550	104.4				
RB-21	2	3	6.0 - 7.5	14	21.4	1540	102.6				
	3	5	13.5 - 15.0	5	33.7						
	3	6	18.5 - 20.0	5	25.4						
RB-22	1	1	1.0 - 2.5	7	21.3						
	1	3	6.0 - 7.5	10	21.8						
	1	5	13.5 - 15.0	7	22.5						
RB-23	1	1	1.0 - 2.5	10	22.5						
	1	3	6.0 - 7.5	9	20.1						
	1	5	13.5 - 15.0	10	16.1						
RB-24	2	1	1.0 - 2.5	10	25.8						
	2	2	3.5 - 5.0	11	22.0	1260	102.3				

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
RB-24	2	3	6.0 - 7.5	11	23.1	1030	98.3				
	4	5	13.5 - 15.0	10	23.6						
RB-25	1	3	6.0 - 7.5	11	20.7	1930	107.7				
RB-26	1	1	1.0 - 2.5	7	26.4	1730	94.4				
RB-27	1	1	1.0 - 2.5	6	19.6						
	1	2	3.5 - 5.0	8	23.1	1480	103.6				
	1	3	6.0 - 7.5	7	22.1						
RB-28	1	2	3.5 - 5.0	11	23.6	1340	96.9				
	1	2	6.0 - 7.5	12	32.8	1240	90.5				
RB-29	1	1	1.0 - 2.5	4	26.2						
	2	2	3.5 - 5.0	7	23.0						
	2	4	8.5 - 10.0	8	22.2						
RB-30	7	1	1.0 - 2.5	4	24.1						
	2	3	6.0 - 7.5	9	22.0	2220	102.3				
RB-31	2	1	1.0 - 2.5	8	20.7						
	1	2	3.5 - 5.0	8	20.7						
RB-32	2	1	1.0 - 2.5	19	16.4						
	1	2	3.5 - 5.0	11	21.3						
	2	3	6.0 - 7.5	8	19.5						
RB-33	2	2	3.5 - 5.0	6	26.3						
	2	4	8.5 - 10.0	10	22						
	1	5	13.5 - 15.0	12	20						
RB-36	2	1	1.0 - 2.5	4	31.3						
	2	2	3.5 - 5.0	8	26.2						
RB-37	2	1	1.0 - 2.5	9	27.7						
	2	3	6.0 - 7.5	15	20						

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
RB-41	2	1	1.0 - 2.5	7	23.4						
	2	2	3.5 - 5.0	10	22.3						
RB-43	1	1	1.0 - 2.5	2	26.3						
	2	2	3.5 - 5.0	4	23.7						
	2	3	6.0 - 7.5	9	19.1						
	1	4	8.5 - 10.0	3	32.4						
RB-45	2	2	3.5 - 5.0	11	25.9						
RB-46	2	1	1.0 - 2.5	1	29						
	2	2	3.5 - 5.0	3	29.6						
	2	3	6.0 - 7.5	12	18.7						
RB-49	2	1	1.0 - 2.5	7	27.6						
	2	2	3.5 - 5.0	7	24.9						
	2	4	8.5 - 10.0	10	24						
	6	5	13.5 - 15.0	11				7.3	27	22	5
	5	6	18.5 - 20.0	5	29.5						
	5	7	23.5 - 25.0	3	36.2						
RB-50	2	1	1.0 - 2.5	9	22.3						
	2	3	6.0 - 7.5	11	18.2						
	5	6	18.5 - 20.0	5	29.3						
RB-51	2	1	1.0 - 2.5	3	28.5						
	2	2	3.5 - 5.0	6	20.6						
	2	4	8.5 - 10.0	8	22.7						
RB-52	7	1	1.0 - 2.5	4	21.7						
	1	2	3.5 - 5.0	7	24.6	1000	98.8				
RB-53	2	1	1.0 - 2.5	10	26.8						
	2	3	6.0 - 7.5	11	19.3						

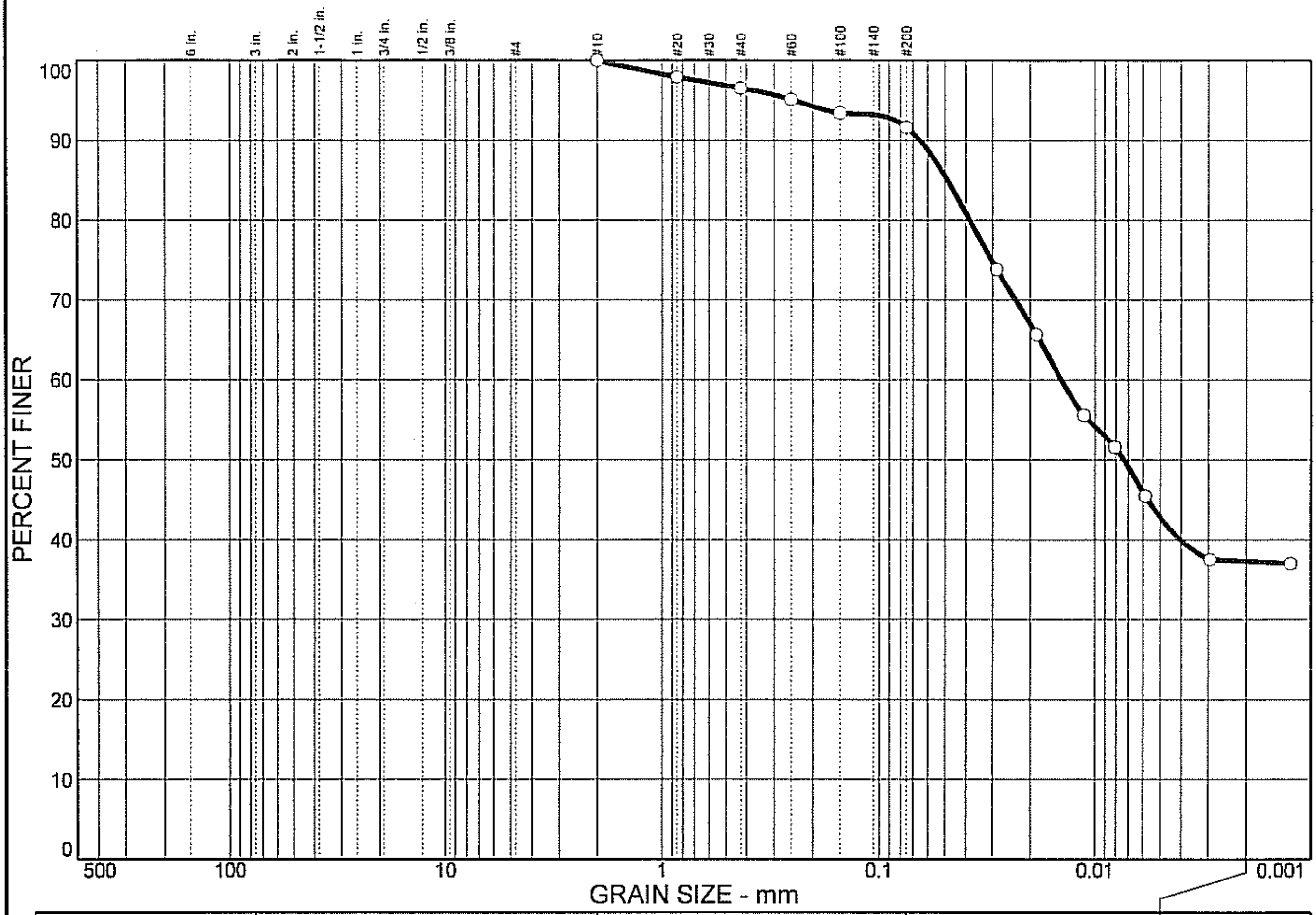
Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
RB-53	1	5	13.5 - 15.0	7	29.4						
RB-54	7	1	1.0 - 2.5	3	23.6						
	7	2	3.5 - 5.0	3	25.3						
	1	3	6.0 - 7.5	7	20.3						
	1	4	8.5 - 10.0	7	27.5						
RB-55	2	2	3.5 - 5.0	10	18.2						
	1	4	8.5 - 10.0	12	20.1						
	2	5	13.5 - 15.0	10	20.1						
RB-56	2	2	3.5 - 5.0	8	35.6						
	2	4	8.5 - 10.0	8	21.4						
	2	5	13.5 - 15.0	6	29.1						
	1	6	18.5 - 20.0	4	36.9						
	5	7	23.5 - 25.0	1	53.9						
RB-57	7	1	1.0 - 2.5	1	27.5			6.2	27	23	4
	1	4	8.5 - 10.0	7	22.5	1860	102.3				
RB-58	7	1	1.0 - 2.5	3	25.5						
	7	2	3.5 - 5.0	3	26.7						
	1	3	6.0 - 7.5	6	24.7						
	1	4	8.5 - 10.0	7	22.5						
	5	6	18.5 - 20.0	3	52.9						
RB-59	7	1	1.0 - 2.5	2	26.0	750	96.5				
	2	2	3.5 - 5.0	7	23.0	1570	102.2				
	1	3	6.0 - 7.5	8	20.9	1280	105.5				
	1	4	8.5 - 10.0	10	20.0	3530	108.9				
RB-60	7	1	1.0 - 2.5	2	26.7						
	2	2	3.5 - 5.0	11	28.6						

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
RB-60	1	3	6.0 - 7.5	7	24.2						
RB-61	2	1	1.0 - 2.5	7	24.2						
	2	3	6.0 - 7.5	10	19.4						
	1	4	8.5 - 10.0	11	21.1						
TB-1	2	1	1.0 - 2.5	9	25.4	1830	95.7				
	2	2	3.5 - 5.0	9	27.1						
	2	4	8.5 - 10.0	10	21.9						
TB-2	2	2	3.5 - 5.0	8	26.0						
	2	3	6.0 - 7.5	6	23.3	3280	103.5				
	1	4	8.5 - 10.0	11	22.0						
TB-3	2	1	1.0 - 2.5	10	29.0						
	2	2	3.5 - 5.0	9	21.2						
	2	3	6.0 - 7.5	7	28.6						
	1	4	8.5 - 10.0	12	22.5			7.6	42	20	22
	2	5	13.5 - 15.0	7	23.1						
TB-3-T	2	Tube	5.0 - 7.0	--	20.2	1330	110.0		33	17	16
	2	Tube	12.0 - 14.0	--	22.1	1070	104.6				
TB-4	2	2	3.5 - 5.0	7	26.1				35	20	15
	2	4	8.5 - 10.0	9	22.1						
	2	5	13.5 - 15.0	7	35.7			7.4			
	5	6	18.5 - 20.0	6	25.0						
	5	7	23.5 - 25.0	5	33.2						
	5	8	28.5 - 30.0	5	47.9			8.1	59	24	35
	5	9	33.5 - 35.0	7	46.0	780	73.6				
TB-5	Visual	2	3.5 - 5.0	9	11.9						
TB-5	Visual	4	8.5 - 10.0	7	17.7						

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
	2	5	13.5 - 15.0	6	23.6						
	5	6	18.5 - 20.0	5	23.6						
TB-6	1	1	1.0 - 2.5	6	6.0						
	2	3	6.0 - 7.5	5	5.0						
	1	5	13.5 - 15.0	9	9.0						
TB-7	1	2	3.5 - 5.0	7	28.0						
	2	3	6.0 - 7.5	2	28.5						
	1	4	8.5 - 10.0	9	24.3						
	1	5	13.5 - 15.0	11	21.1						
TB-8	7	1	1.0 - 2.5	3	25.9						
	1	3	6.0 - 7.5	7	23.1	1130	100.5				
TB-9	2	1	1.0 - 2.5	4	25.1						
	2	2	3.5 - 5.0	3	23.0						
	2	3	6.0 - 7.5	6	20.9						
TB-10	6	1	1.0 - 2.5	13	25.3	1210	95.2				
	5	5	13.5 - 15.0	4	22.6			6.9	50	20	30
TB-11	2	1	1.0 - 2.5	2	26.5						
	2	2	3.5 - 5.0	5	24.9						
	3	3	6.0 - 7.5	3	24.5						
	1	4	8.5 - 10.0	10	24.3						
	4	5	13.5 - 15.0	8	27.1						
TB-11-T	Tube	3	6.0 - 8.0	--	26.1	720	98.0				
		4	12.0 - 14.0	--	27.3	580	97.3				
TB-12	7	1	1.0 - 2.5	2	23.8						
	2	3	6.0 - 7.5	9	18.3						
TB-13	7	1	1.0 - 2.5	2	31.3						

Boring Number	Laboratory Number	Sample Number	Depth, ft	Blow count, "N"	Natural Moisture Content, %	Undrained Shear Strength, lbs./sq.ft	Dry Density, lbs./cu.ft	pH	Atterberg Limts		
									LL	PL	PI
TB-13	7	2	3.5 - 5.0	3	24.7						
	7	3	6.0 - 7.5	4	25.4						
	2	4	8.5 - 10.0	8	22.0						
TB-14	8	5	13.5 - 15.0	4	28.5			7.0	35	23	12
TL-16	2	1	1.0 - 2.5	7	24.9						
	2	3	6.0 - 7.5	17	18.0						
TL-17	2	1	1.0 - 2.5	6	24.3						
	2	2	3.5 - 5.0	12	15.9						
TL-18	2	2	3.5 - 5.0	8	22.3	1410	102.8				
TL-19	2	1	1.0 - 2.5	10	24.0	1440	100.5				
TL-21	9	2	3.5 - 5.0	13	18.9			5.7	26	20	6
	3	3	6.0 - 7.5	12	21.1	2520	104.1	6.4	38	20	18
	3	4	8.5 - 10.0	10	26.4						
	6	5	13.5 - 15.0	2	28.2						
	5	6	18.5 - 20.0	7	20.9						
	5	7	23.5 - 25.0	2	31.3						
	5	8	28.5 - 30.0	2	43.9						
	5	9	33.5 - 35.0	21	27.6						
TL-22	2	3	6.0 - 7.5	12	18.5	2590	100.7				
	2	4	8.5 - 10.0	11	21.1	2370	107.0				

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	8.4	54.3	37.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.9		
#40	96.5		
#60	95.1		
#100	93.4		
#200	91.6		

* (no specification provided)

Soil Description

Silty Clay
Lab No. I

Atterberg Limits

PL= 20 LL= 42 PI= 22

Coefficients

D_{85}= 0.0488 D_{60}= 0.0144 D_{50}= 0.0074
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-6(21)

Remarks

Sample No.: TB-3; SS-4 **Source of Sample:** 11149 **Date:**
Location: **Elev./Depth:** 8.5'-10.0'

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Particle Size Distribution Report

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	5.8	66.4	27.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#10	99.8		
#20	99.6		
#40	99.3		
#60	99.0		
#100	97.7		
#200	94.0		

* (no specification provided)

Soil Description

Silty Clay Loam
Lab No. 2

Atterberg Limits

PL= 20 LL= 35 PI= 15

Coefficients

D_{85}= 0.0488 D_{60}= 0.0138 D_{50}= 0.0096
D_{30}= 0.0024 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-6(14)

Remarks

Sample No.: TB-4; SS-5 **Source of Sample:** 11148 **Date:**
Location: **Elev./Depth:** 13.5'-15.0'

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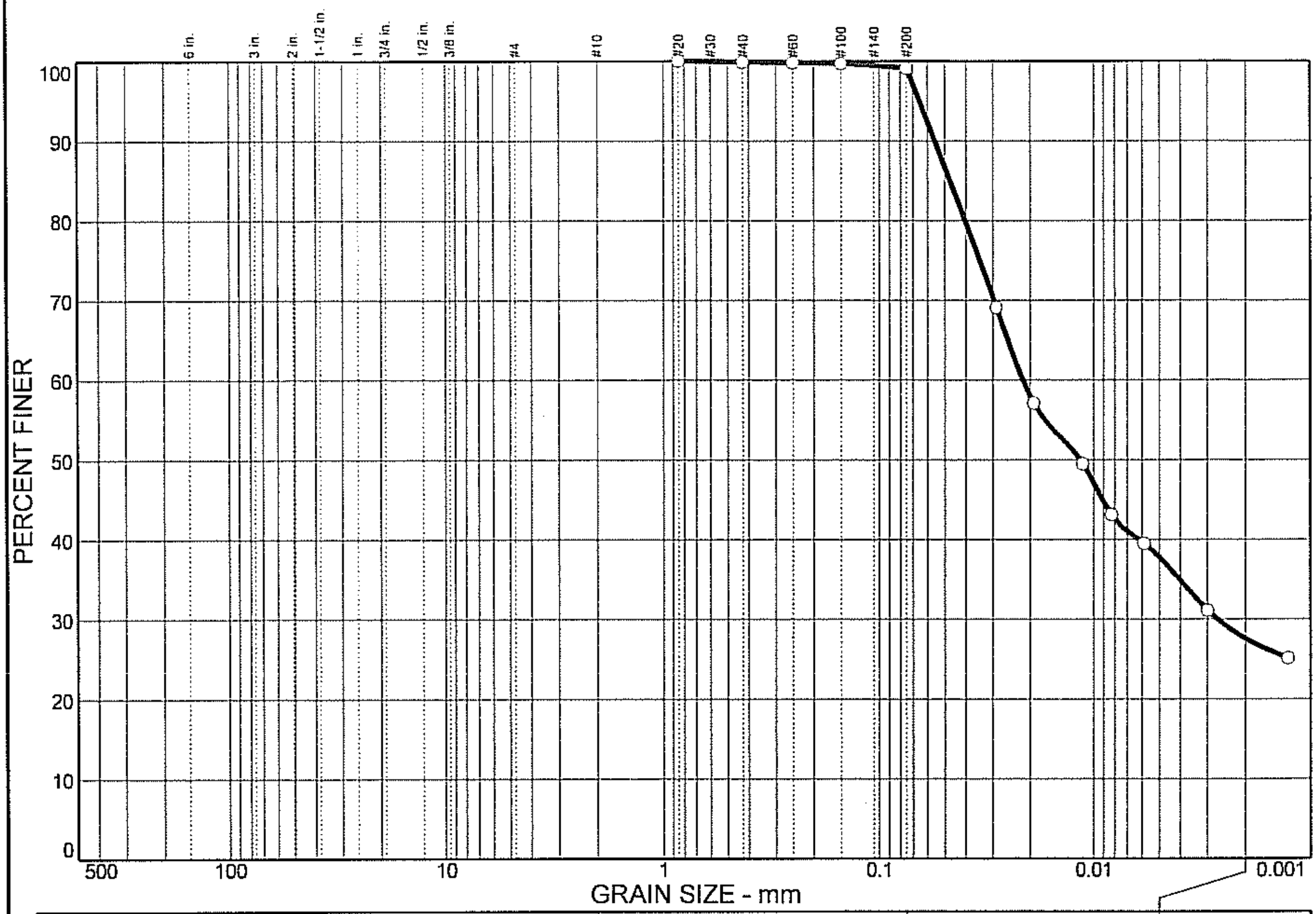
Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	0.9	71.5	27.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	100.0		
#40	99.9		
#60	99.8		
#100	99.7		
#200	99.1		

* (no specification provided)

Soil Description

Silty Clay Loam
Lab No. 3

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{85}= 0.0474 D_{60}= 0.0217 D_{50}= 0.0116
D_{30}= 0.0027 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-6(19)

Remarks

Sample No.: TL-21; SS-3 **Source of Sample:** 11213 **Date:**
Location: **Elev./Depth:** 6.0'-7.5'

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Particle Size Distribution Report

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	1.1	61.2	37.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#60	100.0		
#100	99.8		
#200	98.9		

* (no specification provided)

Soil Description

Silty Clay
Lab No. 4

Atterberg Limits

PL= 20
LL= 50
PI= 30

Coefficients

D_{85}= 0.0240
D_{60}= 0.0105
D_{50}= 0.0063
D_{30}=
D_{15}=
D_{10}=
C_u=
C_c=

Classification

USCS=
AASHTO= A-7-6(33)

Remarks

Sample No.: TB-10; SS-5
Source of Sample: 11213
Date:
Location:
Elev./Depth: 13.5'-15.0'

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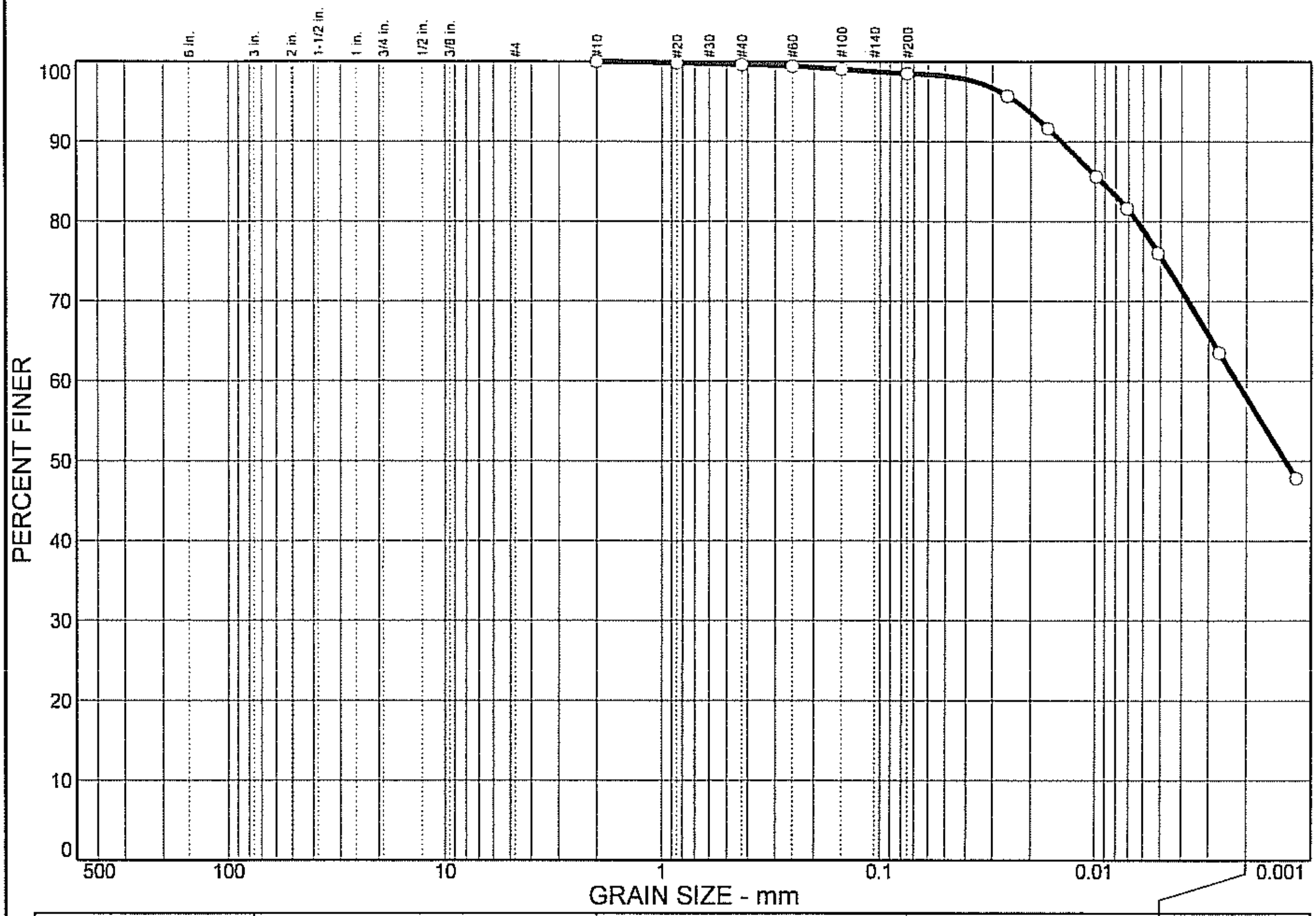
Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	1.5	40.6	57.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	99.6		
#60	99.4		
#100	99.0		
#200	98.5		

* (no specification provided)

Soil Description

Clay
Lab No. 5

Atterberg Limits

PL= 24 LL= 59 PI= 35

Coefficients

D_{85}= 0.0094 D_{60}= 0.0022 D_{50}= 0.0013
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-6(39)

Remarks

Sample No.: TB-4; SS-8 **Source of Sample:** 11148 **Date:**
Location: **Elev./Depth:** 28.5'-30.0'

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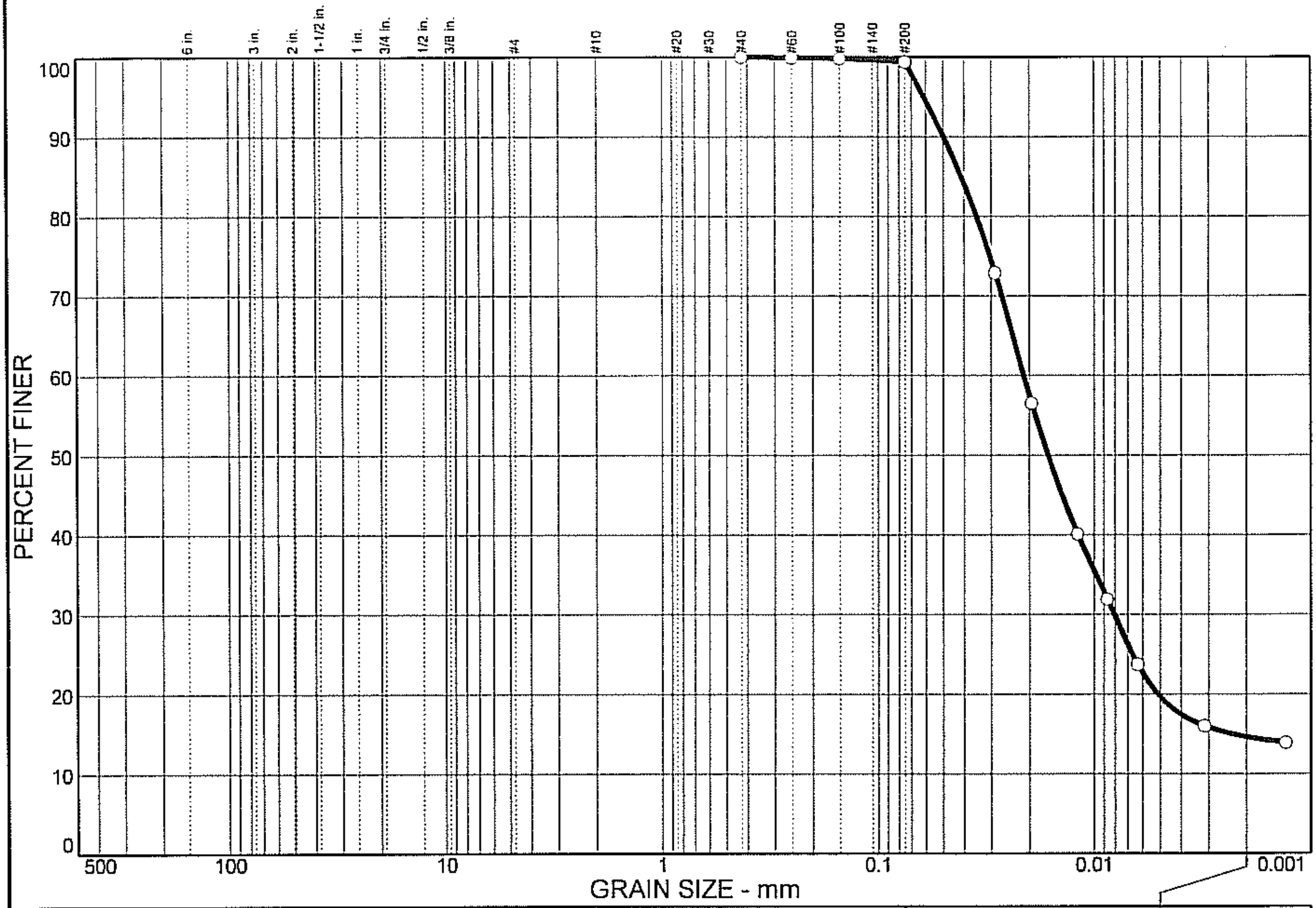
Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	0.6	84.8	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#40	100.0		
#60	99.9		
#100	99.8		
#200	99.4		

* (no specification provided)

Soil Description

Silt
Lab No. 6

Atterberg Limits

PL= 22 LL= 27 PI= 5

Coefficients

D_{85}= 0.0414 D_{60}= 0.0213 D_{50}= 0.0164
D_{30}= 0.0081 D_{15}= 0.0024 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-4(4)

Remarks

Sample No.: RB-49; SS-5 **Source of Sample:** 11150 **Date:**
Location: **Elev./Depth:** 13.5'-15.0'

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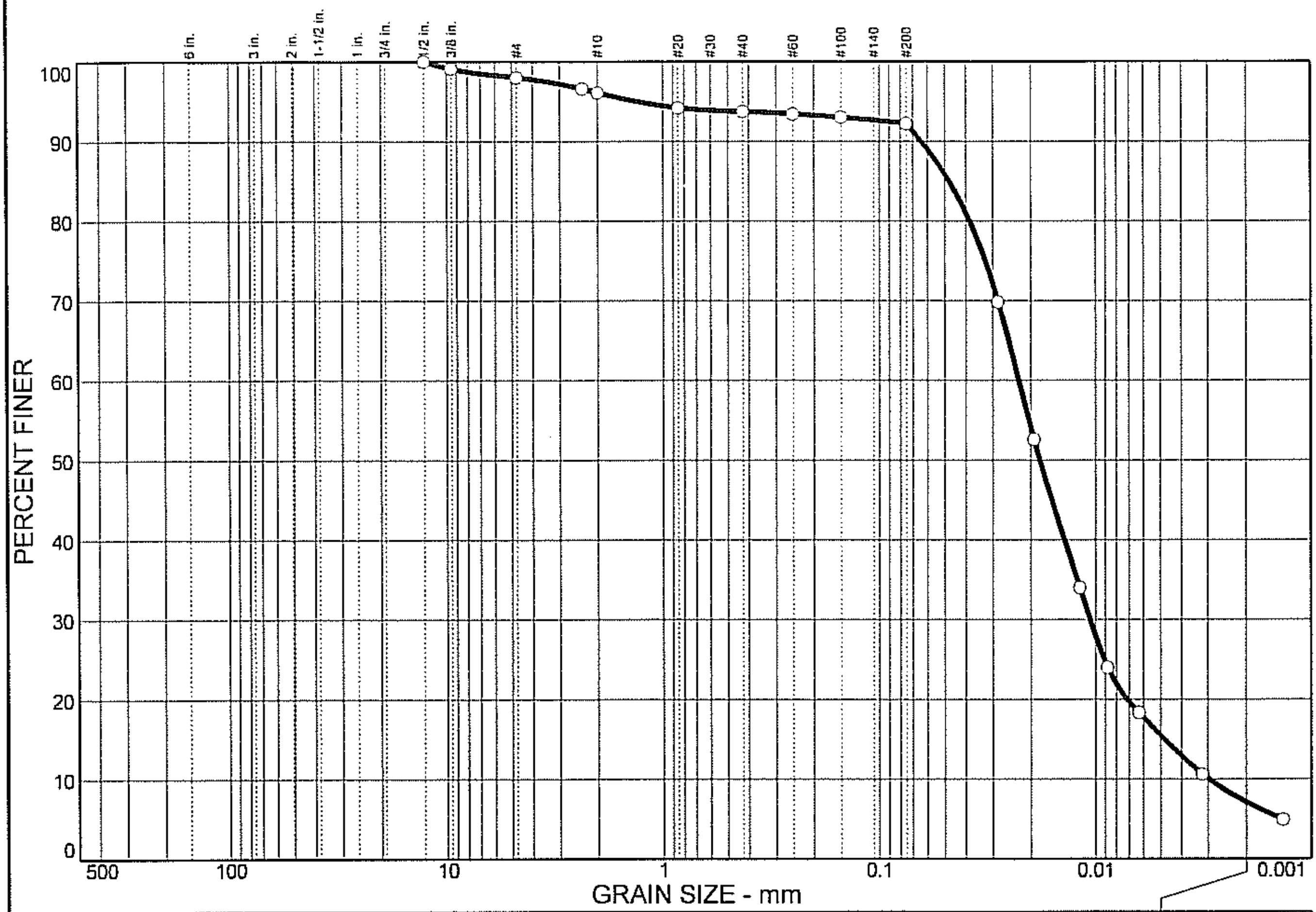
Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.9	3.9	85.1	7.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.1		
#4	98.0		
#8	96.6		
#10	96.1		
#20	94.2		
#40	93.7		
#60	93.4		
#100	93.0		
#200	92.2		

* (no specification provided)

Soil Description

Silt
Lab No. 7

Atterberg Limits

PL= 23
LL= 27
PI= 4

Coefficients

D_{85}= 0.0479
D_{60}= 0.0228
D_{50}= 0.0182
D_{30}= 0.0106
D_{15}= 0.0048
D_{10}= 0.0030
C_u= 7.66
C_c= 1.67

Classification

USCS=
AASHTO= A-4(3)

Remarks

Sample No.: RB-57; SS-1
Source of Sample: 11213
Date:
Location:
Elev./Depth: 1.0'-2.5'

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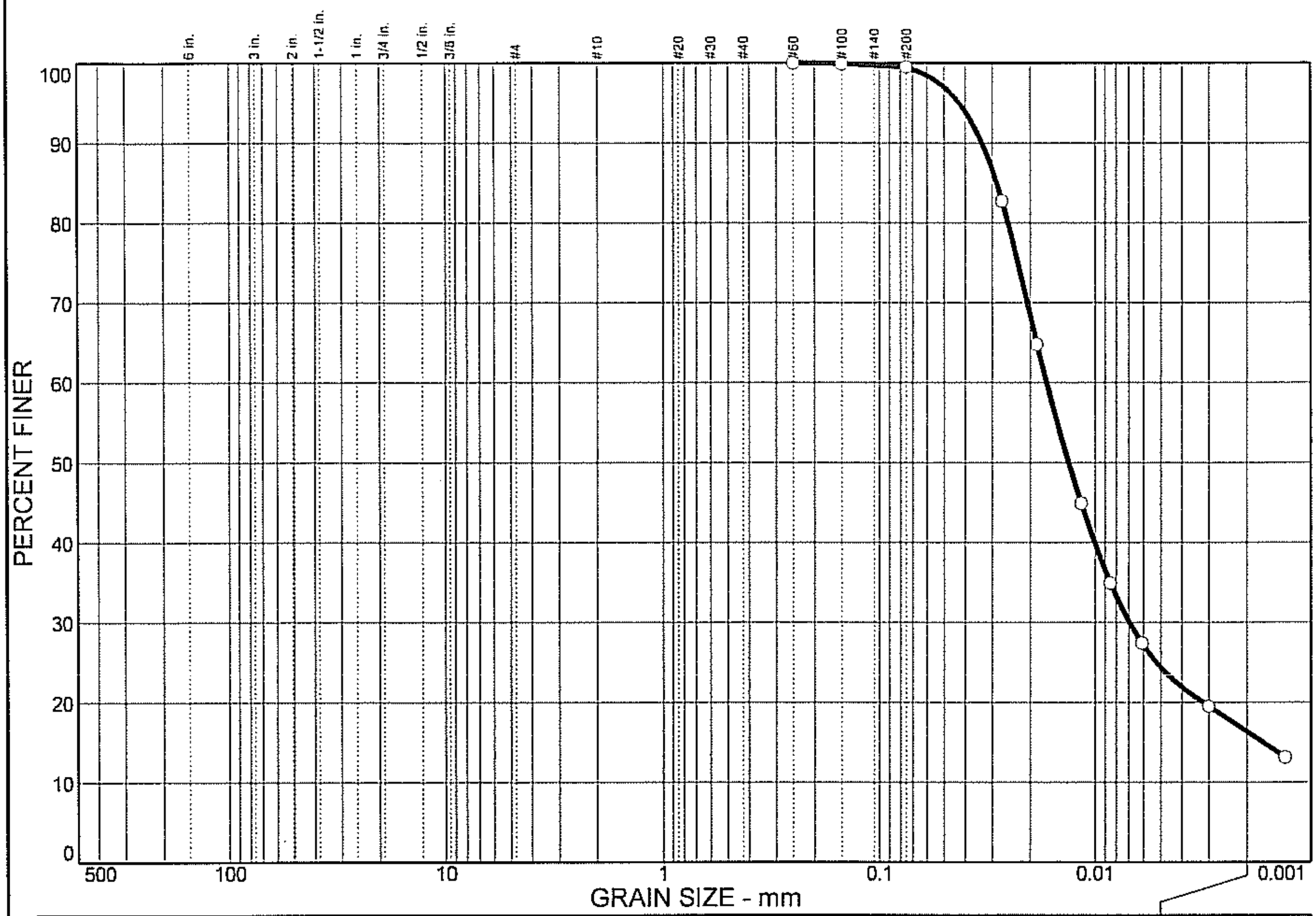
Client: American Structurepoint
Project: I-69
Project No: 00481.0181

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	0.5	83.2	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#60	100.0		
#100	99.9		
#200	99.5		

* (no specification provided)

Soil Description

Silt
Lab No. 8

Atterberg Limits

PL= 23 LL= 35 PI= 12

Coefficients

D_{85}= 0.0287 D_{60}= 0.0168 D_{50}= 0.0133
D_{30}= 0.0070 D_{15}= 0.0017 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-6(13)

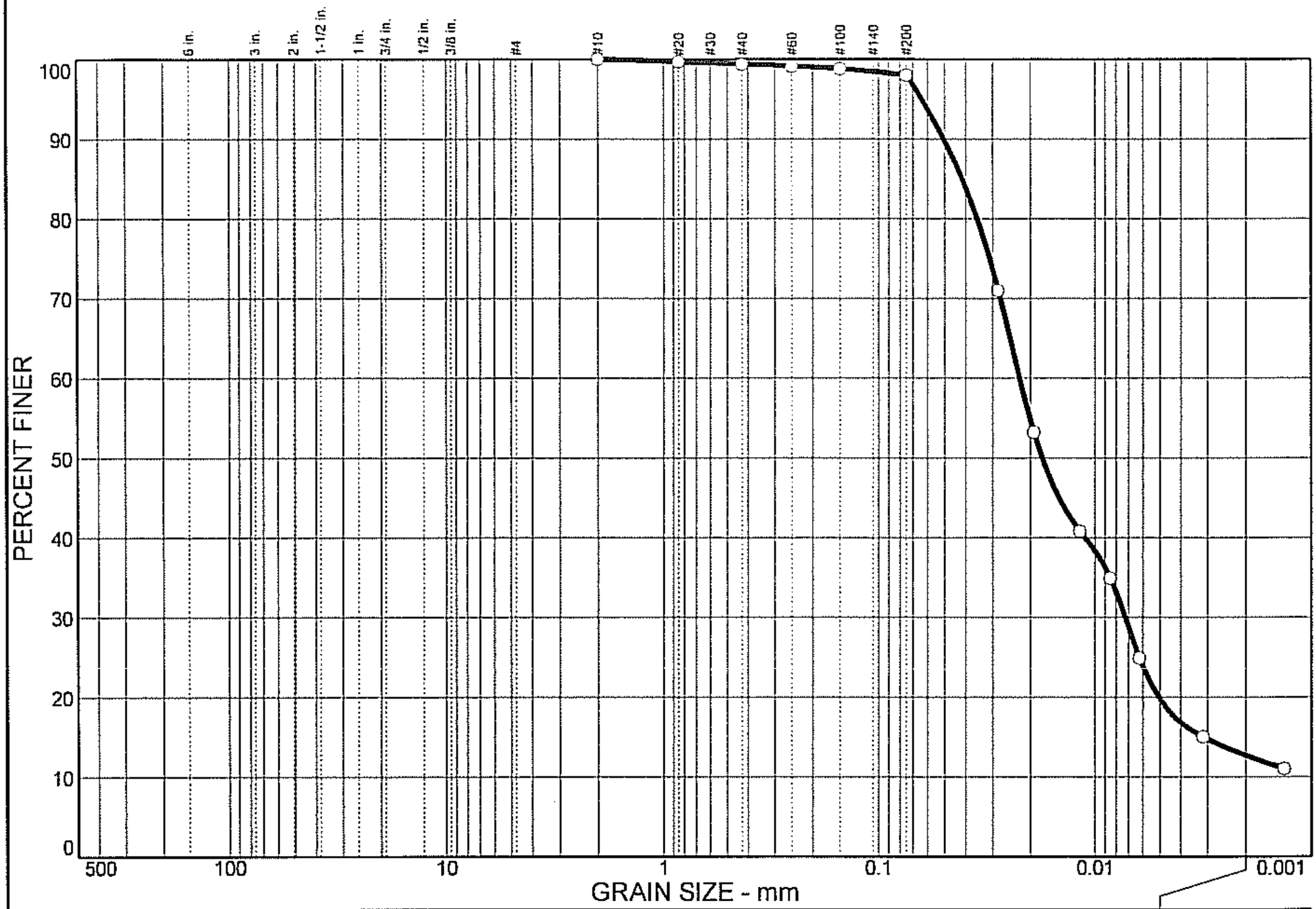
Remarks

Sample No.: TB-14; SS-5 **Source of Sample:** 11213 **Date:**
Location: **Elev./Depth:** 13.5'-15.0'

ATC ASSOCIATES, INC.

Client: American Structurepoint
Project: I-69
Project No: 00481.0181 **Page** 11213

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.0	85.3	12.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	99.4		
#60	99.1		
#100	98.8		
#200	98.0		

* (no specification provided)

Soil Description

Silt
Lab No. 9

Atterberg Limits

PL= 20 LL= 26 PI= 6

Coefficients

D_{85}= 0.0417 D_{60}= 0.0225 D_{50}= 0.0177
D_{30}= 0.0073 D_{15}= 0.0031 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-4(5)

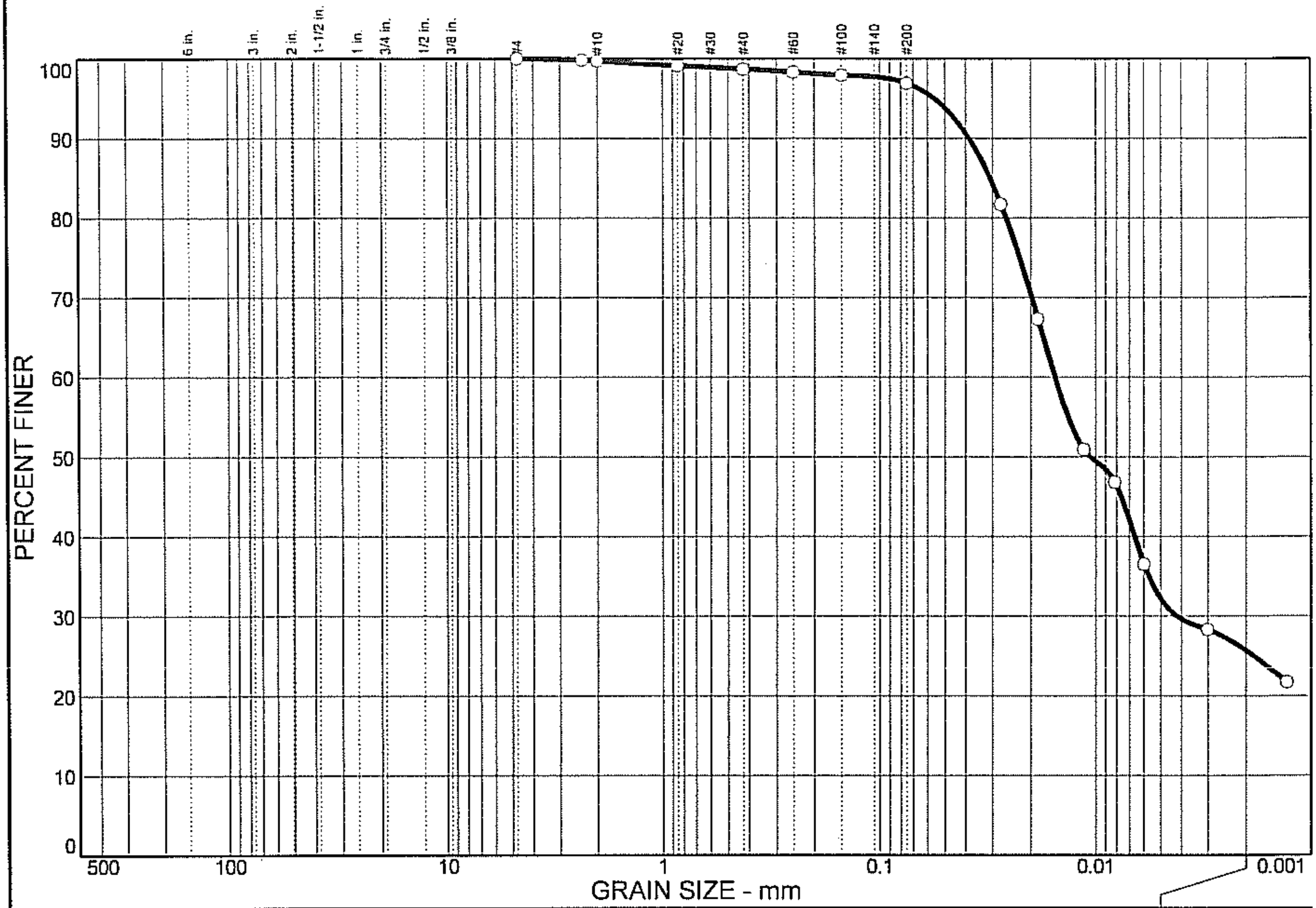
Remarks

Sample No.: TL-21; SS-2 **Source of Sample:** 11213 **Date:**
Location: **Elev./Depth:** 3.5'-5.0'

ATC ASSOCIATES, INC.

Client: American Structurepoint
Project: I-69
Project No: 00481.0181 **Page** 11213

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.3	2.8	71.2	25.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.8		
#10	99.7		
#20	99.1		
#40	98.7		
#60	98.3		
#100	97.9		
#200	96.9		

* (no specification provided)

Soil Description

Silty Clay Loam
Lab No. 10

Atterberg Limits

PL= 19 LL= 33 PI= 14

Coefficients

D_{85}= 0.0309 D_{60}= 0.0155 D_{50}= 0.0107
D_{30}= 0.0042 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-6(14)

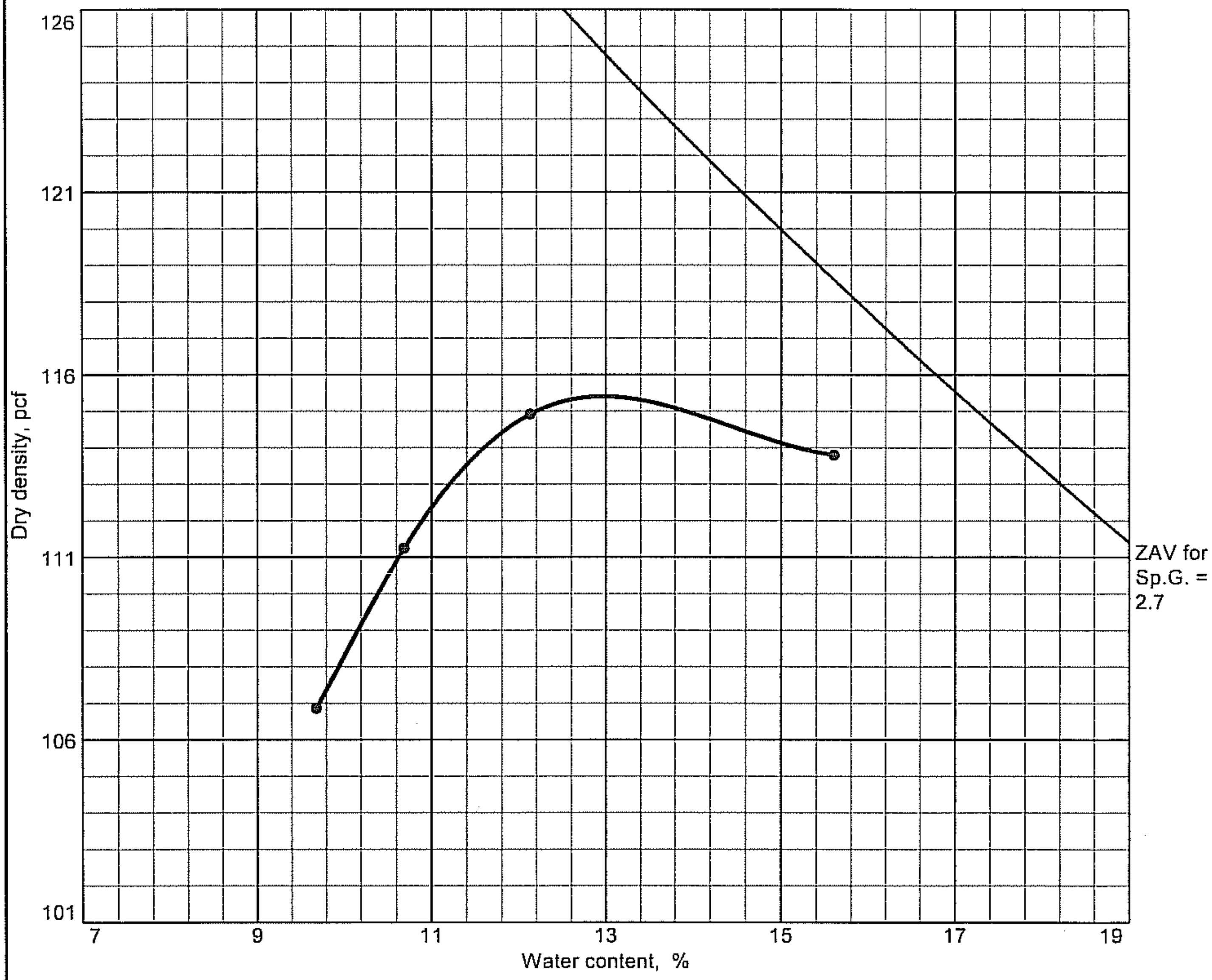
Remarks

Sample No.: RB-6; Bulk **Source of Sample:** 11253 **Date:**
Location: **Elev./Depth:** 1.0'-5.0'

ATC ASSOCIATES, INC.

Client: American Structurepoint
Project: I-69
Project No: 00481.0181 **Page** 11253

MOISTURE / DENSITY (PROCTOR) RELATIONSHIP TEST



Test specification: AASHTO T 99 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.0'-5.0'		A-6(14)			33	14	0.0	96.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 115 pcf Optimum moisture = 13 %	Silty Clay Loam Lab No. 10 / Lab No. 2

Project No. 00481.0181 **Client:** American Structurepoint

Project: I-69

Date: 03/15/07

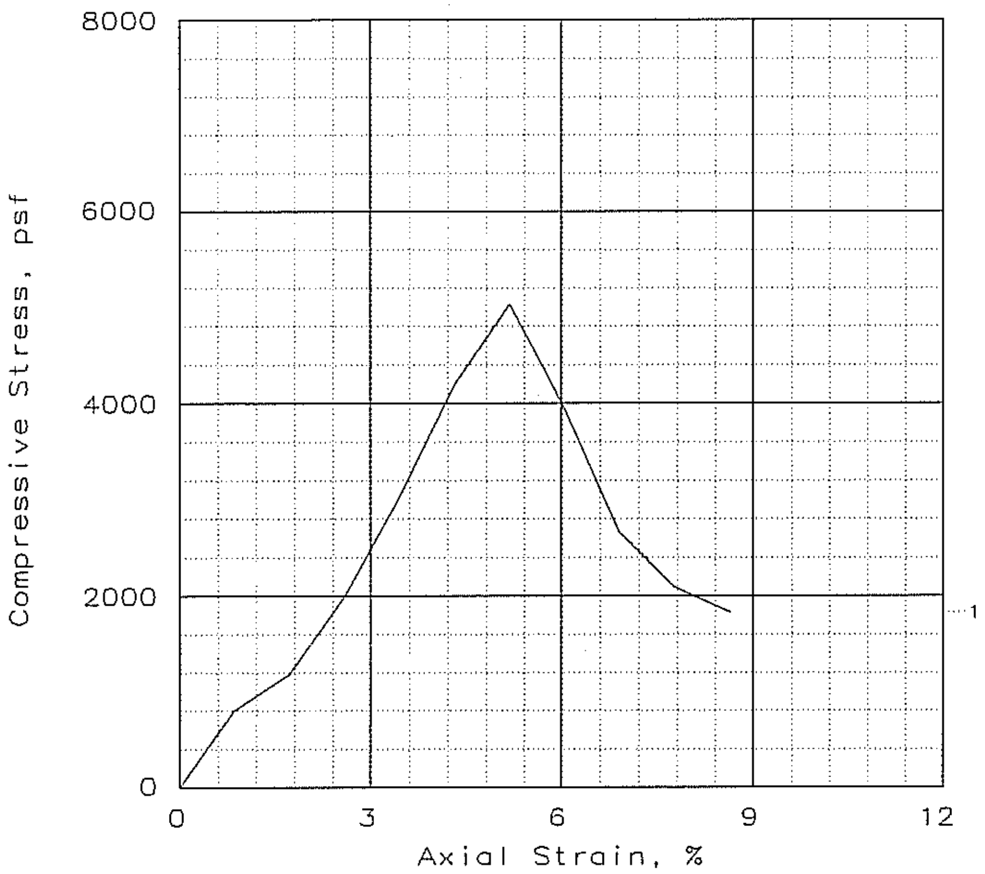
● **Source:** 11253 **Sample No.:** RB-6; Bulk **Elev./Depth:** 1.0'-5.0'

Remarks:

MOISTURE / DENSITY (PROCTOR) RELATIONSHIP TEST

ATC ASSOCIATES, INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	5037			
Undrained shear strength, psf	2518			
Failure strain, %	5.2			
Strain rate, %/min	2.00			
Water content, %	19.9			
Wet density, pcf	127.8			
Dry density, pcf	106.6			
Saturation, %	92.4			
Void ratio	0.5811			
Specimen diameter, in	1.41			
Specimen height, in	2.89			
Height/diameter ratio	2.05			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Client: American Structurepoint

Project: I-69

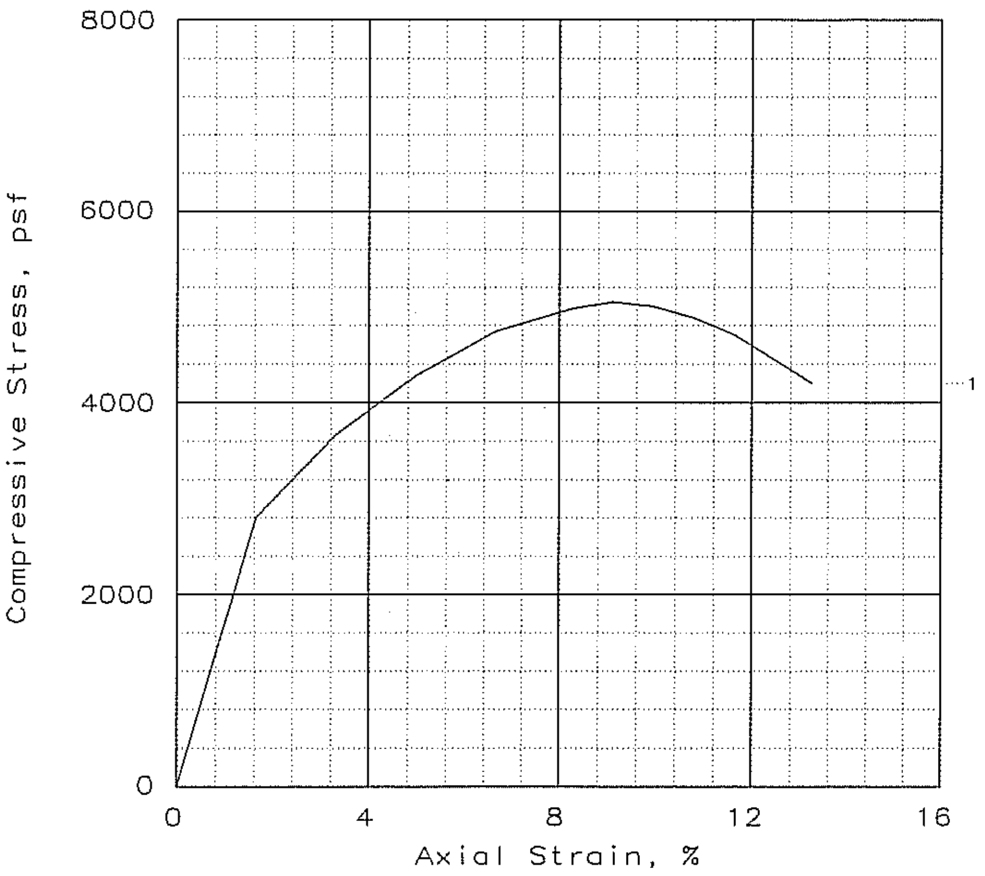
Location: RB-2, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Fig. No.: ______

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	5048			
Undrained shear strength, psf	2524			
Failure strain, %	9.1			
Strain rate, %/min	2.00			
Water content, %	20.1			
Wet density, pcf	128.8			
Dry density, pcf	107.3			
Saturation, %	95.0			
Void ratio	0.5710			
Specimen diameter, in	1.34			
Specimen height, in	3.01			
Height/diameter ratio	2.25			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

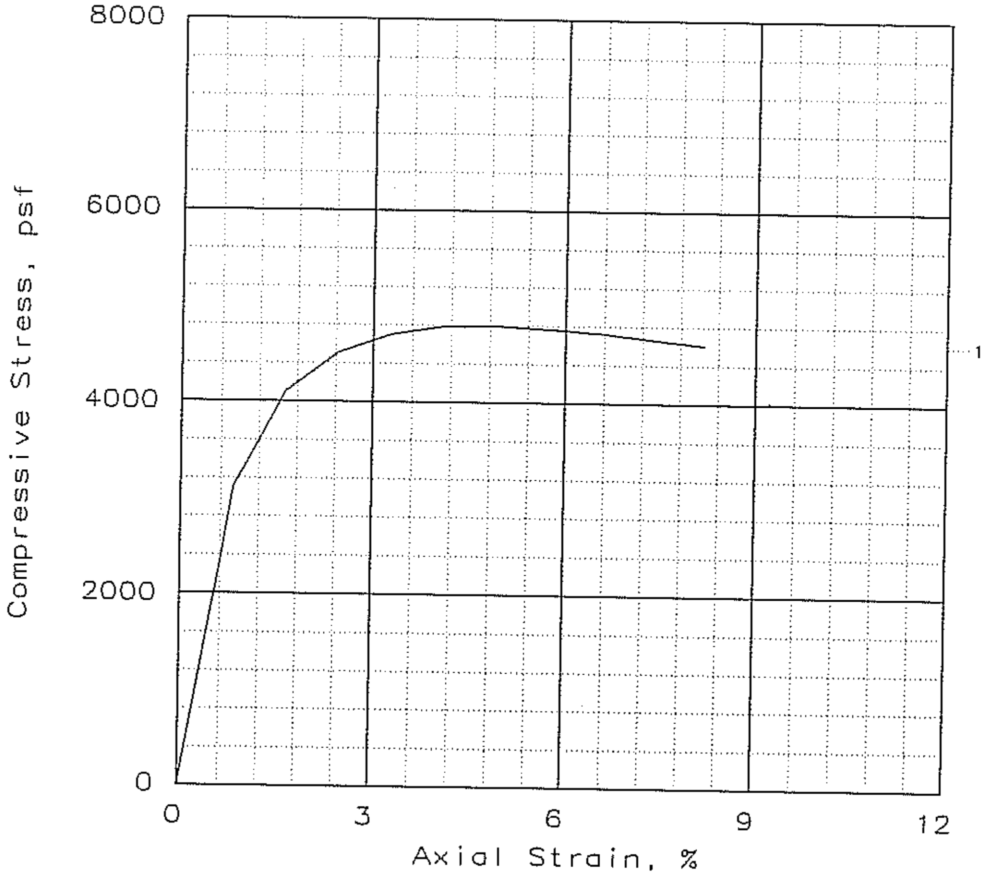
Project: I-69

Location: RB-12, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	4793			
Undrained shear strength, psf	2396			
Failure strain, %	4.9			
Strain rate, %/min	2.00			
Water content, %	23.7			
Wet density, pcf	123.4			
Dry density, pcf	99.8			
Saturation, %	92.8			
Void ratio	0.6895			
Specimen diameter, in	1.35			
Specimen height, in	3.06			
Height/diameter ratio	2.26			

Description:

GS= 2.7

Type: Split spoon

Project No.: 86.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

Project: I-69

Location: RB-13, #4T, 8.5-10'

UNCONFINED COMPRESSION TEST

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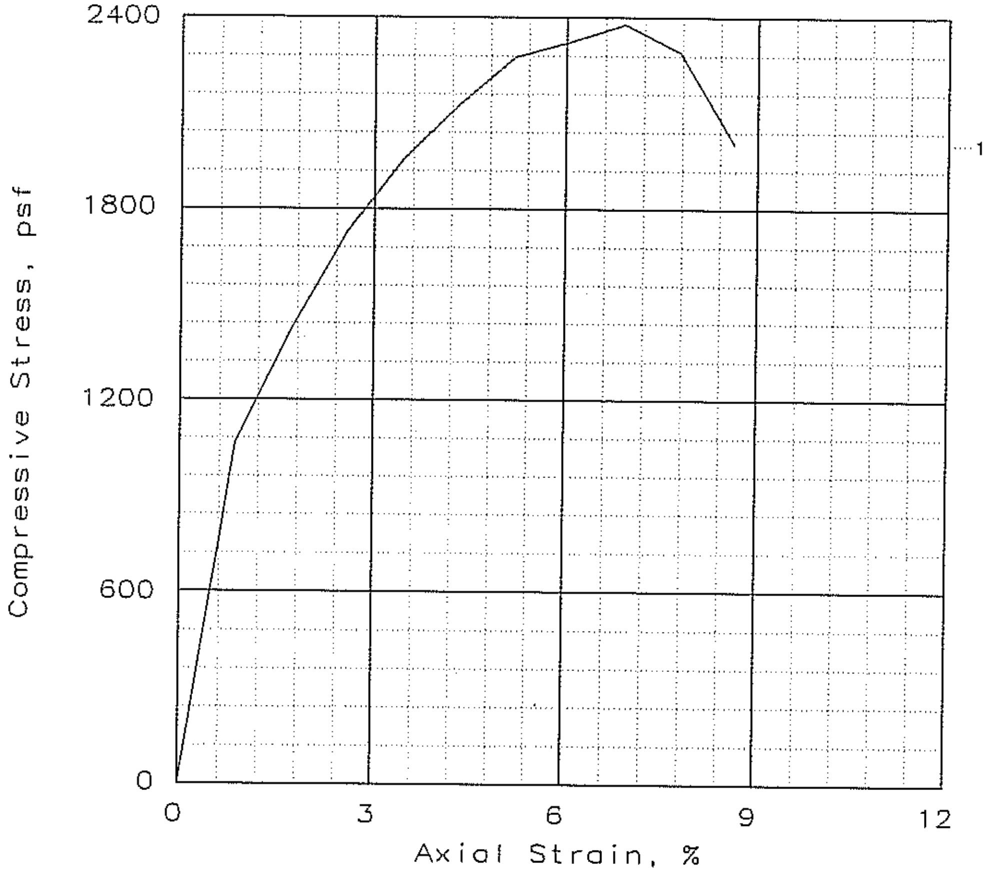
UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2379			
Undrained shear strength, psf	1190			
Failure strain, %	6.9			
Strain rate, %/min	2.00			
Water content, %	21.1			
Wet density, pcf	124.9			
Dry density, pcf	103.2			
Saturation, %	89.9			
Void ratio	0.6340			
Specimen diameter, in	1.41			
Specimen height, in	2.89			
Height/diameter ratio	2.06			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

Project: I-69

Location: RB-19, #2B, 3.5-5'

UNCONFINED COMPRESSION TEST

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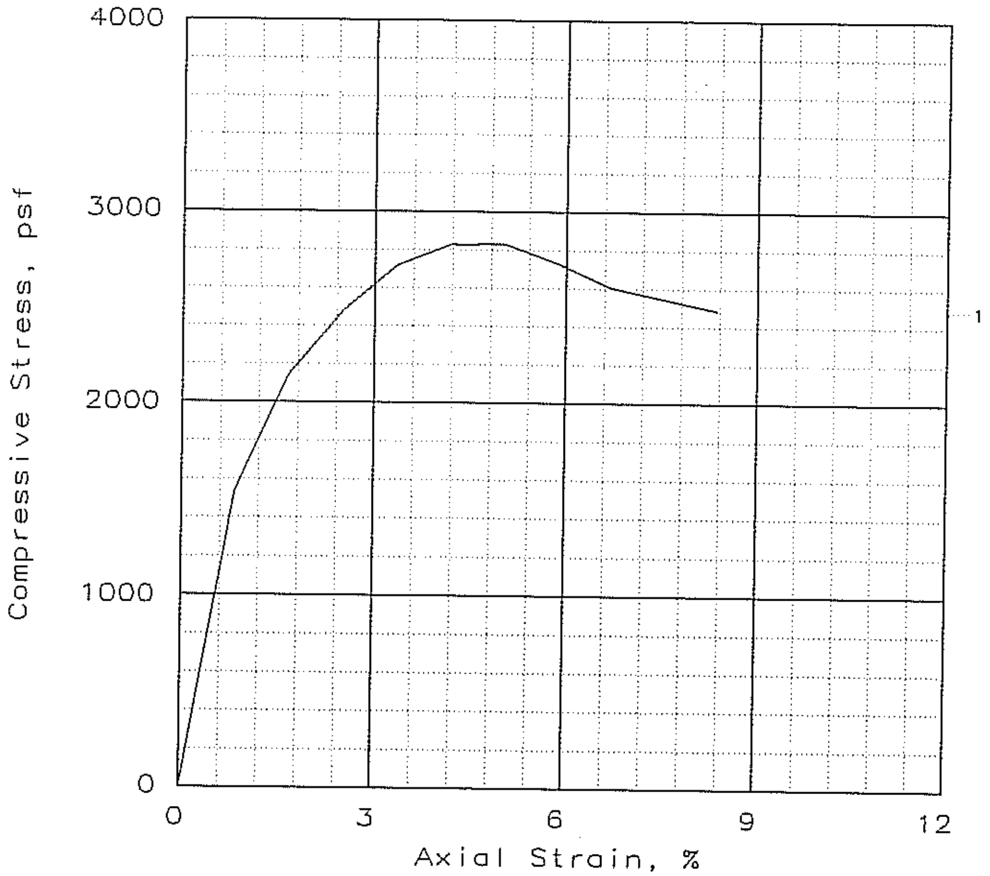
UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2831			
Undrained shear strength, psf	1415			
Failure strain, %	5.0			
Strain rate, %/min	2.00			
Water content, %	24.6			
Wet density, pcf	128.2			
Dry density, pcf	102.9			
Saturation, %	101.9			
Void ratio	0.6623			
Specimen diameter, in	1.36			
Specimen height, in	2.99			
Height/diameter ratio	2.19			

Description:

GS= 2.74

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

Project: I-69

Location: RB-19, #4B, 8.5-10'

UNCONFINED COMPRESSION TEST

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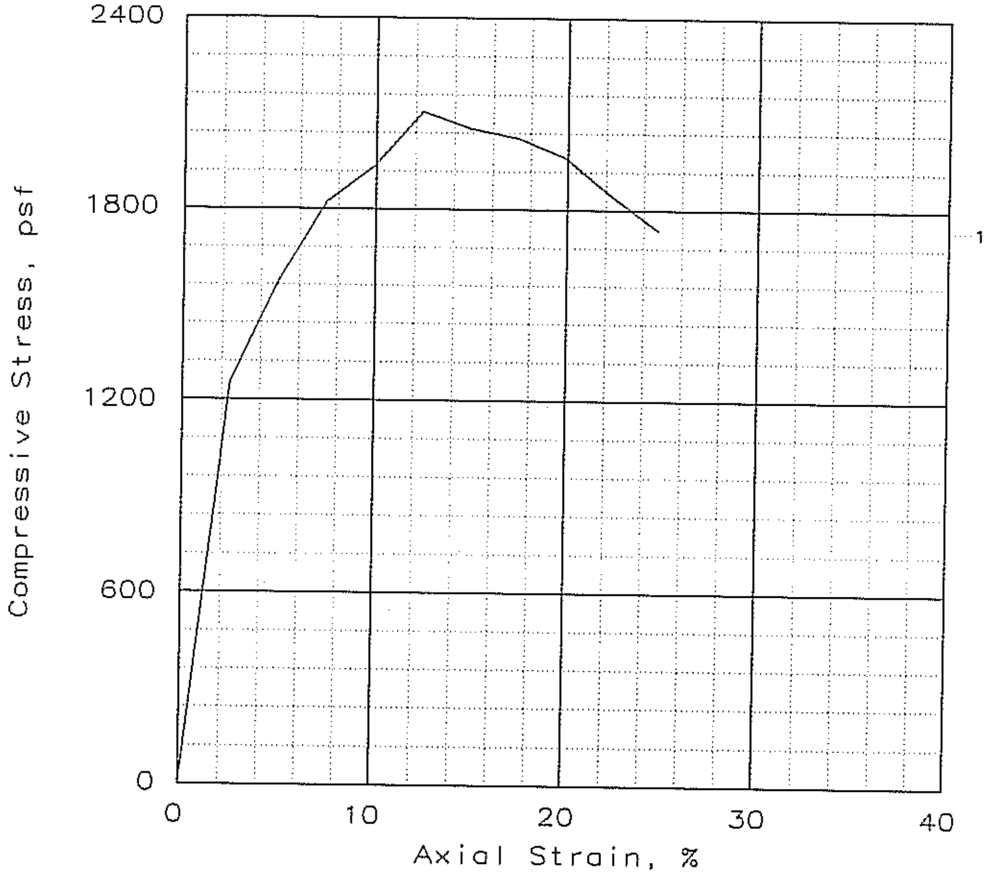
UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2105			
Undrained shear strength, psf	1053			
Failure strain, %	12.4			
Strain rate, %/min	2.00			
Water content, %	13.6			
Wet density, pcf	127.1			
Dry density, pcf	111.9			
Saturation, %	72.4			
Void ratio	0.5065			
Specimen diameter, in	1.39			
Specimen height, in	3.03			
Height/diameter ratio	2.17			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Client: American Structurepoint

Project: I-69

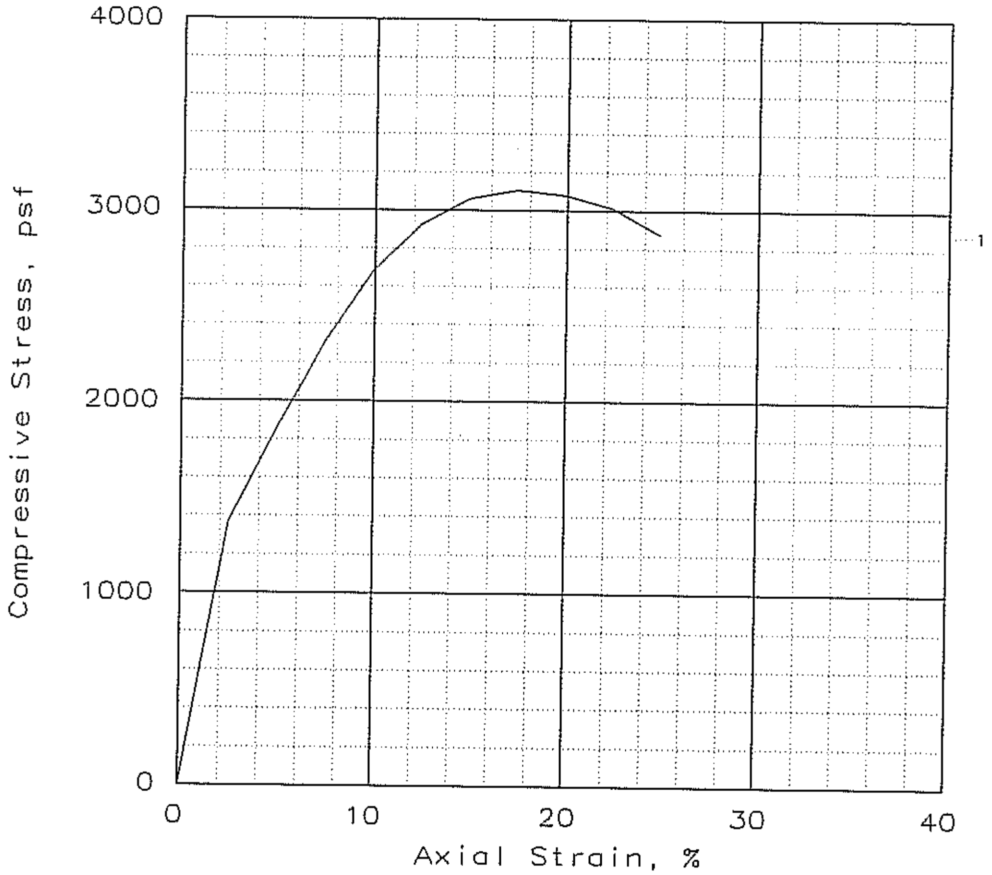
Location: RB-20, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Fig. No.: ____

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3106			
Undrained shear strength, psf	1553			
Failure strain, %	17.4			
Strain rate, %/min	2.00			
Water content, %	22.7			
Wet density, pcf	128.1			
Dry density, pcf	104.4			
Saturation, %	99.7			
Void ratio	0.6141			
Specimen diameter, in	1.39			
Specimen height, in	3.02			
Height/diameter ratio	2.18			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

Project: I-69

Location: RB-20, #4T, 8.5-10'

UNCONFINED COMPRESSION TEST

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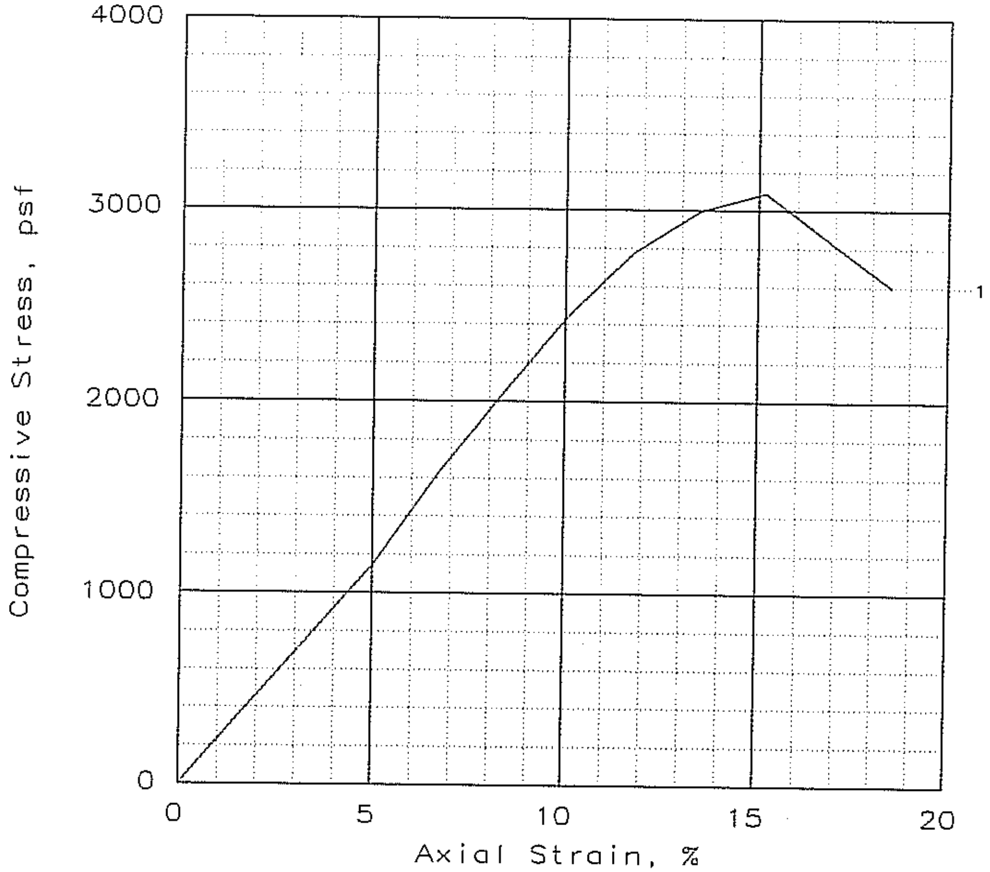
UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3089			
Undrained shear strength, psf	1544			
Failure strain, %	15.2			
Strain rate, %/min	2.00			
Water content, %	21.4			
Wet density, pcf	124.5			
Dry density, pcf	102.6			
Saturation, %	89.7			
Void ratio	0.6431			
Specimen diameter, in	1.50			
Specimen height, in	2.97			
Height/diameter ratio	1.98			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

Project: I-69

Location: RB-21, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

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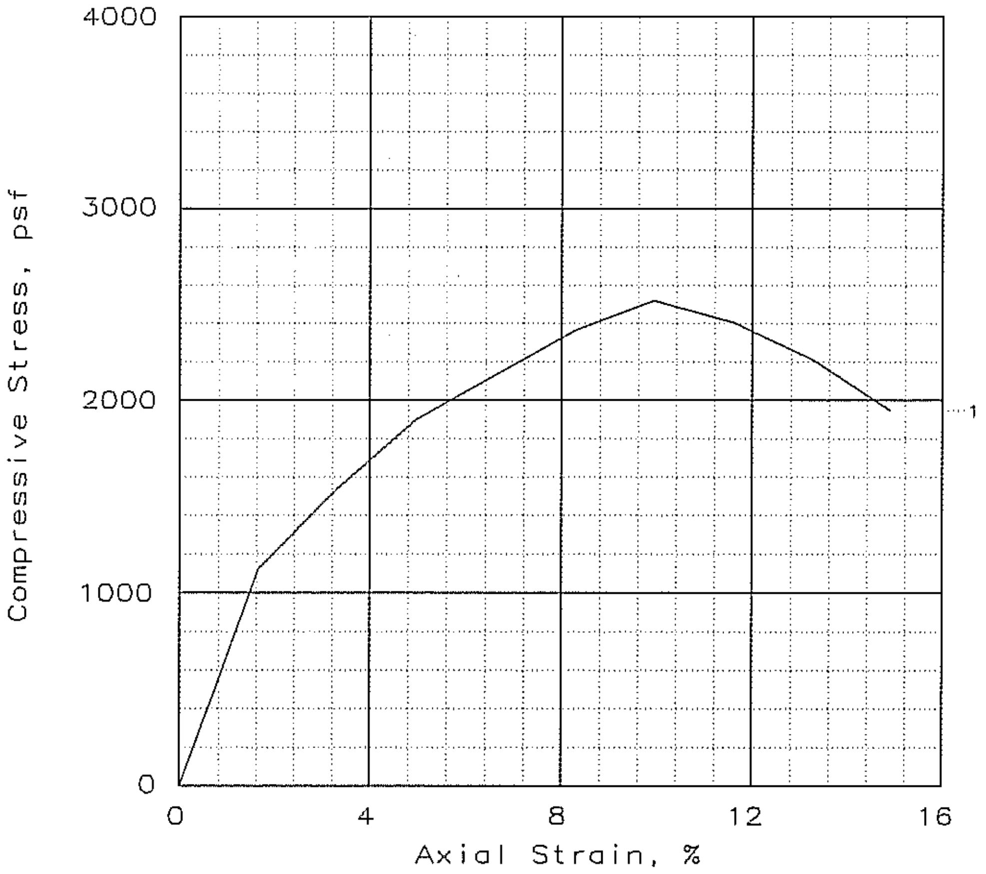
UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2520			
Undrained shear strength, psf	1260			
Failure strain, %	9.9			
Strain rate, %/min	2.00			
Water content, %	22.0			
Wet density, pcf	124.8			
Dry density, pcf	102.3			
Saturation, %	91.8			
Void ratio	0.6472			
Specimen diameter, in	1.39			
Specimen height, in	3.02			
Height/diameter ratio	2.18			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

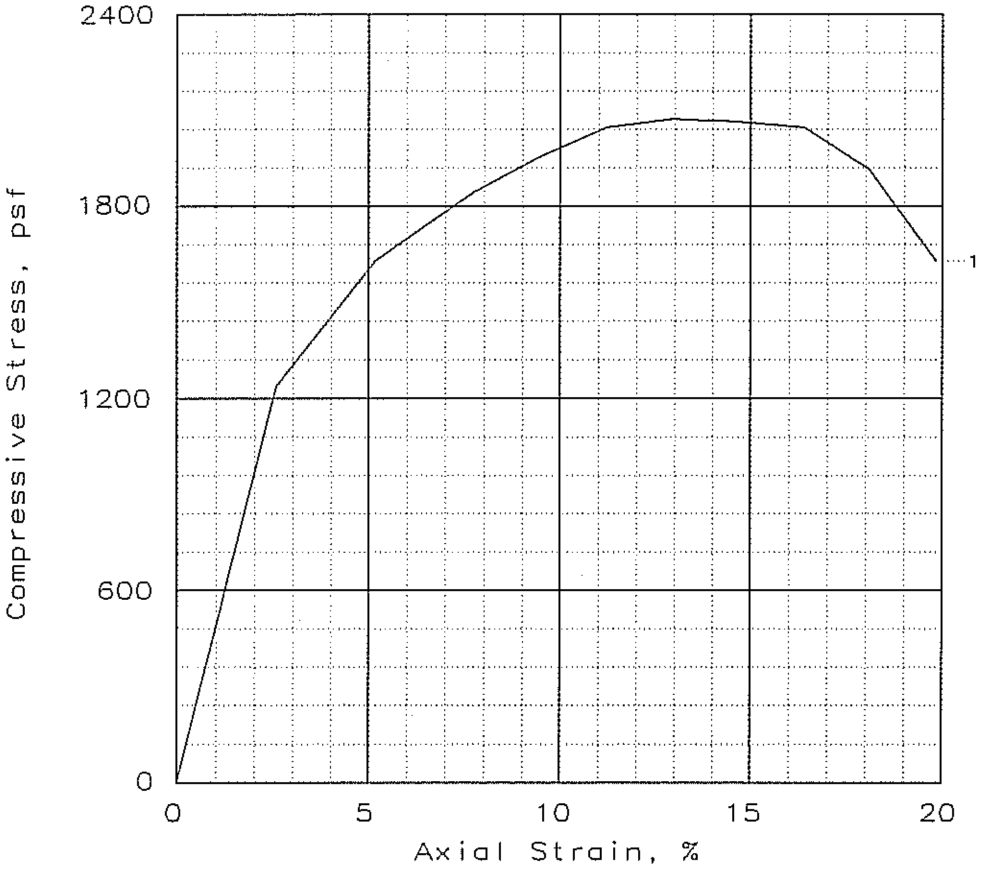
Project: I-69

Location: RB-24, #2B, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2073			
Undrained shear strength, psf	1037			
Failure strain, %	12.9			
Strain rate, %/min	2.00			
Water content, %	23.1			
Wet density, pcf	121.1			
Dry density, pcf	98.3			
Saturation, %	87.4			
Void ratio	0.7142			
Specimen diameter, in	1.39			
Specimen height, in	2.90			
Height/diameter ratio	2.08			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

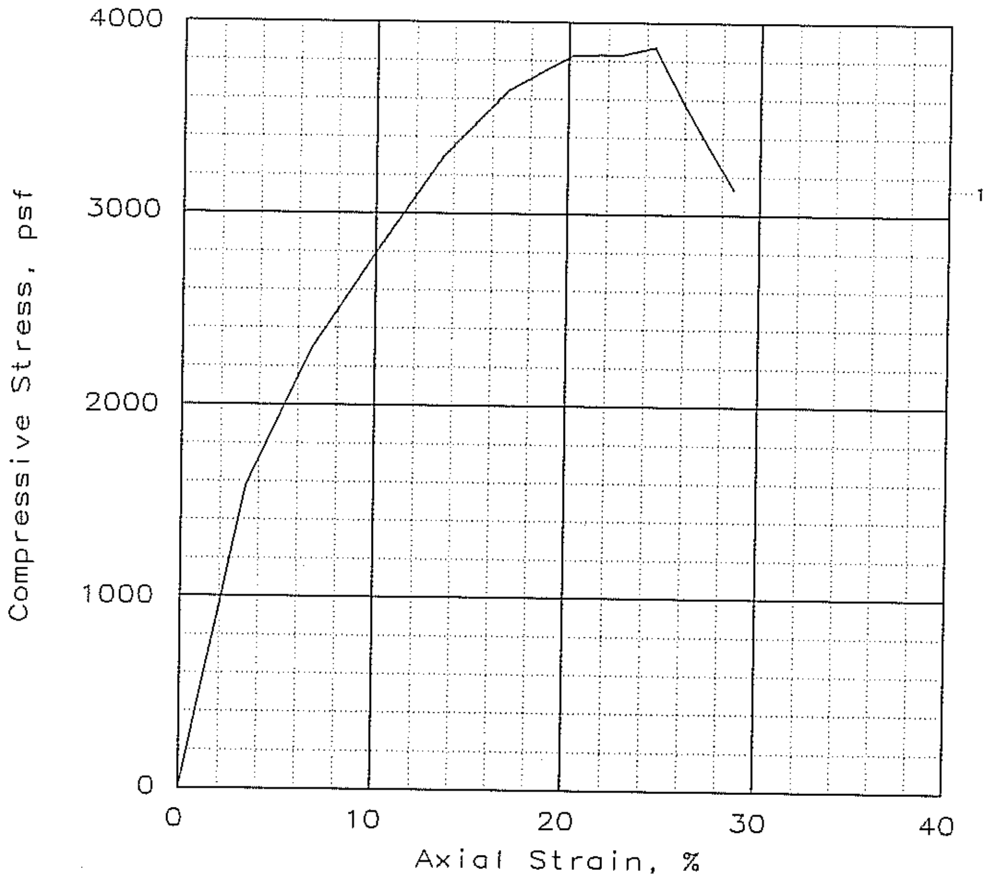
Project: I-69

Location: RB-24, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3873			
Undrained shear strength, psf	1936			
Failure strain, %	24.5			
Strain rate, %/min	2.00			
Water content, %	20.7			
Wet density, pcf	130.0			
Dry density, pcf	107.7			
Saturation, %	99.0			
Void ratio	0.5648			
Specimen diameter, in	1.38			
Specimen height, in	2.96			
Height/diameter ratio	2.15			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

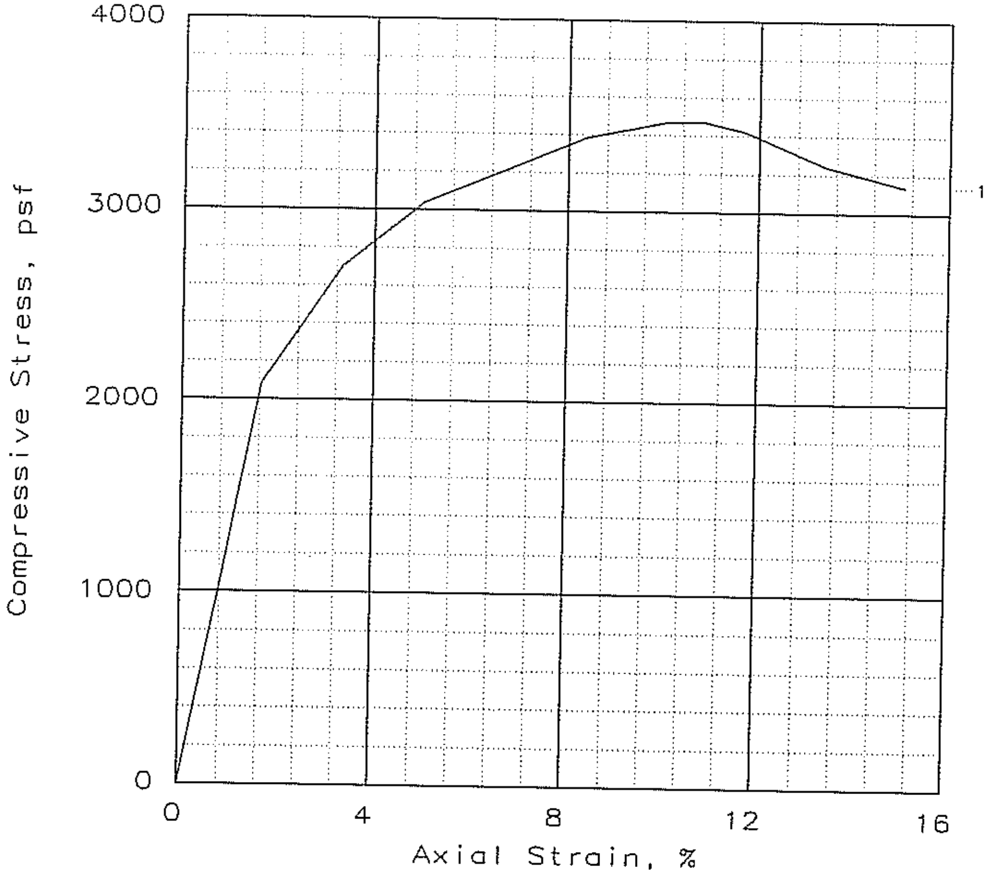
Project: I-69

Location: RB-25, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3470			
Undrained shear strength, psf	1735			
Failure strain, %	10.9			
Strain rate, %/min	2.00			
Water content, %	26.4			
Wet density, pcf	119.4			
Dry density, pcf	94.4			
Saturation, %	90.9			
Void ratio	0.7854			
Specimen diameter, in	1.35			
Specimen height, in	2.99			
Height/diameter ratio	2.21			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

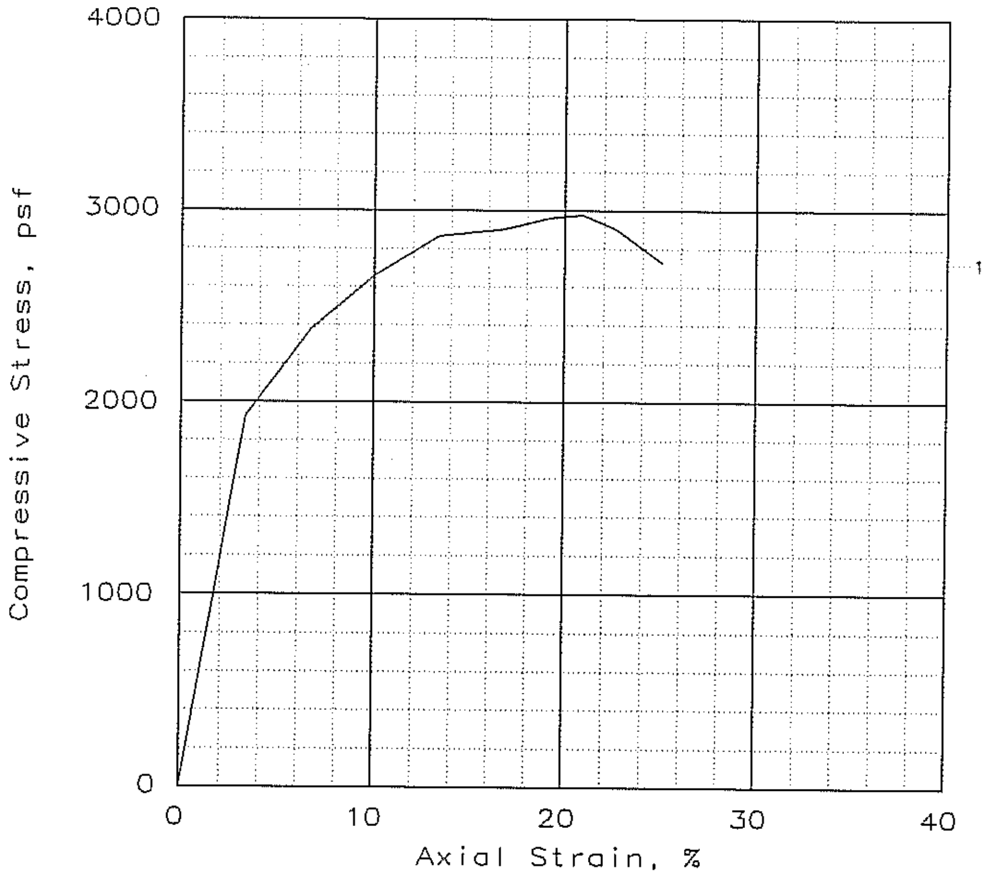
Project: I-69

Location: RB-26, #1T, 1-2.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2977			
Undrained shear strength, psf	1489			
Failure strain, %	20.9			
Strain rate, %/min	2.00			
Water content, %	23.1			
Wet density, pcf	127.5			
Dry density, pcf	103.6			
Saturation, %	99.5			
Void ratio	0.6269			
Specimen diameter, in	1.37			
Specimen height, in	2.99			
Height/diameter ratio	2.18			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

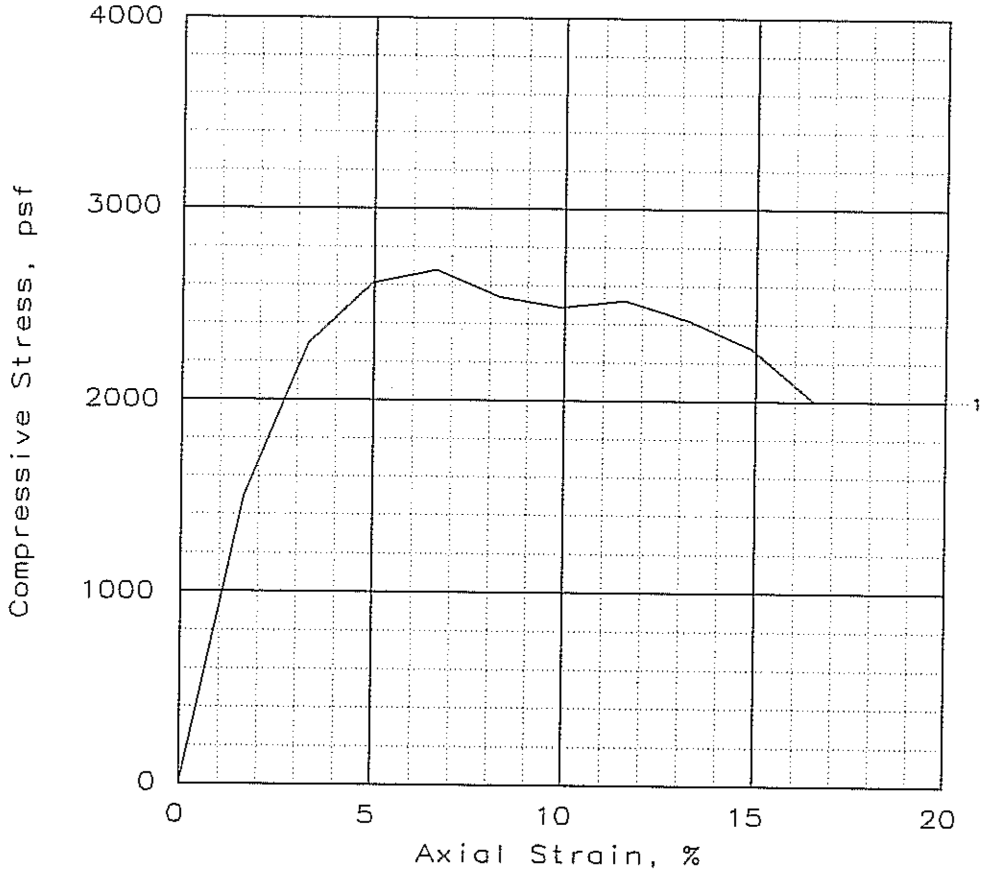
Project: I-69

Location: RB-27, #2T, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2680			
Undrained shear strength, psf	1340			
Failure strain, %	6.6			
Strain rate, %/min	2.00			
Water content, %	23.6			
Wet density, pcf	119.8			
Dry density, pcf	96.9			
Saturation, %	86.2			
Void ratio	0.7397			
Specimen diameter, in	1.53			
Specimen height, in	3.03			
Height/diameter ratio	1.98			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

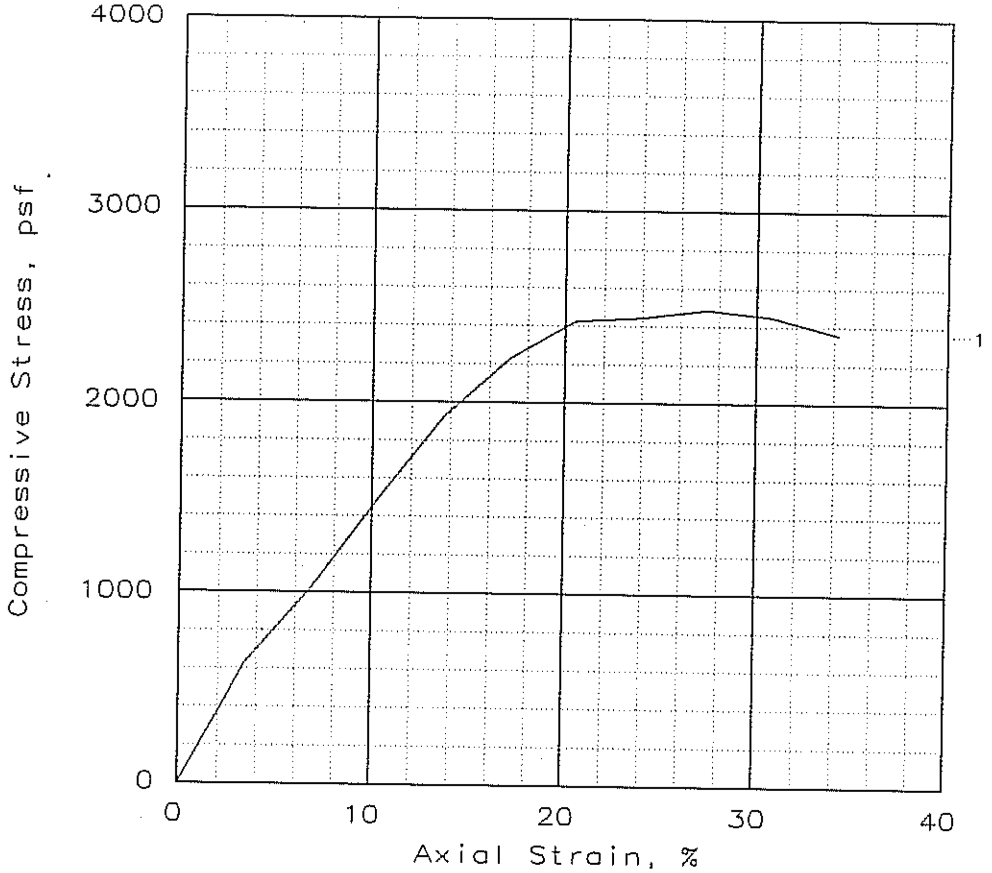
Project: I-69

Location: RB-28, #2T, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2486			
Undrained shear strength, psf	1243			
Failure strain, %	27.4			
Strain rate, %/min	2.00			
Water content, %	32.8			
Wet density, pcf	120.2			
Dry density, pcf	90.5			
Saturation, %	100.5			
Void ratio	0.8967			
Specimen diameter, in	1.57			
Specimen height, in	2.92			
Height/diameter ratio	1.86			

Description:

GS= 2.75

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

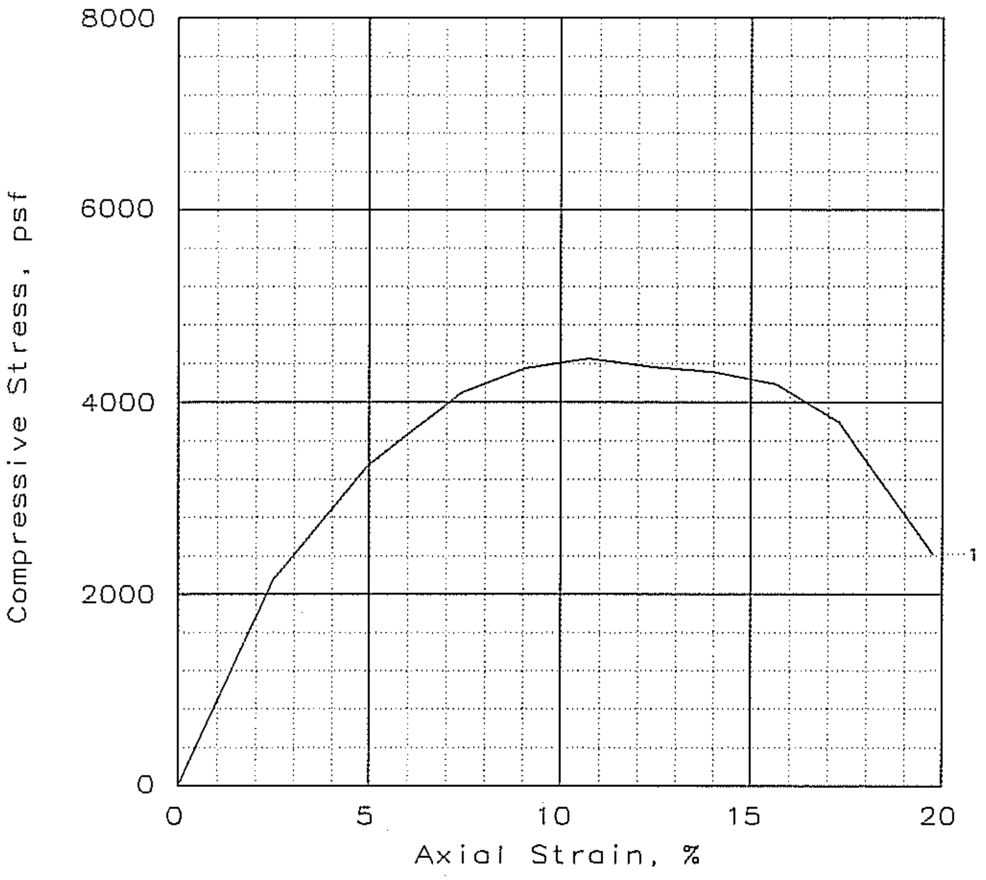
Project: I-69

Location: RB-28, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	4454			
Undrained shear strength, psf	2227			
Failure strain, %	10.7			
Strain rate, %/min	2.00			
Water content, %	22.0			
Wet density, pcf	124.8			
Dry density, pcf	102.3			
Saturation, %	91.6			
Void ratio	0.6479			
Specimen diameter, in	1.41			
Specimen height, in	3.03			
Height/diameter ratio	2.15			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

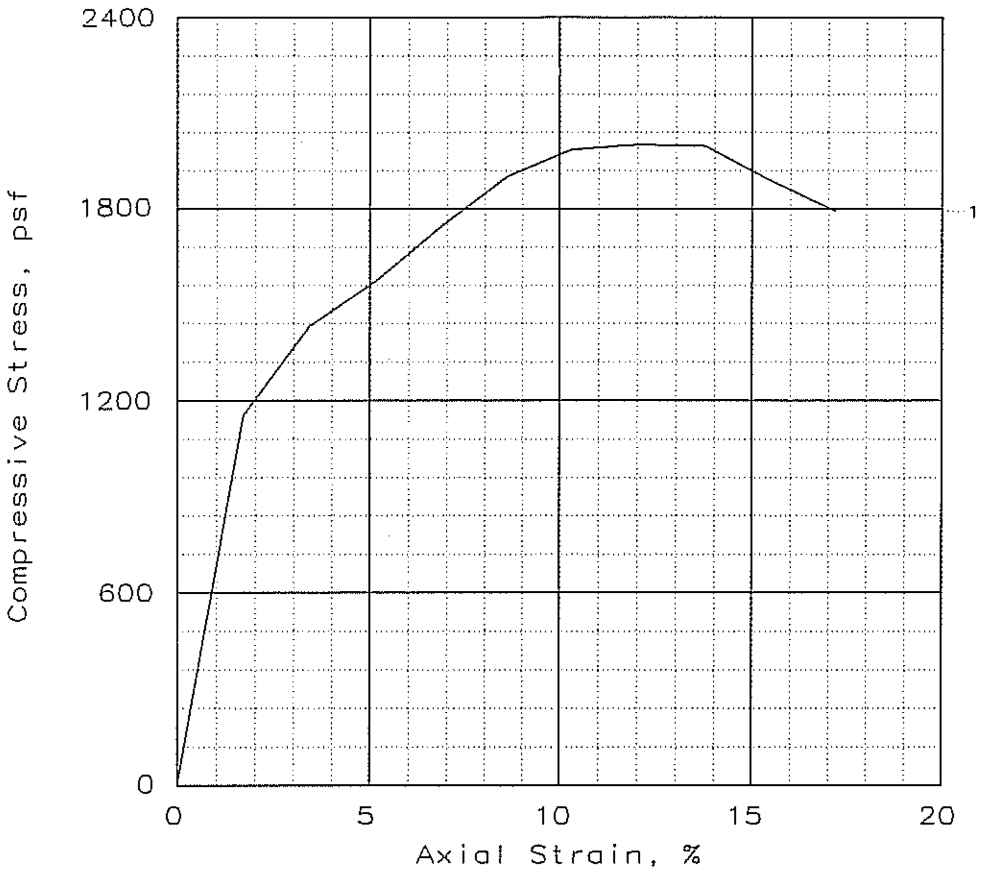
Project: I-69

Location: RB-30, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2003			
Undrained shear strength, psf	1001			
Failure strain, %	12.0			
Strain rate, %/min	2.00			
Water content, %	24.6			
Wet density, pcf	123.1			
Dry density, pcf	98.8			
Saturation, %	94.1			
Void ratio	0.7056			
Specimen diameter, in	1.33			
Specimen height, in	2.91			
Height/diameter ratio	2.18			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

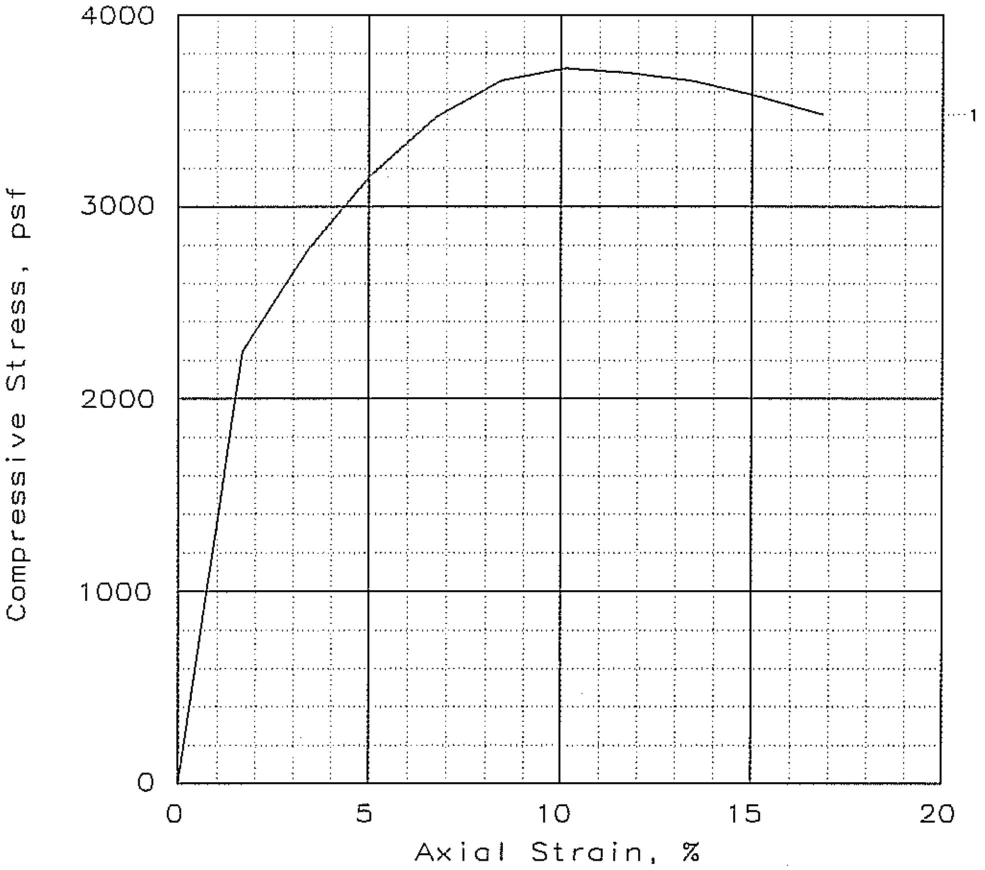
Project: I-69

Location: RB-52, #2B, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3724			
Undrained shear strength, psf	1862			
Failure strain, %	10.1			
Strain rate, %/min	2.00			
Water content, %	22.5			
Wet density, pcf	125.3			
Dry density, pcf	102.3			
Saturation, %	93.8			
Void ratio	0.6471			
Specimen diameter, in	1.33			
Specimen height, in	2.97			
Height/diameter ratio	2.24			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

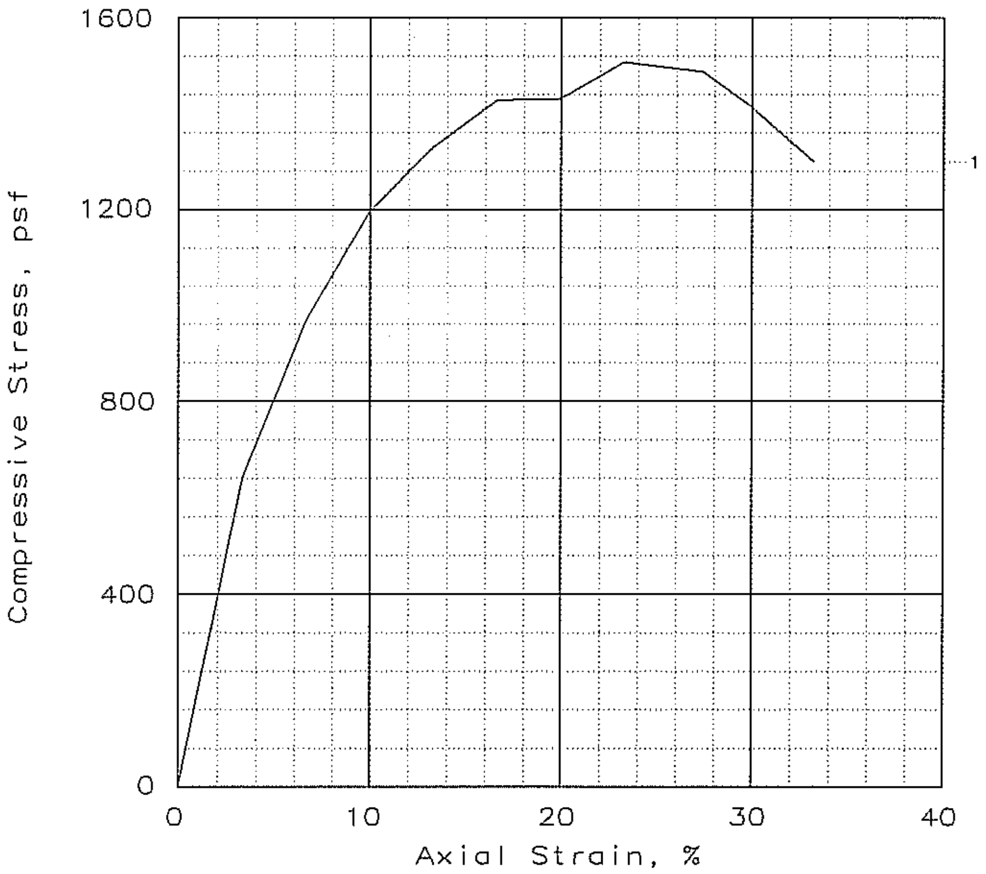
Project: I-69

Location: RB-57, #4B, 8.5-10'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	1508			
Undrained shear strength, psf	754			
Failure strain, %	23.3			
Strain rate, %/min	2.00			
Water content, %	26.0			
Wet density, pcf	121.7			
Dry density, pcf	96.5			
Saturation, %	94.2			
Void ratio	0.7463			
Specimen diameter, in	1.40			
Specimen height, in	3.01			
Height/diameter ratio	2.15			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

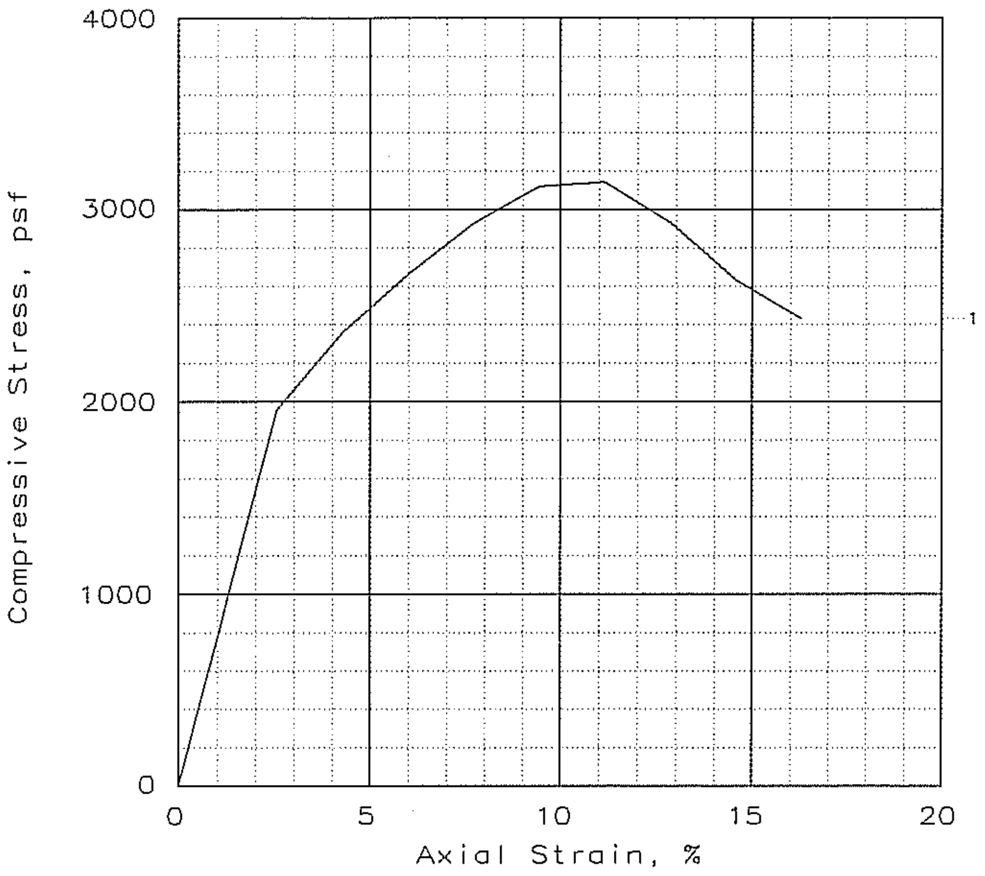
Project: I-69

Location: RB-59, #1B, 1-2.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3143			
Undrained shear strength, psf	1572			
Failure strain, %	11.1			
Strain rate, %/min	2.00			
Water content, %	23.0			
Wet density, pcf	125.7			
Dry density, pcf	102.2			
Saturation, %	95.5			
Void ratio	0.6494			
Specimen diameter, in	1.34			
Specimen height, in	2.92			
Height/diameter ratio	2.17			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

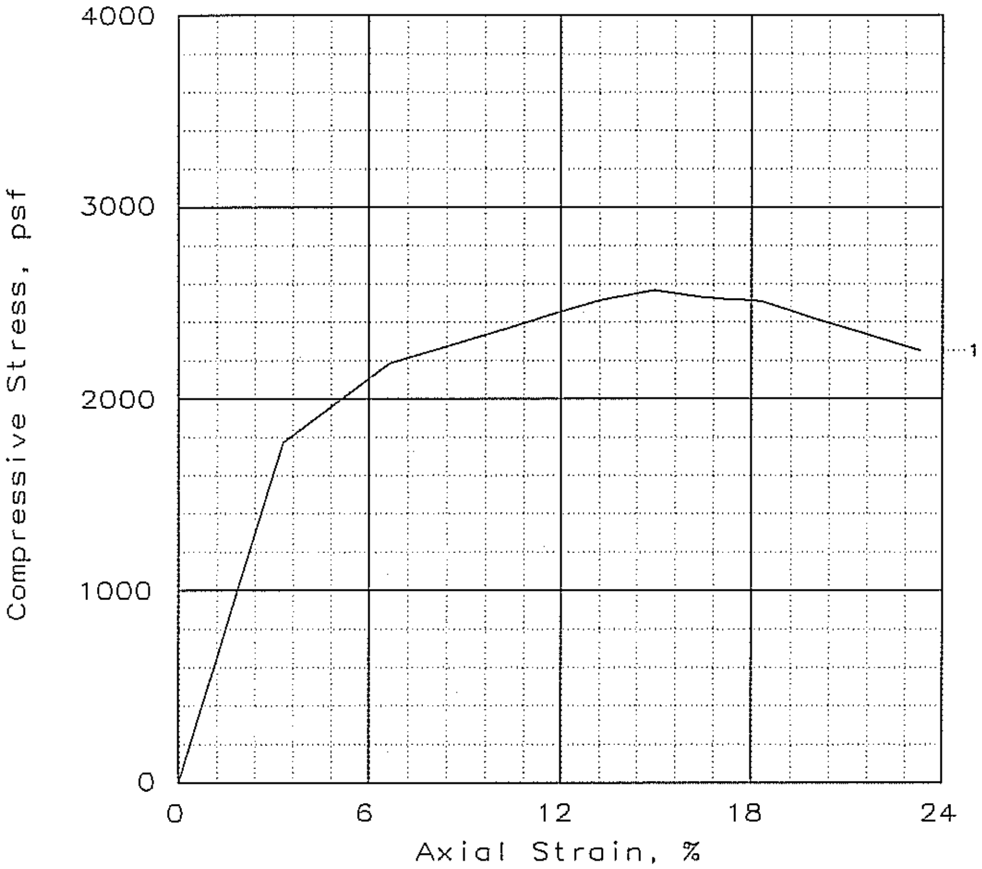
Project: I-69

Location: RB-59, #2B, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2568			
Undrained shear strength, psf	1284			
Failure strain, %	15.0			
Strain rate, %/min	2.00			
Water content, %	20.9			
Wet density, pcf	127.6			
Dry density, pcf	105.5			
Saturation, %	94.6			
Void ratio	0.5973			
Specimen diameter, in	1.33			
Specimen height, in	3.01			
Height/diameter ratio	2.27			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

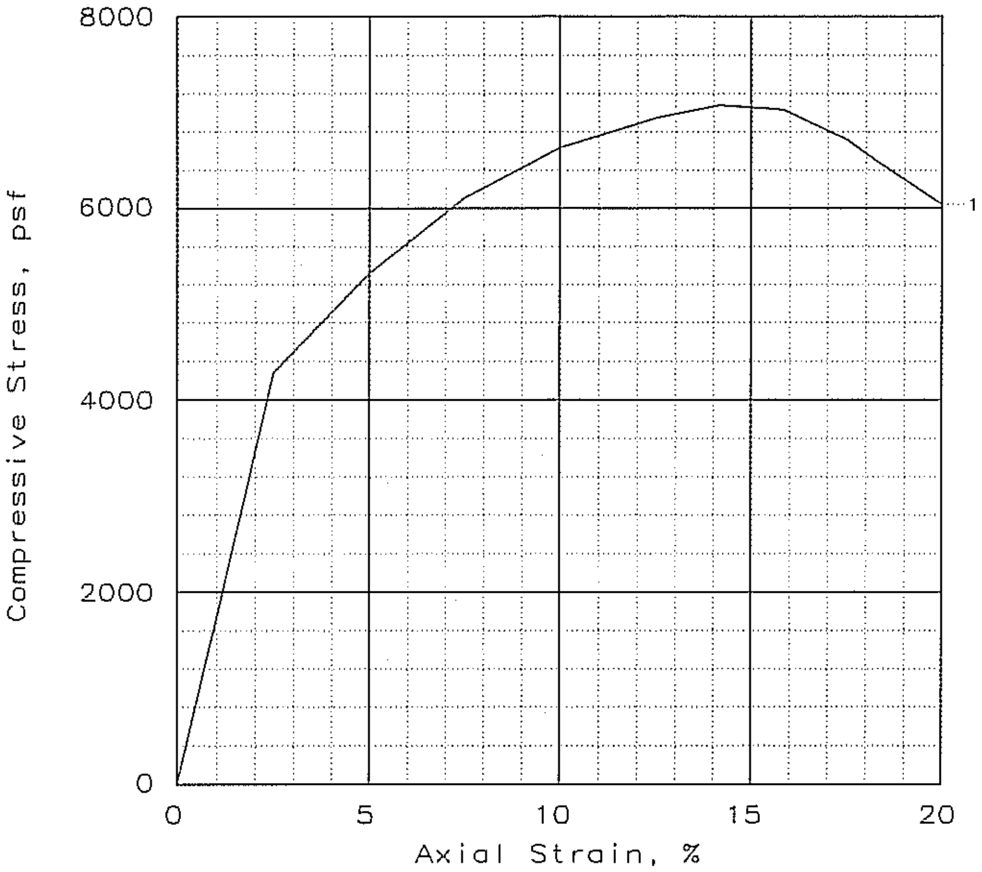
Project: I-69

Location: RB-59, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	7078			
Undrained shear strength, psf	3539			
Failure strain, %	14.2			
Strain rate, %/min	2.00			
Water content, %	20.0			
Wet density, pcf	130.8			
Dry density, pcf	108.9			
Saturation, %	98.8			
Void ratio	0.5471			
Specimen diameter, in	1.33			
Specimen height, in	3.00			
Height/diameter ratio	2.26			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

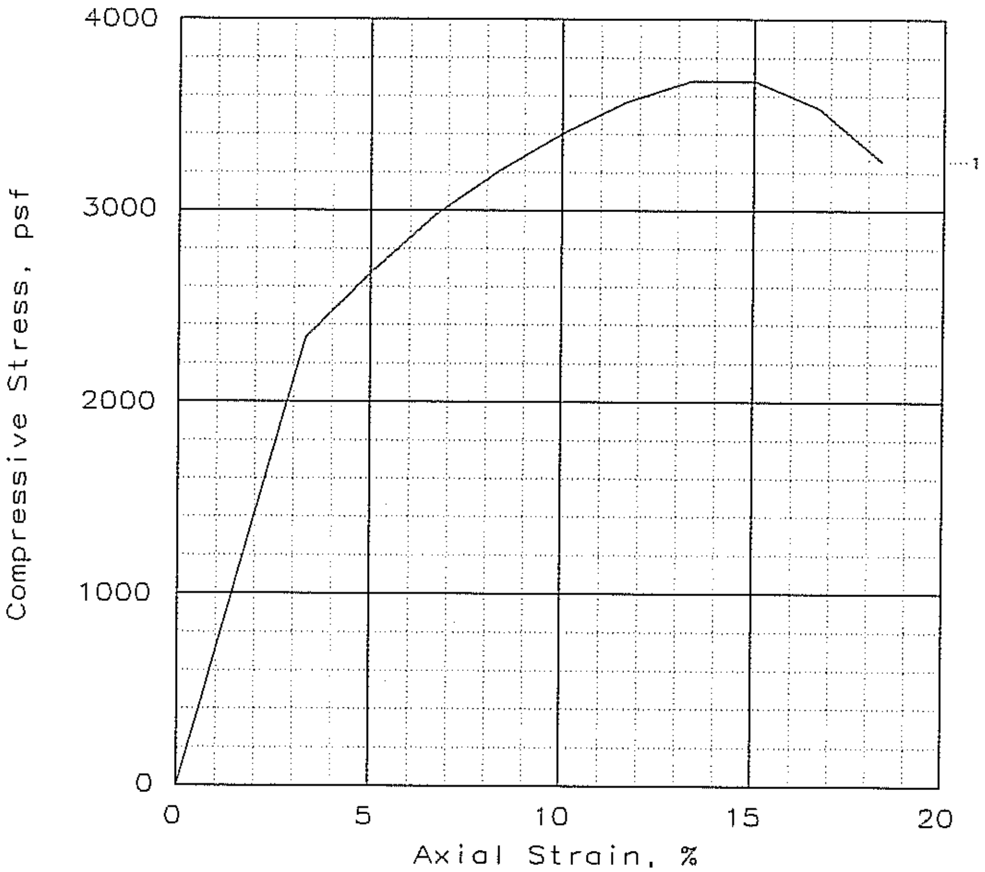
Project: I-69

Location: RB-59, #4B, 8.5-10'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	3678			
Undrained shear strength, psf	1839			
Failure strain, %	13.4			
Strain rate, %/min	2.00			
Water content, %	25.4			
Wet density, pcf	120.0			
Dry density, pcf	95.7			
Saturation, %	90.0			
Void ratio	0.7620			
Specimen diameter, in	1.35			
Specimen height, in	2.99			
Height/diameter ratio	2.22			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Client: American Consulting, Inc.

Project: I-69

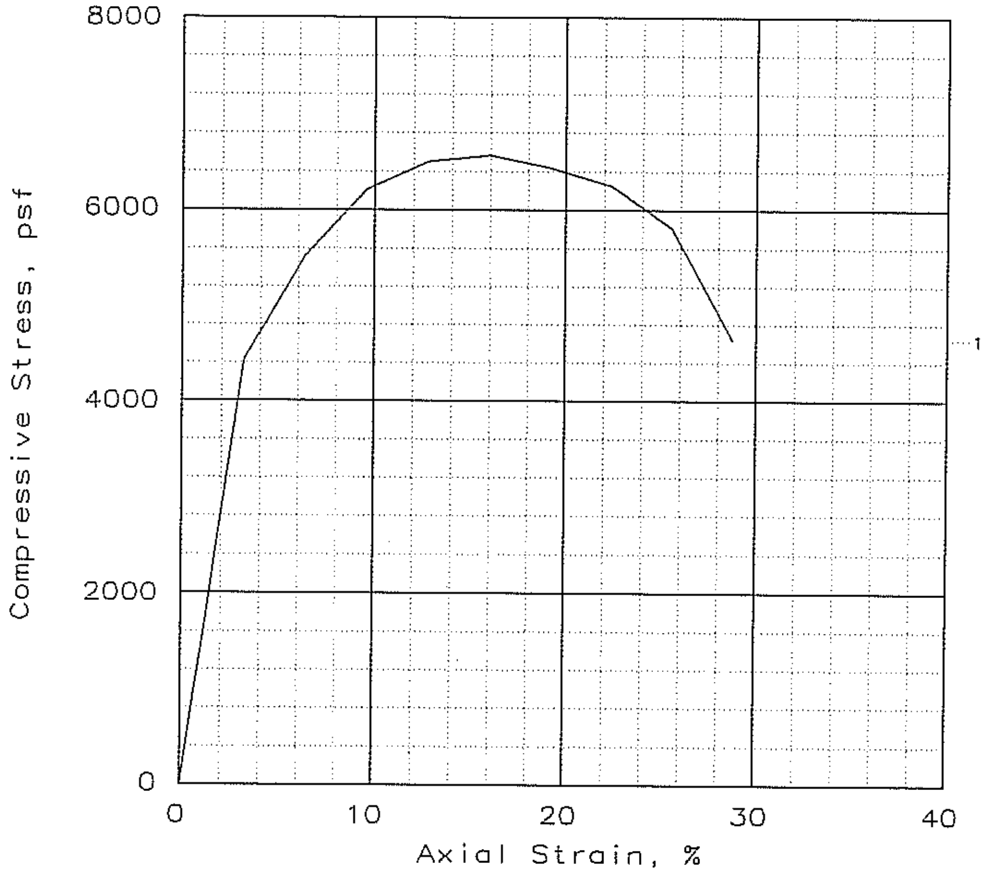
Location: TB-1, #1, 1-2.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Fig. No.: ______

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	6570			
Undrained shear strength, psf	3285			
Failure strain, %	16.0			
Strain rate, %/min	2.00			
Water content, %	23.3			
Wet density, pcf	127.6			
Dry density, pcf	103.5			
Saturation, %	99.5			
Void ratio	0.6349			
Specimen diameter, in	1.33			
Specimen height, in	3.12			
Height/diameter ratio	2.34			

Description:

GS= 2.71

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ——

Client: American Consulting, Inc.

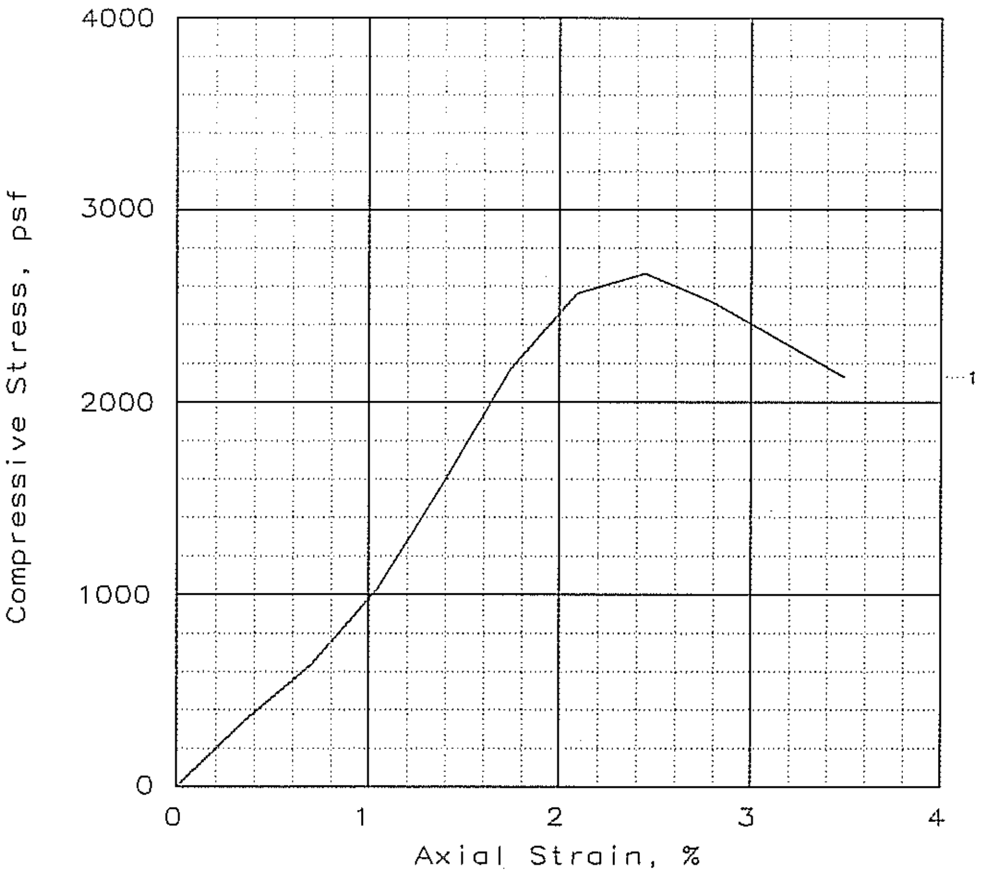
Project: I-69

Location: TB-2, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2667			
Undrained shear strength, psf	1333			
Failure strain, %	2.4			
Strain rate, %/min	2.00			
Water content, %	20.2			
Wet density, pcf	132.3			
Dry density, pcf	110.0			
Saturation, %	100.0			
Void ratio	0.5545			
Specimen diameter, in	2.86			
Specimen height, in	5.73			
Height/diameter ratio	2.01			

Description:

GS= 2.74

Type: Shelby tube

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

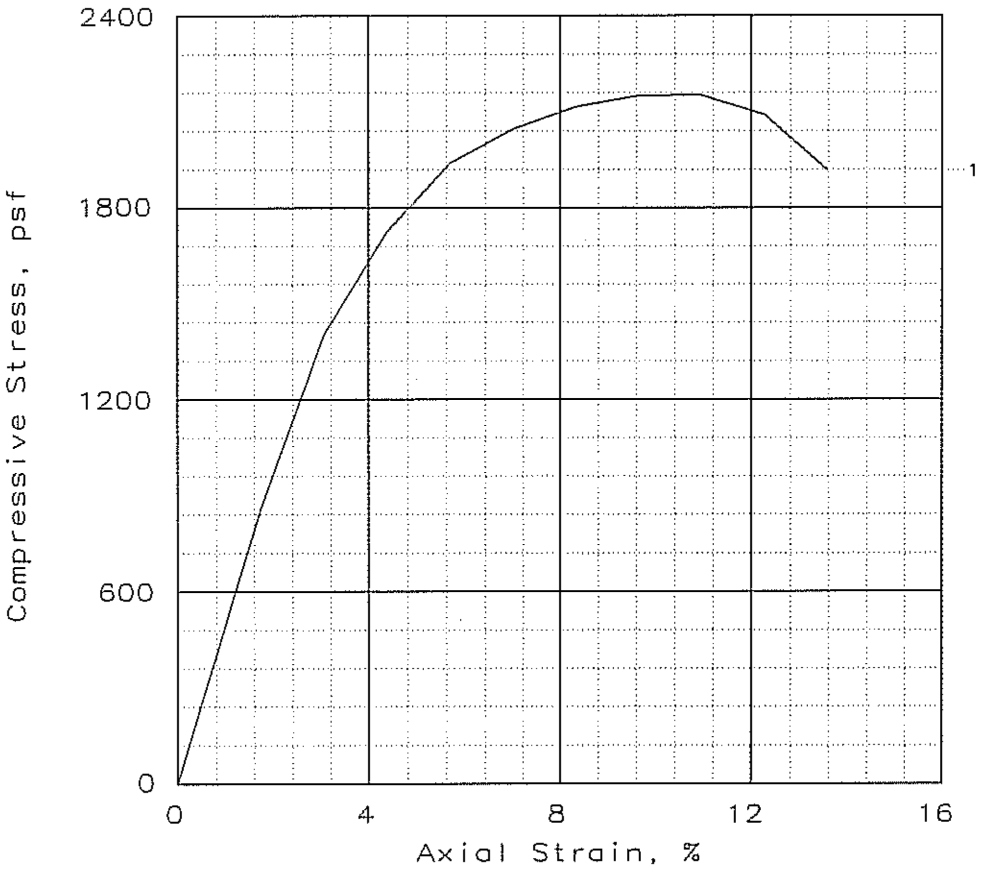
Project: I-69

Location: TB-3, 5-7'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2153			
Undrained shear strength, psf	1076			
Failure strain, %	11.0			
Strain rate, %/min	2.00			
Water content, %	22.1			
Wet density, pcf	127.7			
Dry density, pcf	104.6			
Saturation, %	97.6			
Void ratio	0.6109			
Specimen diameter, in	2.85			
Specimen height, in	5.70			
Height/diameter ratio	2.00			

Description:

GS= 2.7

Type: Shelby tube

Project No.: 86.00481.0181

Date:

Remarks:

Client: American Structurepoint

Project: I-69

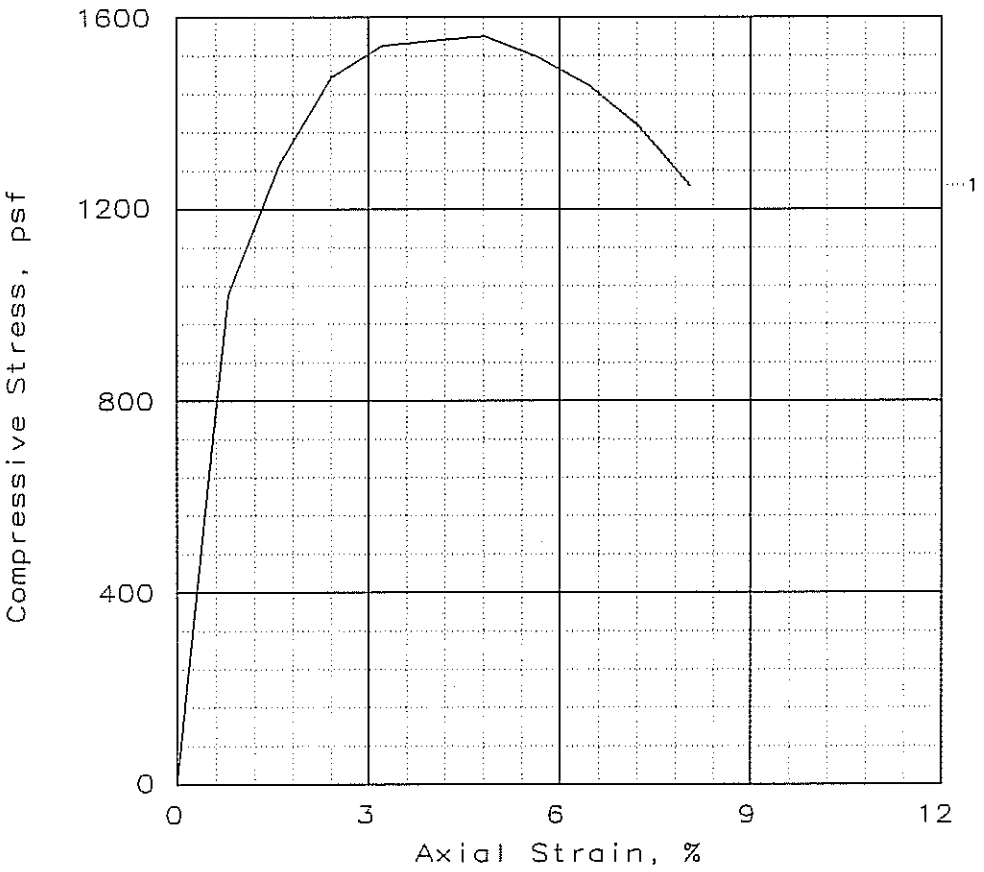
Location: TB-3, 12-14'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Fig. No.: ____

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	1561			
Undrained shear strength, psf	781			
Failure strain, %	4.8			
Strain rate, %/min	2.00			
Water content, %	46.0			
Wet density, pcf	107.5			
Dry density, pcf	73.6			
Saturation, %	96.4			
Void ratio	1.2891			
Specimen diameter, in	1.51			
Specimen height, in	3.10			
Height/diameter ratio	2.06			

Description:

GS= 2.7

Type: Split spoon

Project No.: 86.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Consulting, Inc.

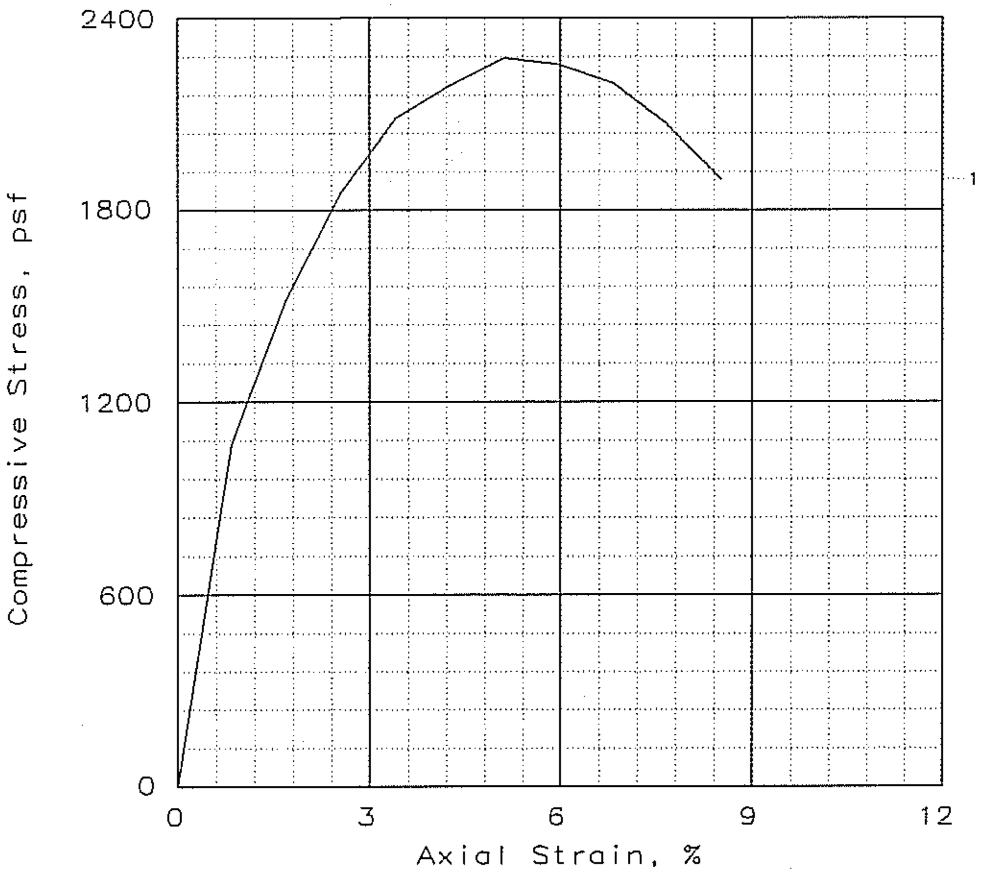
Project: I-69

Location: TB-4, #9B, 33.5-35'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2275			
Undrained shear strength, psf	1138			
Failure strain, %	5.1			
Strain rate, %/min	2.00			
Water content, %	23.1			
Wet density, pcf	123.7			
Dry density, pcf	100.5			
Saturation, %	92.1			
Void ratio	0.6772			
Specimen diameter, in	1.36			
Specimen height, in	2.93			
Height/diameter ratio	2.15			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

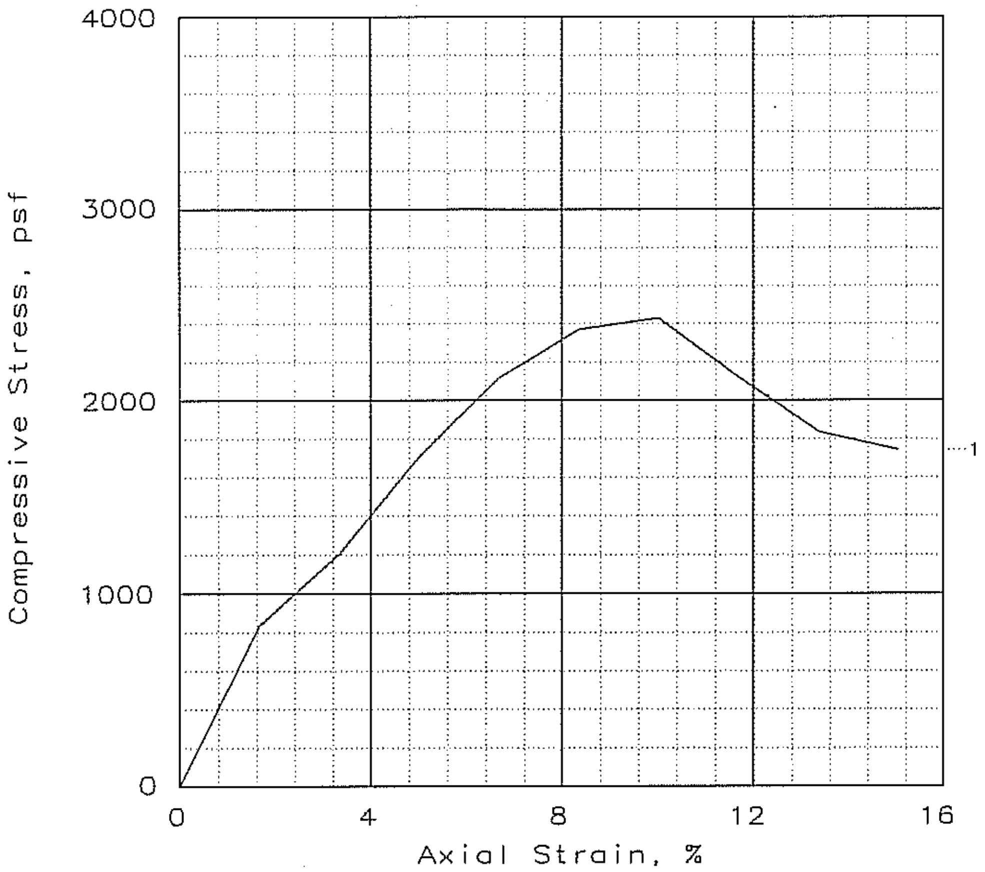
Project: I-69

Location: TB-8, #3T, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2431			
Undrained shear strength, psf	1216			
Failure strain, %	10.0			
Strain rate, %/min	2.00			
Water content, %	25.3			
Wet density, pcf	119.3			
Dry density, pcf	95.2			
Saturation, %	88.6			
Void ratio	0.7704			
Specimen diameter, in	1.39			
Specimen height, in	2.99			
Height/diameter ratio	2.15			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

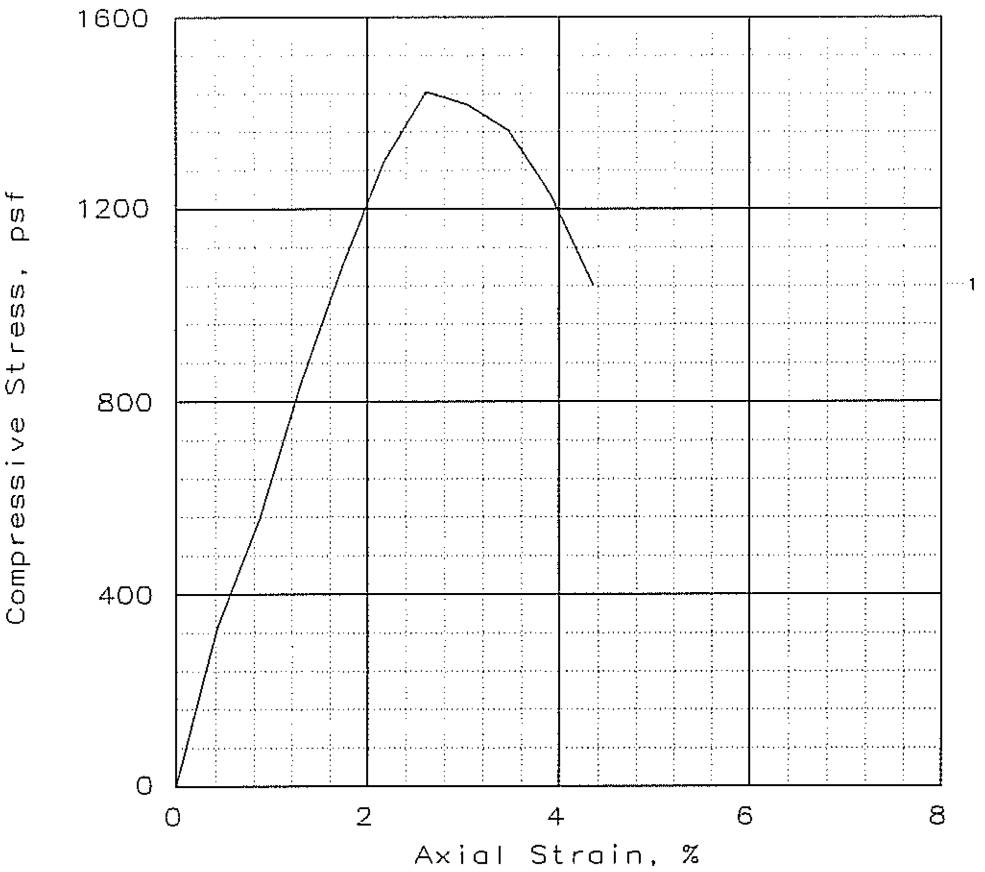
Project: I-69

Location: TB-10, #1B, 1-2.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	1444			
Undrained shear strength, psf	722			
Failure strain, %	2.6			
Strain rate, %/min	2.00			
Water content, %	26.1			
Wet density, pcf	123.5			
Dry density, pcf	98.0			
Saturation, %	97.7			
Void ratio	0.7201			
Specimen diameter, in	2.86			
Specimen height, in	5.74			
Height/diameter ratio	2.01			

Description:

GS= 2.7

Type: Shelby tube

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

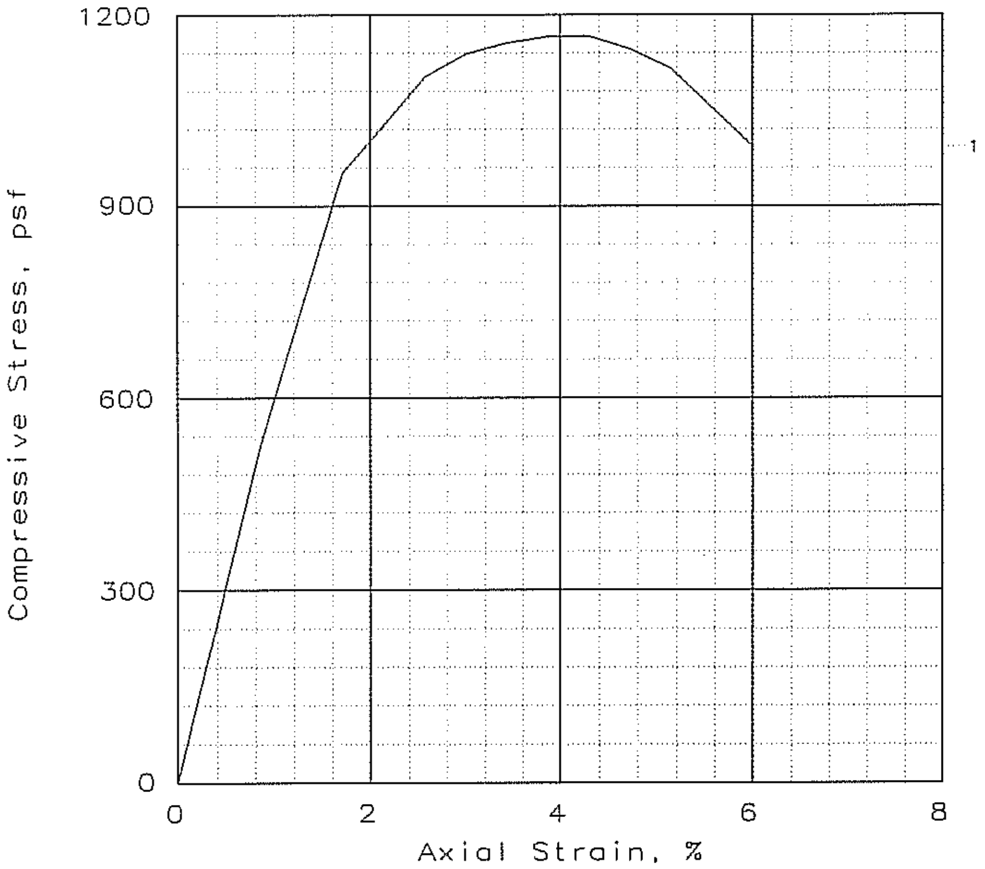
Project: I-69

Location: TB-11, 6-8'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	1166			
Undrained shear strength, psf	583			
Failure strain, %	4.3			
Strain rate, %/min	2.00			
Water content, %	27.3			
Wet density, pcf	123.9			
Dry density, pcf	97.3			
Saturation, %	100.1			
Void ratio	0.7387			
Specimen diameter, in	2.87			
Specimen height, in	5.83			
Height/diameter ratio	2.03			

Description:

GS= 2.71

Type: Shelby tube

Project No.: 86.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

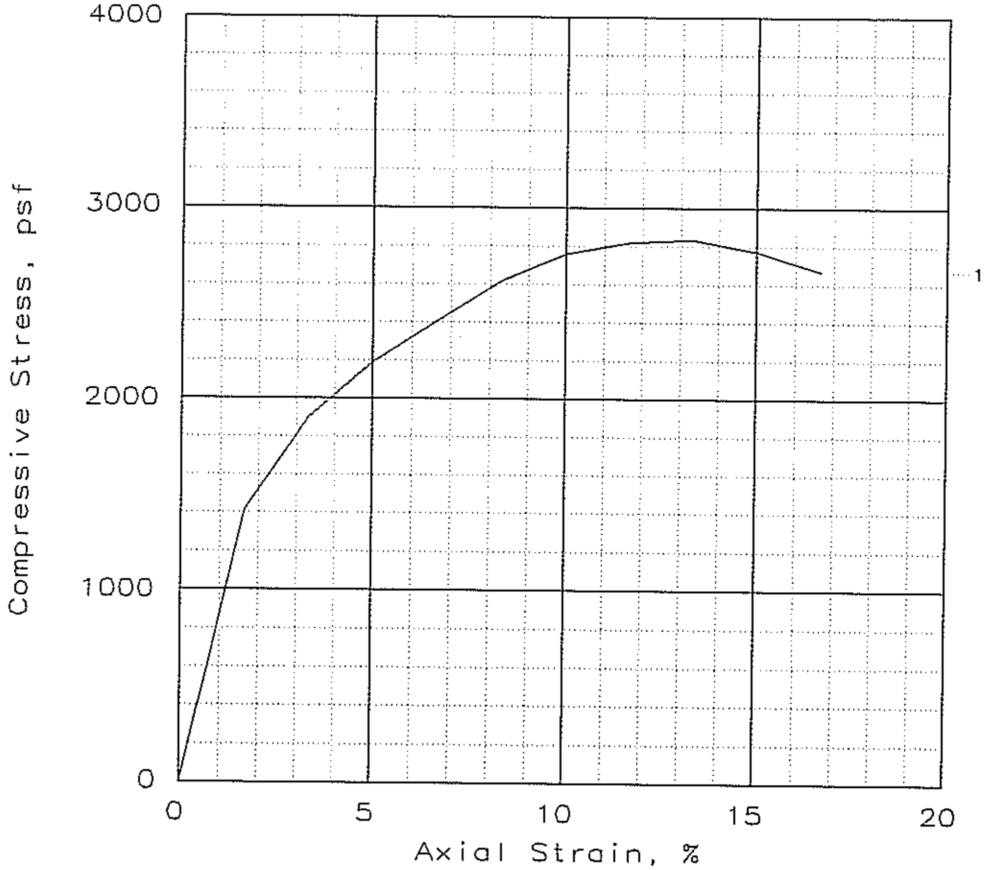
Project: I-69

Location: TB-11, 12-14'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2835			
Undrained shear strength, psf	1418			
Failure strain, %	13.3			
Strain rate, %/min	2.00			
Water content, %	22.3			
Wet density, pcf	125.8			
Dry density, pcf	102.8			
Saturation, %	94.3			
Void ratio	0.6398			
Specimen diameter, in	1.36			
Specimen height, in	3.00			
Height/diameter ratio	2.20			

Description:

GS= 2.7

Type: Split spoon

Project No.: 86.00481.0181

Date:

Remarks:

Client: American Consulting, Inc.

Project: I-69

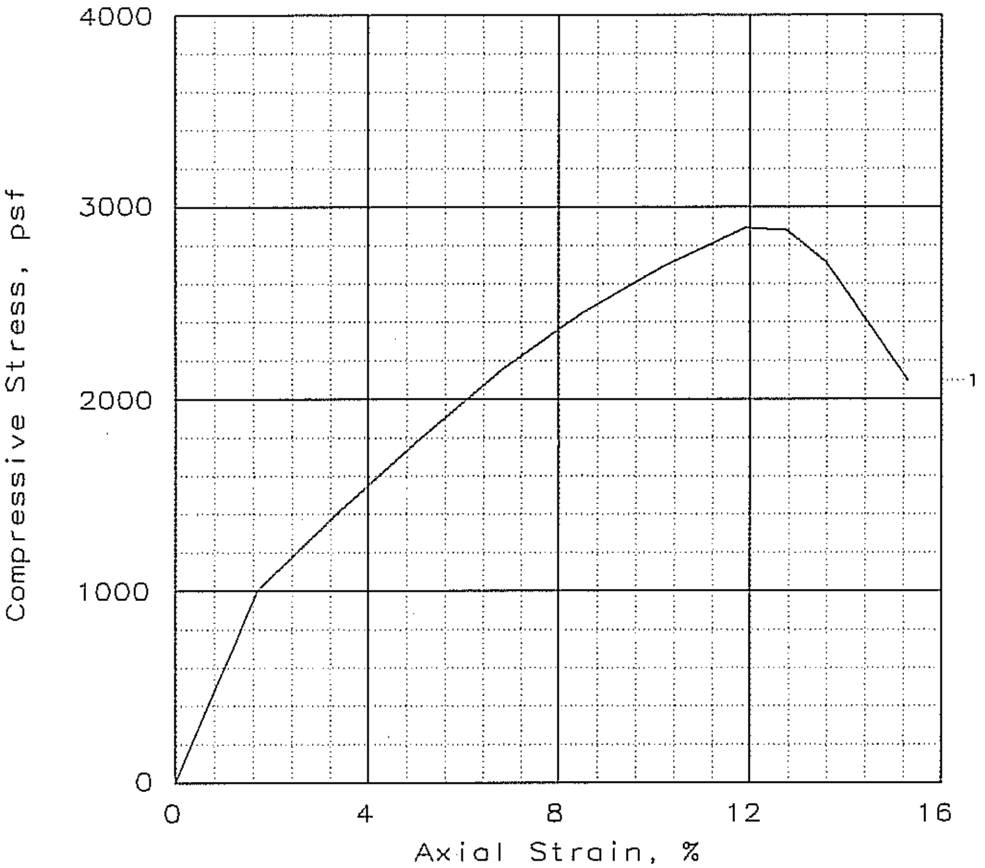
Location: TL-18, #2, 3.5-5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Fig. No.: ______

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	2892			
Undrained shear strength, psf	1446			
Failure strain, %	11.9			
Strain rate, %/min	2.00			
Water content, %	24.0			
Wet density, pcf	124.6			
Dry density, pcf	100.5			
Saturation, %	95.5			
Void ratio	0.6774			
Specimen diameter, in	1.37			
Specimen height, in	2.94			
Height/diameter ratio	2.14			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ______

Client: American Structurepoint

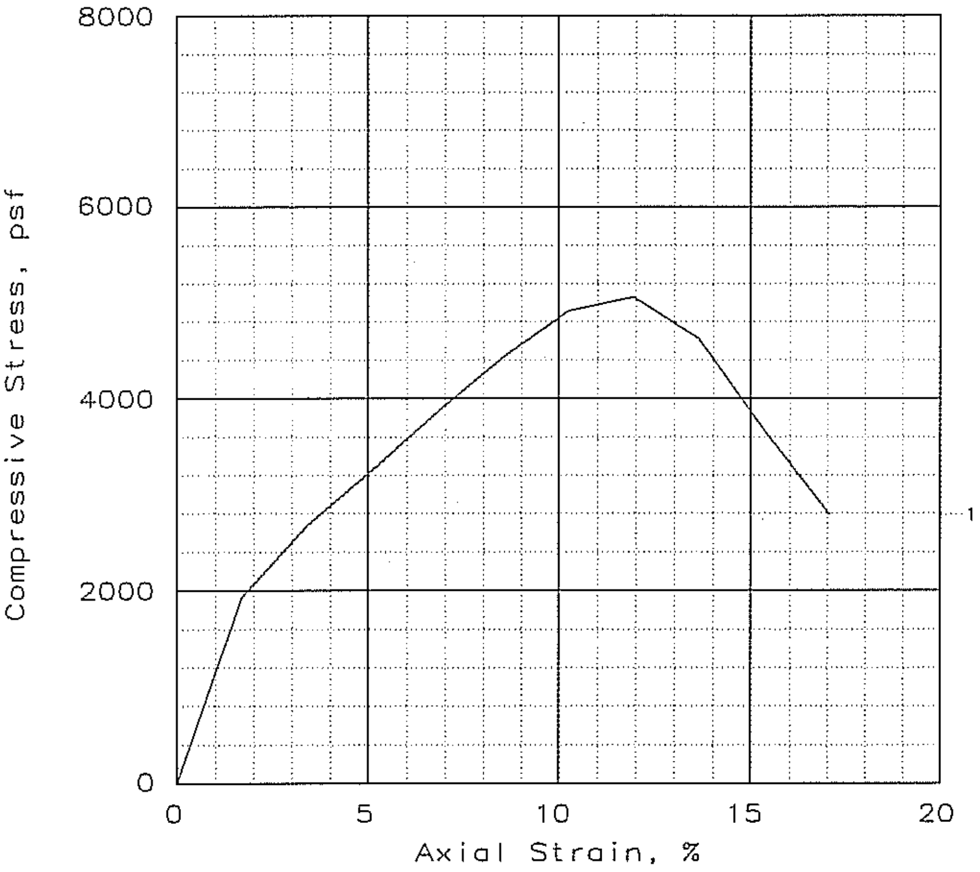
Project: I-69

Location: TL-21, #1, 1-2.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	5059			
Undrained shear strength, psf	2529			
Failure strain, %	12.0			
Strain rate, %/min	2.00			
Water content, %	21.1			
Wet density, pcf	126.1			
Dry density, pcf	104.1			
Saturation, %	92.2			
Void ratio	0.6191			
Specimen diameter, in	1.35			
Specimen height, in	2.93			
Height/diameter ratio	2.17			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

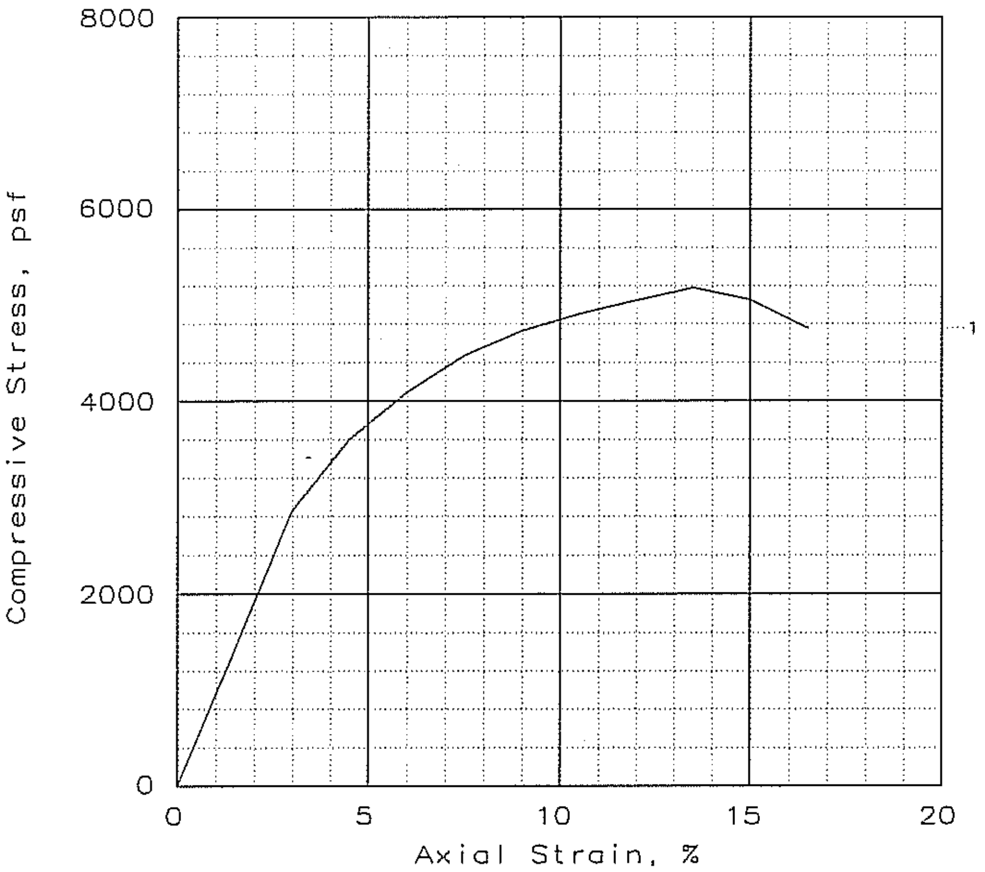
Project: I-69

Location: TL-21, #3, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	5182			
Undrained shear strength, psf	2591			
Failure strain, %	13.5			
Strain rate, %/min	2.00			
Water content, %	18.5			
Wet density, pcf	119.3			
Dry density, pcf	100.7			
Saturation, %	73.9			
Void ratio	0.6739			
Specimen diameter, in	1.52			
Specimen height, in	3.33			
Height/diameter ratio	2.19			

Description:

			GS= 2.7	Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ____

Client: American Structurepoint

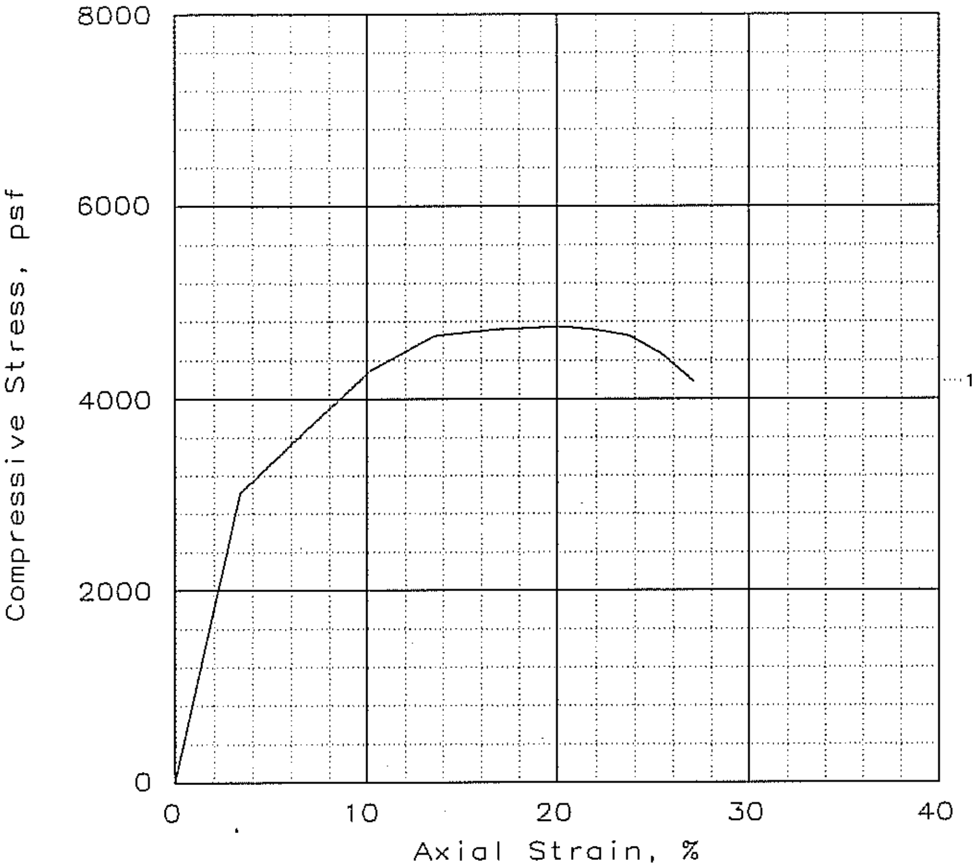
Project: I-69

Location: TL-22, #3B, 6-7.5'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	4749			
Undrained shear strength, psf	2375			
Failure strain, %	20.3			
Strain rate, %/min	2.00			
Water content, %	21.1			
Wet density, pcf	129.7			
Dry density, pcf	107.0			
Saturation, %	99.3			
Void ratio	0.5747			
Specimen diameter, in	1.36			
Specimen height, in	2.95			
Height/diameter ratio	2.17			

Description:

GS= 2.7

Type: Split spoon

Project No.: 086.00481.0181

Date:

Remarks:

Fig. No.: ——

Client: American Structurepoint

Project: I-69

Location: TL-22, #4B, 8.5-10'

UNCONFINED COMPRESSION TEST

ATC ASSOCIATES INC.

Project Name: I-69
Project Number: 086.00481.0181
Date: 4/10/2007

Consolidation Test Results

Input Values

Ring Diameter = 2.5 in
Sample Height, Hi = 1.000 in
Wt. Water, Wi = 24.88 gr
Wt. Water, Wf = 24.89 gr
Specific Gravity, Gs = 2.650
Unit Wt Water = 16.38 gr/cu.in
Dry Weight Sample, Wt = 135.38 gr
Final Saturation, Sf= 100 %

Load		Dial Reading		Delta H	Void Ratio
tsf	kPa	in x 10-4	in	in	
0	0	0	0	0	0.573892842
0.0625	5.98165625	2	0.0002	0.0002	0.573578064
0.125	11.9633125	23	0.0023	0.0023	0.570272889
0.25	205	57	0.0057	0.0057	0.564921653
0.5	47.85325	134	0.0134	0.0134	0.552802678
1	95.7065	244.5	0.02445	0.02445	0.535411162
2	191.413	429.5	0.04295	0.04295	0.506294145
4	382.826	725	0.0725	0.0725	0.459785611
8	2183	996	0.0996	0.0996	0.417133115
16	1531.304	1232	0.1232	0.1232	0.379989244
4	382.826	1216	0.1216	0.1216	0.382507473
1	95.7065	1159	0.1159	0.1159	0.391478662
0.25	23.926625	1095	0.1095	0.1095	0.401551576
0.06	5.98165625	1030	0.103	0.103	0.41178188
	0		0	0	0.573892842
	0		0	0	0.573892842
	0		0	0	0.573892842
	0		0	0	0.573892842
	0		0	0	0.573892842
	0		0	0	0.573892842
	0		0	0	0.573892842

Calculated Values

Sample Area, A= 4.909 sq.in
Intial Moisture Content, wi= 18.38 %
Final Moisture Content, wf= 18.39 %
Volume of Soil Solids, Vs= 3.1188518 cu.in
Height of Solids, Hs= 0.6353673 in
Final Volume of Sample, Vf= 4.3118359 cu.in
Final Volume of Voids, Vvf= 1.1929841 cu.in
Final Void Ratio, ef= 0.3825075

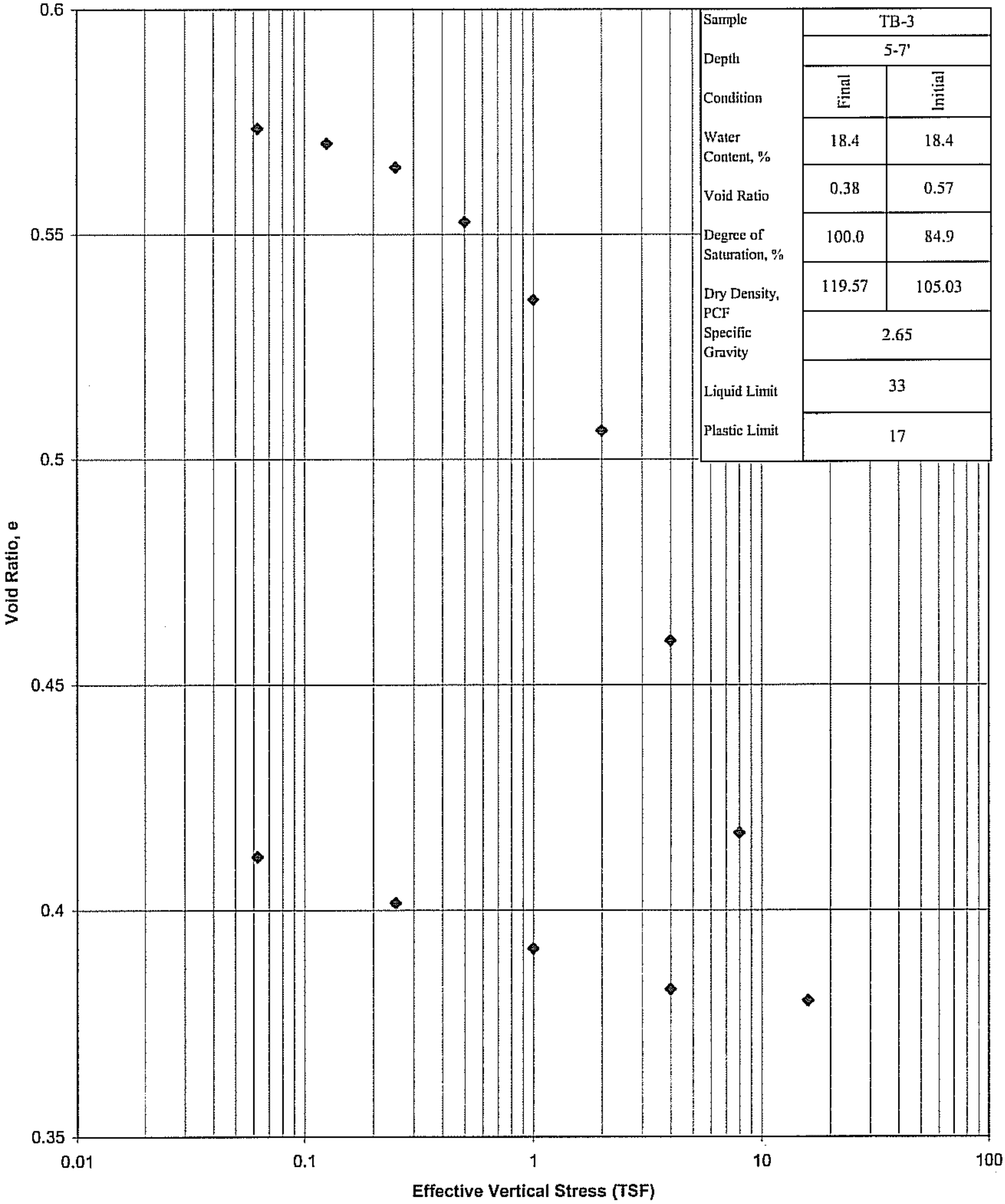
Initial Volume of Voids, Vvi= 1.789886723 cu.in
Initial Void Ratio, ei= 0.573892842
Unit Weight of Soil Solids= 43.407 gr/cu.in
Intial Volume of Water, Vwi= 1.518925519 cu.in
Initial Saturation, Si= 84.86154455 %
Initial Dry Density,Ki= 105.0303085 pcf
Final Dry Density, Kf= 119.5700233 pcf

Boring:	TB-3	
Depth:	5-7'	
Condition	Final	Initial
Water Content, %	18.4	18.4
Void Ratio	0.38	0.57
Degree of Saturation, %	100.0	84.9
Dry Density, PCF	119.57	105.03
Specific Gravity	2.65	
Liquid Limit	33	
Plastic Limit	17	

Consolidation Test Results

ATC Associates, Inc

Project Name: I-69
Project Number: 086.00481.0181
Date: 4/10/2007



Sample	TB-3	
Depth	5-7'	
Condition	Final	Initial
Water Content, %	18.4	18.4
Void Ratio	0.38	0.57
Degree of Saturation, %	100.0	84.9
Dry Density, PCF	119.57	105.03
Specific Gravity	2.65	
Liquid Limit	33	
Plastic Limit	17	

APPENDIX D

RESILIENT MODULUS TEST RESULTS

GeoTesting
express
a subsidiary of Geocomp Corporation

Client:	ATC Assosciates, Inc	Test Date:	03/26/07
Project Name:	I-69	Tested By:	njh
Project Location:	---	Checked By:	jdt
GTX #:	7359		
Boring ID:	11253		
Sample ID:	RB-6 Bulk		
Depth, ft.	1.0-5.0 ft.		
Soil Description:	Silty Clay Loam		
Sample Preparation:	Target Compaction: 95% of Maximum Dry Density (115.0 pcf) at Optimum Moisture Content (13.0%)		
Material Type:	Type 2		
Test No.:	RM1		
Test Comments:	Comments: Atterberg Limits, Sieve Analysis, Sample Description and Proctor values provided by client.		

Resilient Modulus of Subgrade Soil by AASHTO T 307

Test Information:		
	Preconditioning-Greater than 5% perm. strain? (Y=yes or N=no)	N
	Testing-greater than 5% perm. Strain? (Y=yes or N=no)	N
	Testing-Number of Load Sequences Completed (0-15)	15
Specimen Information:		
	Diameter @ top of compacted specimen (in.)	4.01
	Diameter @ middle of compacted specimen (in.)	4.01
	Diameter @ bottom of compacted specimen (in.)	4.01
	Average Diameter of specimen (in.)	4.01
	Membrane Thickness {1} (in.)	0.01
	Membrane Thickness {2} (in.)	0
	Net Diameter (in.)	4.00
	Height of Specimen, Cap and Base, (in.)	10.3
	Height Cap and Base, (in.)	2.3
	Initial Length of Specimen, Lo, (in.)	8.00
	Initial Area Cross Section of Specimen, Ao, (in^2)	12.54
	Initial Volume of Specimen, (Ao)(Lo), (in^3)	100.4
	Soil Specimen Weight	---
	Initial Weight of Container and Wet Soil, (grams)	---
	Final Weight of Container and Wet Soil, (grams)	---
	Weight of Wet Soil Used (grams)	3258.0
Soil Properties:		
	In Situ Moisture Content(Nuclear), %	N/A
	In Situ Wet Density (Nuclear), (pcf)	N/A
	Specific Gravity	---
	Liquid Limit	33
	Plastic Limit	19
	Plasticity Index	14
Test Specimen Properties:		
	Compaction Moisture Content, %	12.3
	Moisture Content after Resilent Modulus Testing, %	13.4
	Compaction Dry Density r_d, pcf	110.1
	Permanent Strain, %	0.5
	Quick Shear Test	N/A
	Stress-Strain Plot Attached (Y=yes, N=no)	NO
	Triaxial Shear Maximum Strength (Max Load/X-Section Area), psi	N/A
	Specimen Fail During Triaxial Shear? (Y=yes, N=no)	N/A

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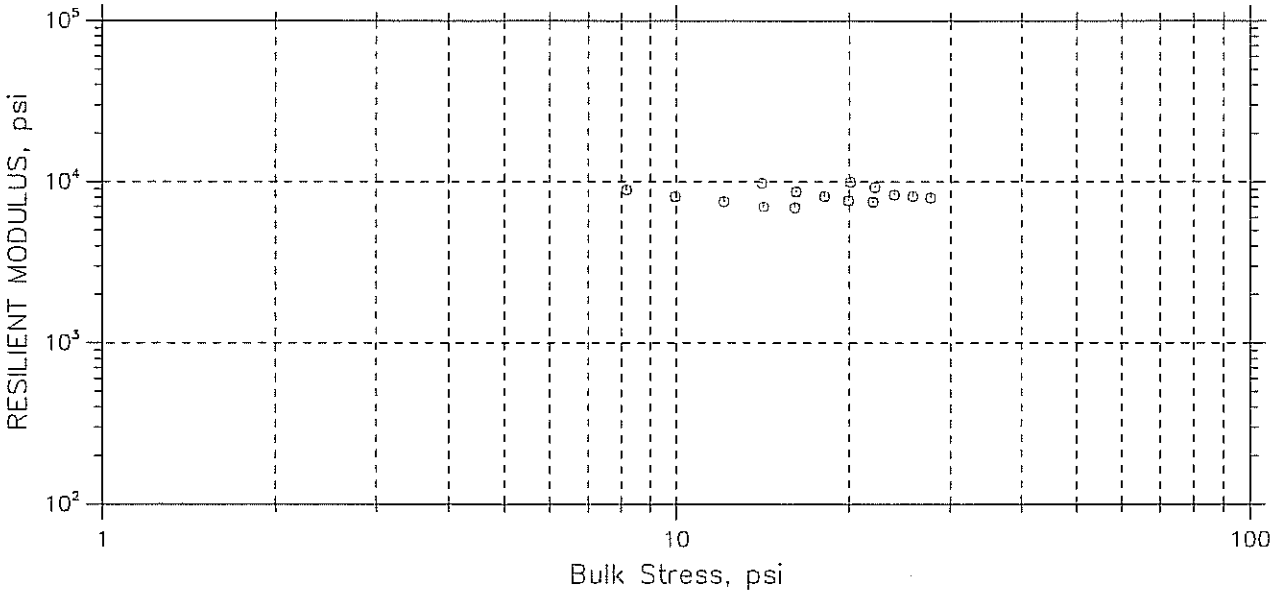
RESILIENT MODULUS TEST DATA

SUMMARY REPORT

$Mr = 8335.8 * B^{-0.00539}$ $r = -0.017121$



Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
6.051	2	1.898	0.0029	20.05	0.02	0.00	9961.7	196.49
6.055	4	3.916	0.0312	22.08	0.04	0.00	9253.2	175.26
6.054	6	5.686	0.0406	23.85	0.06	0.00	8311.9	71.768
6.068	8	7.502	0.0225	25.71	0.08	0.00	8130.8	32.93
6.077	10	9.36	0.0044	27.59	0.11	0.00	7958.5	61.192
4.076	2	1.852	0.0021	14.08	0.02	0.00	9802	358.31
4.075	4	3.934	0.0263	16.16	0.04	0.00	8704.8	286.8
4.078	6	5.868	0.0392	18.1	0.07	0.00	8114.6	38.831
4.063	8	7.721	0.0493	19.91	0.09	0.00	7649.5	51.218
4.093	10	9.635	0.0591	21.91	0.12	0.00	7491.5	42.904
2.087	2	1.903	0.0165	8.163	0.02	0.00	8913.7	372.63
2.084	4	3.69	0.0086	9.942	0.04	0.00	8119.1	48.48
2.089	6	5.811	0.0128	12.08	0.07	0.00	7524.9	77.651
2.1	8	7.881	0.0342	14.18	0.10	0.00	6997.5	51.515
2.099	10	9.783	0.0453	16.08	0.13	0.00	6915.6	25.06

Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: ---	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM1	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 13.0% moisture content (optimum)		
File: D:\system D\RM\7359-rm1.dat		

Mon, 26-MAR-2007 11:31:08

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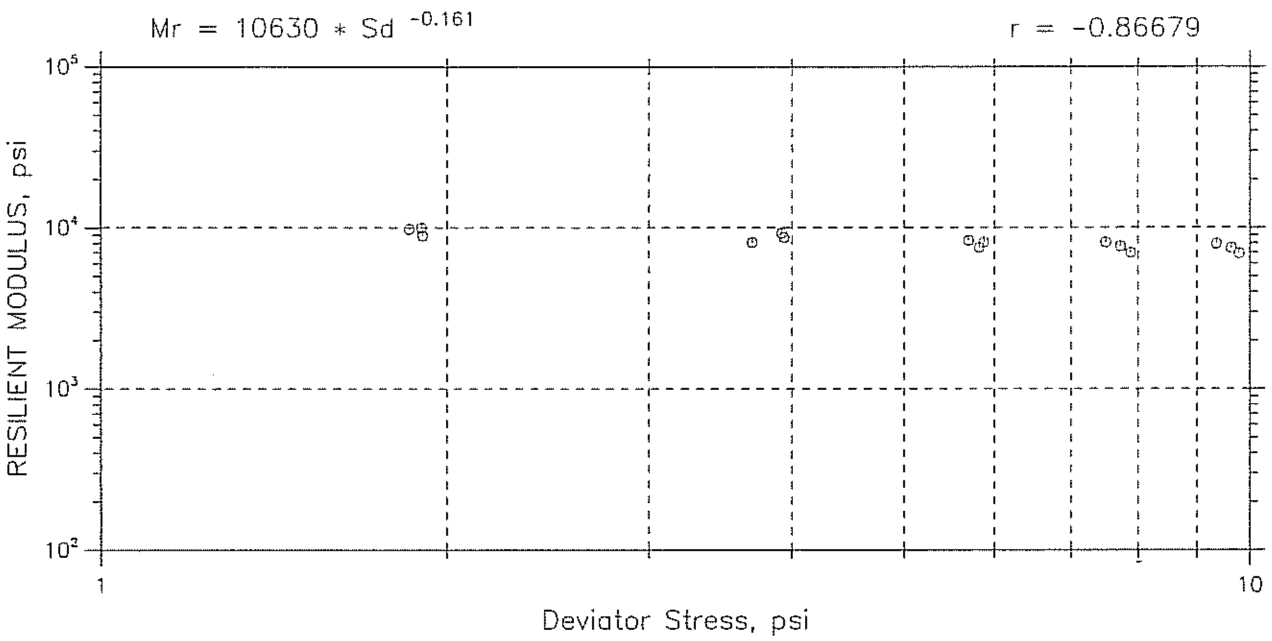
RESILIENT MODULUS TEST DATA

SUMMARY REPORT



Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
6.051	2	1.898	0.0029	20.05	0.02	0.00	9961.7	196.49
6.055	4	3.916	0.0312	22.08	0.04	0.00	9253.2	175.26
6.054	6	5.686	0.0406	23.85	0.06	0.00	8311.9	71.768
6.068	8	7.502	0.0225	25.71	0.08	0.00	8130.8	32.93
6.077	10	9.36	0.0044	27.59	0.11	0.00	7958.5	61.192
4.076	2	1.852	0.0021	14.08	0.02	0.00	9802	358.31
4.075	4	3.934	0.0263	16.16	0.04	0.00	8704.8	286.8
4.078	6	5.868	0.0392	18.1	0.07	0.00	8114.6	38.831
4.063	8	7.721	0.0493	19.91	0.09	0.00	7649.5	51.218
4.093	10	9.635	0.0591	21.91	0.12	0.00	7491.5	42.904
2.087	2	1.903	0.0165	8.163	0.02	0.00	8913.7	372.63
2.084	4	3.69	0.0086	9.942	0.04	0.00	8119.1	48.48
2.089	6	5.811	0.0128	12.08	0.07	0.00	7524.9	77.651
2.1	8	7.881	0.0342	14.18	0.10	0.00	6997.5	51.515
2.099	10	9.783	0.0453	16.08	0.13	0.00	6915.6	25.06

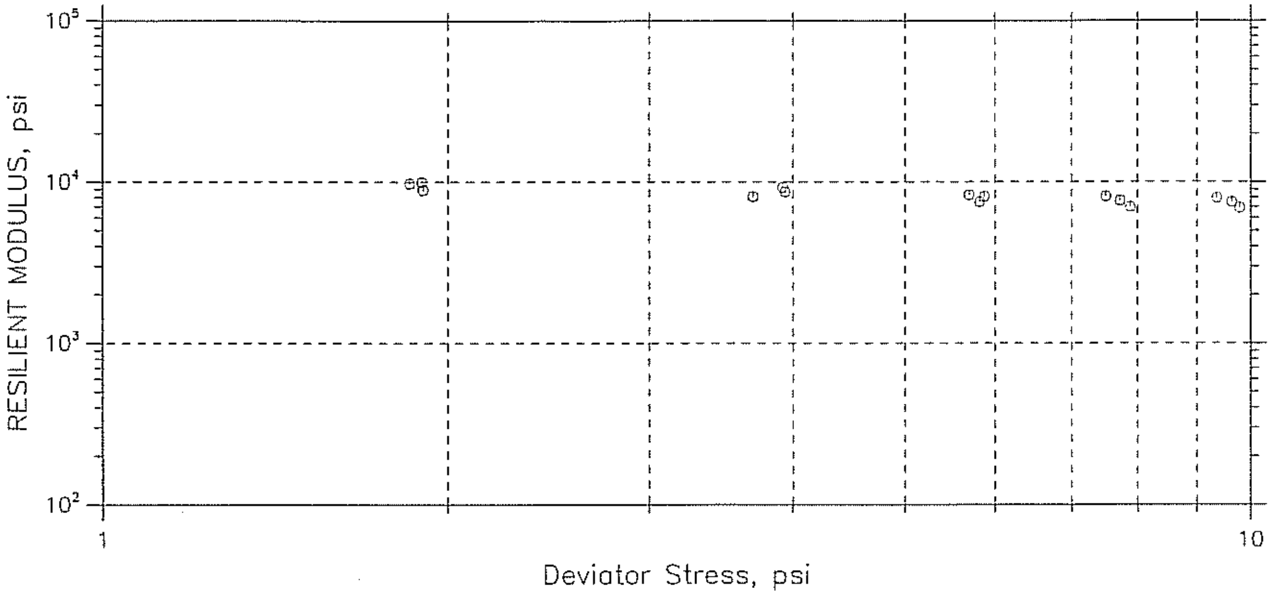
Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: ---	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM1	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 13.0% moisture content (optimum)		
File: D:\system D\RM\7359-rm1.dat		

Mon, 26-MAR-2007 11:31:24

RESILIENT MODULUS TEST DATA

SUMMARY REPORT

$Mr = 434.37 * Pa * (B/Pa)^{0.169} * (Sd/Pa)^{-0.21}$ $r = 0.98524$



Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
6.051	2	1.898	0.0029	20.05	0.02	0.00	9961.7	196.49
6.055	4	3.916	0.0312	22.08	0.04	0.00	9253.2	175.26
6.054	6	5.686	0.0406	23.85	0.06	0.00	8311.9	71.768
6.068	8	7.502	0.0225	25.71	0.08	0.00	8130.8	32.93
6.077	10	9.36	0.0044	27.59	0.11	0.00	7958.5	61.192
4.076	2	1.852	0.0021	14.08	0.02	0.00	9802	358.31
4.075	4	3.934	0.0263	16.16	0.04	0.00	8704.8	286.8
4.078	6	5.868	0.0392	18.1	0.07	0.00	8114.6	38.831
4.063	8	7.721	0.0493	19.91	0.09	0.00	7649.5	51.218
4.093	10	9.635	0.0591	21.91	0.12	0.00	7491.5	42.904
2.087	2	1.903	0.0165	8.163	0.02	0.00	8913.7	372.63
2.084	4	3.69	0.0086	9.942	0.04	0.00	8119.1	48.48
2.089	6	5.811	0.0128	12.08	0.07	0.00	7524.9	77.651
2.1	8	7.881	0.0342	14.18	0.10	0.00	6997.5	51.515
2.099	10	9.783	0.0453	16.08	0.13	0.00	6915.6	25.06

Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: ---	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM1	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 13.0% moisture content (optimum)		
File: D:\system D\RM\7359-rm1.dat		

Mon, 26-MAR-2007 11:31:34

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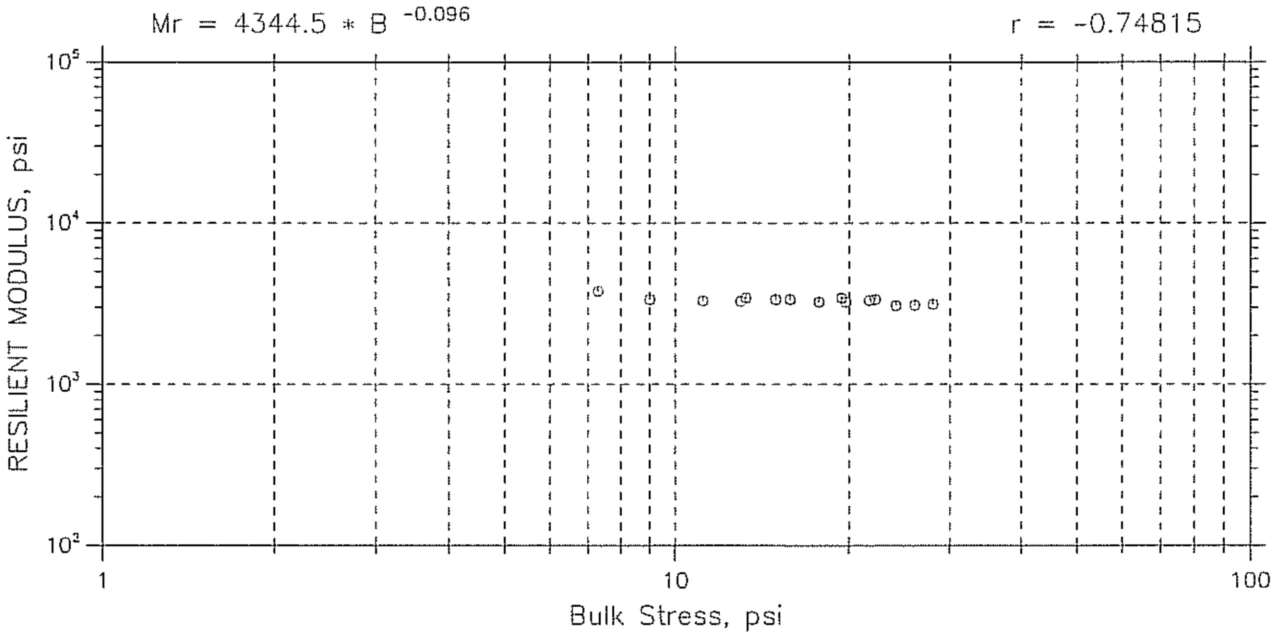
Client:	ATC Assosciates, Inc	Test Date:	03/27/07
Project Name:	I-69	Tested By:	njh
Project Location:	---	Checked By:	jdt
GTX #:	7359		
Boring ID:	11253		
Sample ID:	RB-6 Bulk		
Depth, ft.	1.0-5.0 ft.		
Soil Description:	Silty Clay Loam		
Sample Preparation:	Target Compaction: 95% of Maximum Dry Density (115.0 pcf) at Optimum + 2% Moisture Content (15.0%)		
Material Type:	Type 2		
Test No.:	RM2		
Test Comments:	Comments: Atterberg Limits, Sieve Analysis, Sample Description and Proctor values provided by client.		

Resilient Modulus of Subgrade Soil by AASHTO T 307

Test Information:		
	Preconditioning-Greater than 5% perm. strain? (Y=yes or N=no)	N
	Testing-greater than 5% perm. Strain? (Y=yes or N=no)	N
	Testing-Number of Load Sequences Completed (0-15)	15
Specimen Information:		
	Diameter @ top of compacted specimen (in.)	4.01
	Diameter @ middle of compacted specimen (in.)	4.01
	Diameter @ bottom of compacted specimen (in.)	4.01
	Average Diameter of specimen (in.)	4.01
	Membrane Thickness {1} (in.)	0.01
	Membrane Thickness {2} (in.)	0
	Net Diameter (in.)	4.00
	Height of Specimen, Cap and Base, (in.)	10.3
	Height Cap and Base, (in.)	2.3
	Initial Length of Specimen, Lo, (in.)	8.00
	Initial Area Cross Section of Specimen, Ao, (in^2)	12.54
	Initial Volume of Specimen, (Ao)(Lo), (in^3)	100.4
	Soil Specimen Weight	---
	Initial Weight of Container and Wet Soil, (grams)	---
	Final Weight of Container and Wet Soil, (grams)	---
	Weight of Wet Soil Used (grams)	3315.0
Soil Properties:		
	In Situ Moisture Content(Nuclear), %	N/A
	In Situ Wet Density (Nuclear), (pcf)	N/A
	Specific Gravity	---
	Liquid Limit	33
	Plastic Limit	19
	Plasticity Index	14
Test Specimen Properties:		
	Compaction Moisture Content, %	15.4
	Moisture Content after Resilent Modulus Testing, %	14.9
	Compaction Dry Density r_d, pcf	109.0
	Permanent Strain, %	1.1
	Quick Shear Test	N/A
	Stress-Strain Plot Attached (Y=yes, N=no)	NO
	Triaxial Shear Maximum Strength (Max Load/X-Section Area), psi	N/A
	Specimen Fail During Triaxial Shear? (Y=yes, N=no)	N/A

RESILIENT MODULUS TEST DATA

SUMMARY REPORT



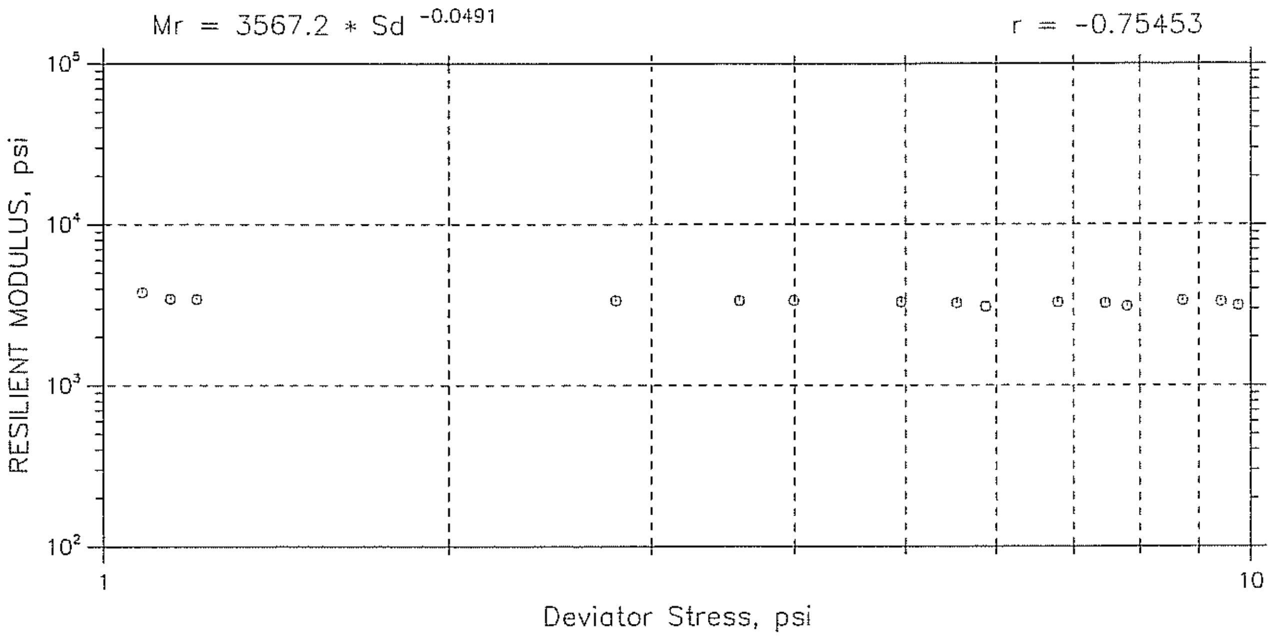
Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
6.065	2	1.203	0.0231	19.4	0.03	0.00	3435.6	131.14
6.059	4	3.991	0.0122	22.17	0.11	0.00	3370.4	33.425
6.063	6	5.869	0.0171	24.06	0.18	0.00	3084.3	20.194
6.063	8	7.792	0.0236	25.98	0.23	0.00	3103.3	11.425
6.065	10	9.746	0.0287	27.94	0.28	0.00	3141.6	18.545
4.046	2	1.142	0.0169	13.28	0.03	0.00	3448.5	82.965
4.076	4	3.578	0.0101	15.8	0.10	0.00	3365.8	32.221
4.056	6	5.536	0.0071	17.7	0.16	0.00	3248.6	10.256
4.079	8	7.461	0.0021	19.7	0.21	0.00	3242.5	11.285
4.074	10	9.416	0.0046	21.64	0.26	0.00	3317.3	9.3105
2.073	2	1.08	0.0061	7.299	0.03	0.00	3793.6	104.03
2.067	4	2.793	0.0332	8.995	0.08	0.00	3365.8	91.725
2.072	6	4.951	0.0197	11.17	0.14	0.00	3303.4	16.827
2.073	8	6.785	0.0275	13	0.19	0.00	3286.1	9.9955
2.074	10	8.713	0.0267	14.93	0.23	0.00	3369.3	11.629

Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: 11253	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM2	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 15.0% moisture content (optimum + 2)		
File: D:\system D\RM\7359-rm2.dat		

Tue, 27-MAR-2007 10:50:40

RESILIENT MODULUS TEST DATA

SUMMARY REPORT



Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
6.065	2	1.203	0.0231	19.4	0.03	0.00	3435.6	131.14
6.059	4	3.991	0.0122	22.17	0.11	0.00	3370.4	33.425
6.063	6	5.869	0.0171	24.06	0.18	0.00	3084.3	20.194
6.063	8	7.792	0.0236	25.98	0.23	0.00	3103.3	11.425
6.065	10	9.746	0.0287	27.94	0.28	0.00	3141.6	18.545
4.046	2	1.142	0.0169	13.28	0.03	0.00	3448.5	82.965
4.076	4	3.578	0.0101	15.8	0.10	0.00	3365.8	32.221
4.056	6	5.536	0.0071	17.7	0.16	0.00	3248.6	10.256
4.079	8	7.461	0.0021	19.7	0.21	0.00	3242.5	11.285
4.074	10	9.416	0.0046	21.64	0.26	0.00	3317.3	9.3105
2.073	2	1.08	0.0061	7.299	0.03	0.00	3793.6	104.03
2.067	4	2.793	0.0332	8.995	0.08	0.00	3365.8	91.725
2.072	6	4.951	0.0197	11.17	0.14	0.00	3303.4	16.827
2.073	8	6.785	0.0275	13	0.19	0.00	3286.1	9.9955
2.074	10	8.713	0.0267	14.93	0.23	0.00	3369.3	11.629

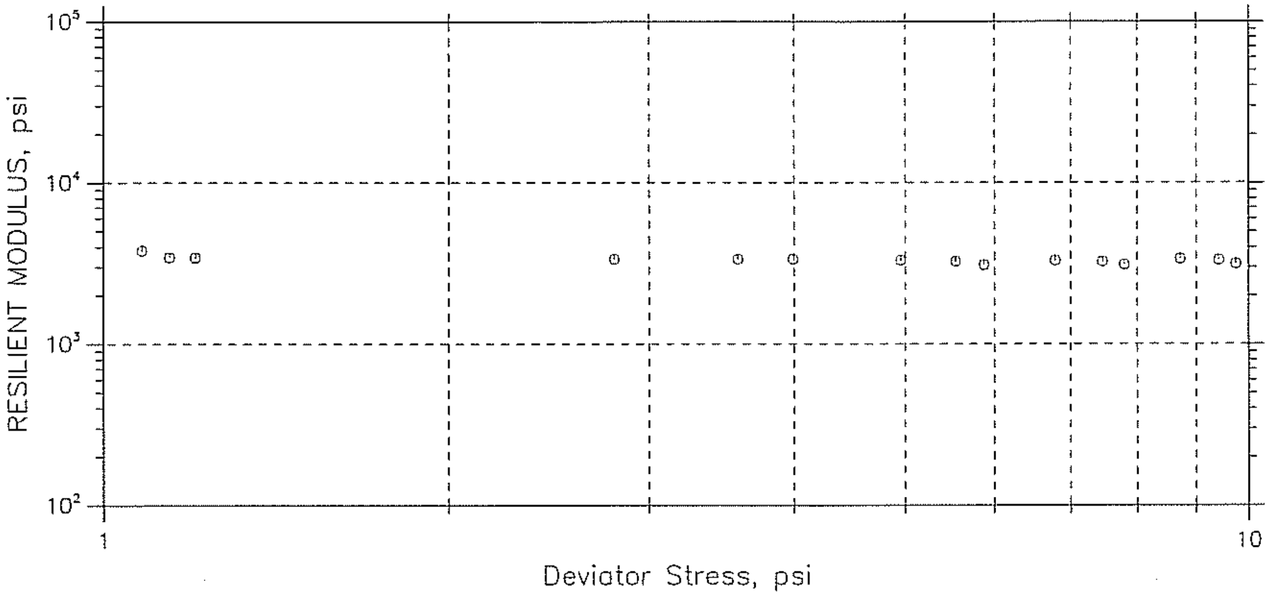
Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: 11253	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM2	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 15.0% moisture content (optimum + 2)		
File: D:\system D\RM\7359-rm2.dat		

Tue, 27-MAR-2007 10:50:53

RESILIENT MODULUS TEST DATA

SUMMARY REPORT

$Mr = 218.75 * Pa * (B/Pa)^{-0.0609} * (Sd/Pa)^{-0.0319}$ $r = 0.85097$



Confining Stress S3 (psi)	Nom. Max. Deviator Stress (psi)	Mean Deviator Stress (psi)	Std. Dev. Deviator Stress (psi)	Mean Bulk Stress (psi)	Mean Resilient Strain (%)	Std. Dev. Resilient Strain (%)	Mean Resilient Modulus (psi)	Std. Dev. Resilient Modulus (psi)
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6.059	4	3.991	0.0122	22.17	0.11	0.00	3370.4	33.425
6.063	6	5.869	0.0171	24.06	0.18	0.00	3084.3	20.194
6.063	8	7.792	0.0236	25.98	0.23	0.00	3103.3	11.425
6.065	10	9.746	0.0287	27.94	0.28	0.00	3141.6	18.545
4.046	2	1.142	0.0169	13.28	0.03	0.00	3448.5	82.965
4.076	4	3.578	0.0101	15.8	0.10	0.00	3365.8	32.221
4.056	6	5.536	0.0071	17.7	0.16	0.00	3248.6	10.256
4.079	8	7.461	0.0021	19.7	0.21	0.00	3242.5	11.285
4.074	10	9.416	0.0046	21.64	0.26	0.00	3317.3	9.3105
2.073	2	1.08	0.0061	7.299	0.03	0.00	3793.6	104.03
2.067	4	2.793	0.0332	8.995	0.08	0.00	3365.8	91.725
2.072	6	4.951	0.0197	11.17	0.14	0.00	3303.4	16.827
2.073	8	6.785	0.0275	13	0.19	0.00	3286.1	9.9955
2.074	10	8.713	0.0267	14.93	0.23	0.00	3369.3	11.629

Project: I-69	Location: ---	Project No.: GTX-7359
Boring No.: 11253	Tested By: njh	Checked By: jdt
Sample No.: RB-6 bulk	Test Date: 03/26/07	Depth: 1-5 ft
Test No.: RM2	Sample Type: compacted	Elevation: ---
Description: Silty Clay Loam		
Remarks: System D - Target Compaction: 95% of 115 pcf @ 15.0% moisture content (optimum + 2)		
File: D:\system D\RM\7359-rm2.dat		

Tue, 27-MAR-2007 10:51:01

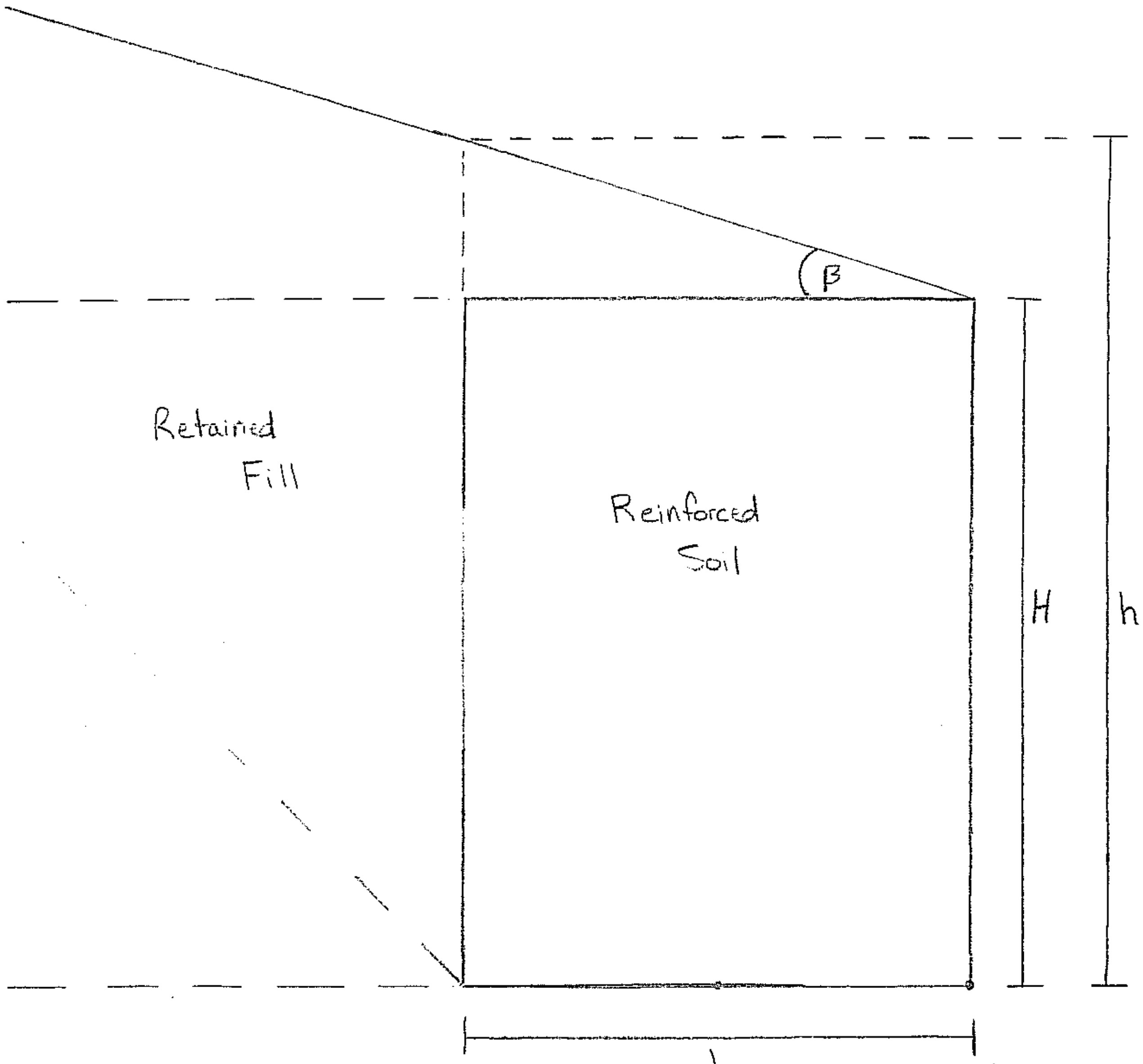
APPENDIX E

CALCULATIONS FOR MSE WALL EXTERNAL STABILITY
STABL6H OUTPUT FOR MSE WALL GLOBAL STABILITY

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Nobles Chapel Road bridge MSE Abutement

PROJECT NUMBER 86.00481.0181
SHEET 1 OF
DATE 5/10/07
COMPUTED BY SM
CHECKED BY

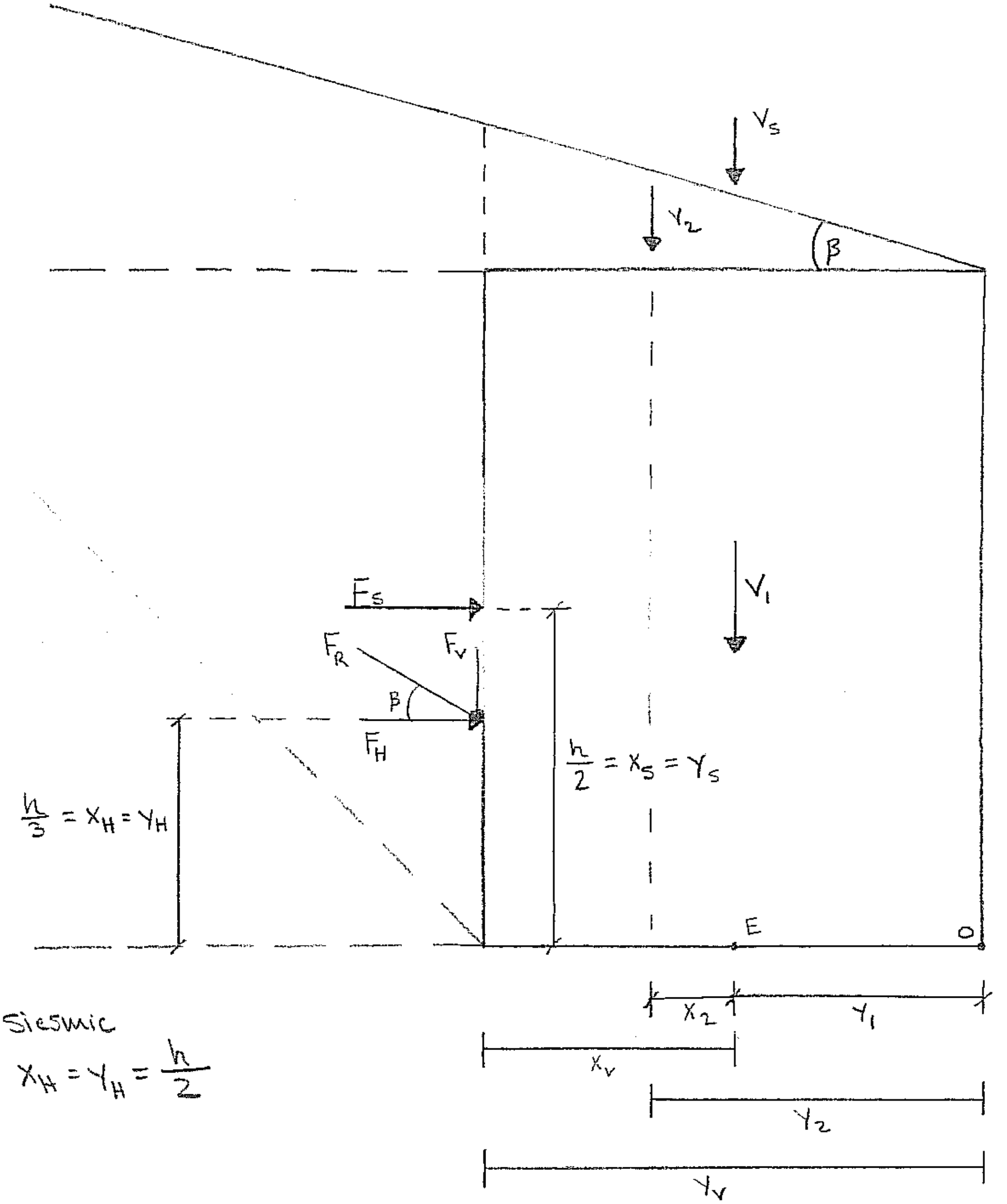


Bearing soil is either Shale bedrock, or structure backfill that is placed after removal of soil to expose shale bedrock

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Nobles Chapel Road bridge MSE Abutement

PROJECT NUMBER 86.00481.0181
SHEET 1 OF
DATE 5/10/07
COMPUTED BY SM
CHECKED BY



for siesmic
$X_H = Y_H = \frac{h}{2}$

$V_1 = (H)(L)(\gamma_{RS})$

$V_2 = \frac{1}{2}(L \tan\beta)(L)(\gamma_{RF})$

$V_s = (S)(L)$

$F_R = \frac{1}{2}(K_a)(\gamma)(h)^2$

$F_H = F_R \cos\beta \qquad F_v = F_R \sin\beta$

$F_s = (V_s)(h)(K_a)$

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69

Wall Properties

Height $H =$ 32 ft
Length $L =$ 22.4 ft
Surcharge $S =$ 200 lbs/sq.ft
Backfill Slope $\beta =$ 0 degrees
Backfill Height $h =$ 32.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle $\phi =$ 30 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 120 lbs/cu.ft
$Ka =$ 0.33

Reinforced Zone

Friction Angle $\phi =$ 34 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 125 lbs/cu.ft

Bearing Soil

Friction Angle $\phi =$ 34 degrees
Sliding Cohesion $c =$ 0 lbs./sq.ft
Bearing Cohesion $c_B =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 125 lbs/cu.ft

$N_c =$ 0
$N_\gamma =$ 41

Calculated Forces

$V_1 =$ 89600 lbs/ft
$V_2 =$ 0 lbs/ft
$V_S =$ 1493 lbs/ft

$F_R =$ 20480 lbs/ft
$F_H =$ 20480 lbs/ft
$F_V =$ 0 lbs/ft
$F_S =$ 2133 lbs/ft

$y_1 =$ 11.2 ft
$x_2 =$ 3.7 ft
$y_2 =$ 14.9 ft
$x_H =$ 10.7 ft
$y_H =$ 10.7 ft
$x_V =$ 11.2 ft
$y_V =$ 22.4 ft
$x_S =$ 16.0 ft
$y_S =$ 16.0 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

$e =$ 2.8 ft must be < L/6 = 3.7 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 4.0 must be at least 2.0

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan \phi + c * L}{F_H + F_S}$$

F.S. = 2.7 must be at least 1.5

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 2.8 ft

σ_{ult} = $C_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

σ_{ult} = 42952 lbs./sq.ft

σ_v = 5405 lbs./sq.ft

σ_{all} = 17181 based on F.S. = 2.5

F.S. = 7.9 must be at least 2.5

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69
Earthquake Condition

Wall Properties

Height H = 32 ft
Length L = 22.4 ft
Surcharge S = 200 lbs/sq.ft
Backfill Slope β = 0 degrees
Backfill Height h = 32.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle ϕ = 30 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft
Ka = 0.40 (effective seismic coefficient)

Reinforced Zone

Friction Angle ϕ = 34 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

Bearing Soil

Friction Angle ϕ = 34 degrees
Sliding Cohesion c = 0 lbs./sq.ft
Bearing Cohesion c_B = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

N_c = 0
N_γ = 41

Calculated Forces

V_1 = 89600 lbs/ft
V_2 = 0 lbs/ft
V_S = 1792 lbs/ft

F_R = 24576 lbs/ft
F_H = 24576 lbs/ft
F_V = 0 lbs/ft
F_S = 2560 lbs/ft

x_2 = 3.7 ft
x_H = 16.0 ft
x_V = 11.2 ft
x_S = 16.0 ft

y_1 = 11.2 ft
y_2 = 14.9 ft
y_H = 16.0 ft
y_V = 22.4 ft
y_S = 16.0 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

e = 4.8 ft must be < L/6 = 3.7 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 2.3 must be at least 1.5

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan \phi + c * L}{F_H + F_S}$$

F.S. = 2.2 must be at least 1.1

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 4.8 ft

$\sigma_{ult} = c_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

$\sigma_{ult} =$ 32566 lbs./sq.ft

$\sigma_v =$ 7085 lbs./sq.ft

$\sigma_{all} =$ 13026.3 based on F.S. = 2.5

F.S. = 4.6 must be at least 1.9

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69

Wall Properties

Height $H =$ 41 ft
Length $L =$ 28.7 ft
Surcharge $S =$ 200 lbs/sq.ft
Backfill Slope $\beta =$ 0 degrees
Backfill Height $h =$ 41.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle $\phi =$ 30 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 120 lbs/cu.ft
$Ka =$ 0.33

Reinforced Zone

Friction Angle $\phi =$ 34 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 125 lbs/cu.ft

Natural Soil

Friction Angle $\phi =$ 0 degrees
Sliding Cohesion $c =$ 5000 lbs./sq.ft
Bearing Cohesion $c_B =$ 5000 lbs./sq.ft
Unit Weight $\gamma =$ 120 lbs/cu.ft

$Nc =$ 5.7
$N\gamma =$ 0

Calculated Forces

$V_1 =$ 147088 lbs/ft
$V_2 =$ 0 lbs/ft
$V_S =$ 1913 lbs/ft

$F_R =$ 33620 lbs/ft
$F_H =$ 33620 lbs/ft
$F_V =$ 0 lbs/ft
$F_S =$ 2733 lbs/ft

$x_2 =$ 4.8 ft
$x_H =$ 13.7 ft
$x_V =$ 14.4 ft
$x_S =$ 20.5 ft

$y_1 =$ 14.4 ft
$y_2 =$ 19.1 ft
$y_H =$ 13.7 ft
$y_V =$ 28.7 ft
$y_S =$ 20.5 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

$e =$ 3.5 ft must be < L/6 = 4.8 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 4.1 must be at least 2.0

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan \phi + c * L}{F_H + F_S}$$

F.S. = 3.9 must be at least 1.5

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 3.5 ft

$$\sigma_{ult} = c_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

σ_{ult} = 28500 lbs./sq.ft

σ_v = 6841 lbs./sq.ft

σ_{all} = 11400 based on F.S. = 2.5

F.S. = 4.2 must be at least 2.5

Local Shear

$\gamma_{RZ} * H \leq 3 * c$

$\gamma_{RZ} * H$ = 5125 lbs/sq.ft

3 * c = 15000 lbs/sq.ft

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69
Earthquake Condition

Wall Properties

Height H = 41 ft
Length L = 28.7 ft
Surcharge S = 200 lbs/sq.ft
Backfill Slope β = 0 degrees
Backfill Height h = 41.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle ϕ = 30 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft
Ka = 0.40

Reinforced Zone

Friction Angle ϕ = 34 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

Natural Soil

Friction Angle ϕ = 0 degrees
Sliding Cohesion c = 5000 lbs./sq.ft
Bearing Cohesion c_B = 5000 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft

N_c = 5.7
N_γ = 0

Calculated Forces

V_1 = 147088 lbs/ft
V_2 = 0 lbs/ft
V_S = 2296 lbs/ft

F_R = 40344 lbs/ft
F_H = 40344 lbs/ft
F_V = 0 lbs/ft
F_S = 3280 lbs/ft

x_2 = 4.8 ft
x_H = 20.5 ft
x_V = 14.4 ft
x_S = 20.5 ft

y_1 = 14.4 ft
y_2 = 19.1 ft
y_H = 20.5 ft
y_V = 28.7 ft
y_S = 20.5 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

e = 6.1 ft must be < L/6 = 4.8 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 2.4 must be at least 1.5

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan \phi + c * L}{F_H + F_S}$$

F.S. = 3.3 must be at least 1.1

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 6.0 ft

$\sigma_{ult} = C_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

σ_{ult} = 28500 lbs./sq.ft

σ_v = 8931 lbs./sq.ft

σ_{all} = 11400 based on F.S. = 2.5

F.S. = 3.2 must be at least 1.9

Local Shear

$\gamma_{RZ} * H \leq 3 * c$

$\gamma_{RZ} * H$ = 5125 lbs/sq.ft

3 * c = 15000 lbs/sq.ft

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69

Wall Properties

Height $H =$ 41 ft
Length $L =$ 28.7 ft
Surcharge $S =$ 200 lbs/sq.ft
Backfill Slope $\beta =$ 0 degrees
Backfill Height $h =$ 41.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle $\phi =$ 30 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 120 lbs/cu.ft
$K_a =$ 0.33

Reinforced Zone

Friction Angle $\phi =$ 34 degrees
Cohesion $c =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 125 lbs/cu.ft

Bearing Soil

Friction Angle $\phi =$ 34 degrees
Sliding Cohesion $c =$ 0 lbs./sq.ft
Bearing Cohesion $c_B =$ 0 lbs./sq.ft
Unit Weight $\gamma =$ 125 lbs/cu.ft

$N_c =$ 0
$N_\gamma =$ 41

Calculated Forces

$V_1 =$ 147088 lbs/ft
$V_2 =$ 0 lbs/ft
$V_S =$ 1913 lbs/ft

$F_R =$ 33620 lbs/ft
$F_H =$ 33620 lbs/ft
$F_V =$ 0 lbs/ft
$F_S =$ 2733 lbs/ft

$x_2 =$ 4.8 ft
$x_H =$ 13.7 ft
$x_V =$ 14.4 ft
$x_S =$ 20.5 ft

$y_1 =$ 14.4 ft
$y_2 =$ 19.1 ft
$y_H =$ 13.7 ft
$y_V =$ 28.7 ft
$y_S =$ 20.5 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

$e =$ 3.5 ft must be < L/6 = 4.8 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 4.1 must be at least 2.0

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan\phi + c * L}{F_H + F_S}$$

F.S. = 2.7 must be at least 1.5

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 3.5 ft

$\sigma_{ult} = c_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

σ_{ult} = 55582 lbs./sq.ft

σ_v = 6841 lbs./sq.ft

σ_{all} = 22232.7 based on F.S. = 2.5

F.S. = 8.1 must be at least 2.5

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69
Earthquake Condition

Wall Properties

Height H = 41 ft
Length L = 28.7 ft
Surcharge S = 200 lbs/sq.ft
Backfill Slope β = 0 degrees
Backfill Height h = 41.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle ϕ = 30 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft
Ka = 0.40 (effective seismic coefficient)

Reinforced Zone

Friction Angle ϕ = 34 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

Bearing Soil

Friction Angle ϕ = 34 degrees
Sliding Cohesion c = 0 lbs./sq.ft
Bearing Cohesion c_B = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

N_c = 0
N_γ = 41

Calculated Forces

V_1 = 147088 lbs/ft
V_2 = 0 lbs/ft
V_s = 2296 lbs/ft

F_R = 40344 lbs/ft
F_H = 40344 lbs/ft
F_V = 0 lbs/ft
F_S = 3280 lbs/ft

y_1 = 14.4 ft
x_2 = 4.8 ft
y_2 = 19.1 ft
x_H = 20.5 ft
y_H = 20.5 ft
x_V = 14.4 ft
y_V = 28.7 ft
x_S = 20.5 ft
y_S = 20.5 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_V)}{V_1 + V_2 + F_V}$$

e = 6.1 ft must be < L/6 = 4.8 ft

Overturning

$$\text{F.S.} = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 2.4 must be at least 1.5

Sliding

$$\text{F.S.} = \frac{(V_1 + V_2 + F_V) * \tan\phi + c * L}{F_H + F_S}$$

F.S. = 2.3 must be at least 1.1

Bearing Capacity

$$\text{F.S.} = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 6.0 ft

$\sigma_{ult} = c_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

$\sigma_{ult} =$ 42384 lbs./sq.ft

$\sigma_v =$ 8931 lbs./sq.ft

$\sigma_{all} =$ 16953.5 based on F.S. = 2.5

F.S. = 4.7 must be at least 1.9

Stability Calculations for MSE Walls

Bridge Structure No. 1
Nobles Chapel Road over Interstate 69

Wall Properties

Height H = 32 ft
Length L = 22.4 ft
Surcharge S = 200 lbs/sq.ft
Backfill Slope β = 0 degrees
Backfill Height h = 32.0 ft

Length of Reinforcement
to Heigth Ratio (L/H) = 0.7

Soil Properties

Retained Fill

Friction Angle ϕ = 30 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft
Ka = 0.33

Reinforced Zone

Friction Angle ϕ = 34 degrees
Cohesion c = 0 lbs./sq.ft
Unit Weight γ = 125 lbs/cu.ft

Natural Soil

Friction Angle ϕ = 0 degrees
Sliding Cohesion c = 1000 lbs./sq.ft
Bearing Cohesion c_B = 1500 lbs./sq.ft
Unit Weight γ = 120 lbs/cu.ft

N_c = 5.7
N_γ = 0

Calculated Forces

V_1 = 89600 lbs/ft
V_2 = 0 lbs/ft
V_S = 1493 lbs/ft

F_R = 20480 lbs/ft
F_H = 20480 lbs/ft
F_V = 0 lbs/ft
F_S = 2133 lbs/ft

x_2 = 3.7 ft
x_H = 10.7 ft
x_V = 11.2 ft
x_S = 16.0 ft

y_1 = 11.2 ft
y_2 = 14.9 ft
y_H = 10.7 ft
y_V = 22.4 ft
y_S = 16.0 ft

Eccentricity

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + F_V}$$

e = 2.8 ft must be < L/6 = 3.7 ft

Overturning

$$F.S. = \frac{(V_1 * y_1) + (V_2 * y_2) + (F_V * y_v)}{(F_H * y_H) + (F_S * y_S)}$$

F.S. = 4.0 must be at least 2.0

Sliding

$$F.S. = \frac{(V_1 + V_2 + F_V) * \tan \phi + c * L}{F_H + F_S}$$

F.S. = 1.0 must be at least 1.5

Bearing Capacity

$$F.S. = \frac{\sigma_{ult}}{\sigma_V}$$

General Shear

$$e = \frac{(F_H * x_H) + (F_S * x_S) - (V_2 * x_2) - (F_V * x_v)}{V_1 + V_2 + V_S + F_V}$$

e = 2.8 ft

$\sigma_{ult} = c_B * N_c + 0.5 * \gamma * (L - 2e) * N_\gamma$

$$\sigma_v = \frac{V_1 + V_2 + V_S + F_V}{L - 2 * e}$$

$\sigma_{ult} =$ 8550 lbs./sq.ft

$\sigma_v =$ 5405 lbs./sq.ft

$\sigma_{all} =$ 3420 based on F.S. = 2.5

F.S. = 1.6 must be at least 2.5

Local Shear

$\gamma_{RZ} * H \leq 3 * c$

$\gamma_{RZ} * H =$ 4000 lbs/sq.ft

$3 * c =$ 3000 lbs/sq.ft

```
                              ** STABL6H  **
                                   by
                            Purdue University
--------------------------------------------------------------------------------

                       --Slope Stability Analysis--
                    Simplified Janbu, Simplified Bishop
                       or Spencer`s Method of Slices


          Run Date:                  04-12-07
          Time of Run:               3:09pm
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69MSE
          Output Filename:           C:I69MSE.OUT
          Plotted Output Filename:   C:I69MSE.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 39+00 Line "S-2-A", Undrained



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 400.00 to Y values listed.

              4 Top   Boundaries
             10 Total Boundaries

          Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
             No.        (ft)        (ft)        (ft)        (ft)      Below Bnd

              1           .00       42.00      100.00       42.00         1
              2        100.00       42.00      100.10       74.00         2
              3        100.10       74.00      123.10       74.00         2
              4        123.10       74.00      200.00       74.00         3
              5        100.00       42.00      123.00       42.00         4
              6        123.00       42.00      123.10       74.00         3
              7        123.00       42.00      200.00       42.00         1
              8         99.90       34.00      100.00       42.00         4
              9        122.90       34.00      123.00       42.00         1
             10           .00       34.00      200.00       34.00         5
--------------------------------------------------------------------------------


         ISOTROPIC SOIL PARAMETERS


           5 Type(s) of Soil


          Soil   Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

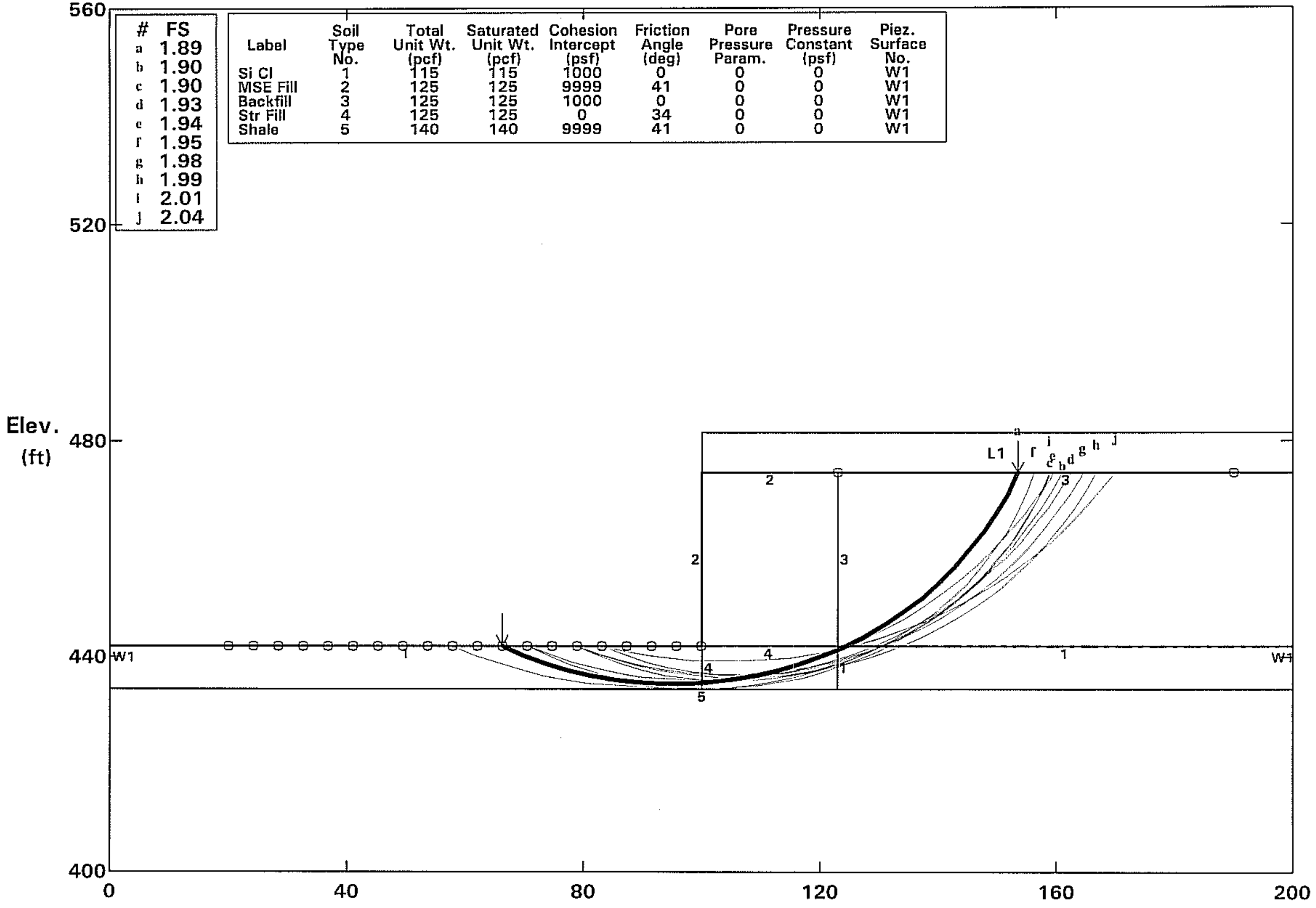
```
    No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.

     1   115.0    115.0    1000.0       .0      .00        .0      1
     2   125.0    125.0    9999.0     41.0      .00        .0      1
     3   125.0    125.0    1000.0       .0      .00        .0      1
     4   125.0    125.0        .0     34.0      .00        .0      1
     5   140.0    140.0    9999.0     41.0      .00        .0      1
--------------------------------------------------------------------------------


   1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


   Unit Weight of Water =  62.40


   Piezometric Surface No.  1 Specified by  2 Coordinate Points


     Point      X-Water     Y-Water
      No.        (ft)        (ft)

       1          .00       42.00
       2       200.00       42.00
--------------------------------------------------------------------------------


  BOUNDARY LOAD(S)

       1 Load(s) Specified


   Load         X-Left      X-Right    Intensity    Deflection
    No.          (ft)        (ft)     (lb/sqft)       (deg)


    1          100.10      200.00       200.0           .0


   NOTE - Intensity Is Specified As A Uniformly Distributed
          Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


   A Critical Failure Surface Searching Method, Using A Random
   Technique For Generating Circular Surfaces, Has Been Specified.


   400 Trial Surfaces Have Been Generated.


    20 Surfaces Initiate From Each Of 20 Points Equally Spaced
   Along The Ground Surface Between  X =  20.00 ft.
                               and  X =  99.90 ft.


   Each Surface Terminates Between   X = 123.00 ft.
```

```
                                        and   X = 190.00 ft.


           Unless Further Limitations Were Imposed, The Minimum Elevation
           At Which A Surface Extends Is  Y =    .00 ft.


            4.00 ft. Line Segments Define Each Trial Failure Surface.



           ****  ERROR - RC11  ****
 >>200 attempts to generate failure surface have failed. Revise limitations

 --------------------------------------------------------------------------------

           Following Are Displayed The Ten Most Critical Of The Trial
           Failure Surfaces Examined.  They Are Ordered - Most Critical
           First.


           * * Safety Factors Are Calculated By The Modified Bishop Method * *


           Failure Surface Specified By 28 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1         66.26       42.00
               2         69.86       40.27
               3         73.57       38.77
               4         77.37       37.51
               5         81.24       36.49
               6         85.16       35.72
               7         89.13       35.20
               8         93.12       34.94
               9         97.12       34.93
              10        101.11       35.17
              11        105.08       35.67
              12        109.01       36.41
              13        112.89       37.41
              14        116.69       38.65
              15        120.41       40.13
              16        124.02       41.84
              17        127.52       43.77
              18        130.89       45.93
              19        134.12       48.30
              20        137.18       50.86
              21        140.08       53.62
              22        142.80       56.55
              23        145.33       59.65
              24        147.66       62.91
              25        149.77       66.30
              26        151.66       69.83
              27        153.33       73.46
              28        153.54       74.00
```

```
Circle Center At X =   95.3 ; Y =   97.8  and Radius,   62.9

      ***     1.892   ***


Failure Surface Specified By 29 Coordinate Points

  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)

    1          66.26        42.00
    2          69.85        40.23
    3          73.53        38.68
    4          77.30        37.34
    5          81.14        36.22
    6          85.04        35.33
    7          88.98        34.66
    8          92.96        34.23
    9          96.96        34.02
   10         100.96        34.05
   11         104.95        34.31
   12         108.92        34.80
   13         112.85        35.52
   14         116.74        36.47
   15         120.56        37.64
   16         124.31        39.04
   17         127.97        40.65
   18         131.54        42.46
   19         134.99        44.48
   20         138.32        46.70
   21         141.51        49.11
   22         144.56        51.70
   23         147.45        54.46
   24         150.18        57.39
   25         152.73        60.47
   26         155.10        63.69
   27         157.28        67.04
   28         159.27        70.52
   29         160.99        74.00
Circle Center At X =   98.5 ; Y =  102.9  and Radius,   68.9

      ***     1.895   ***


-------------------------------------------------------------------------------
Failure Surface Specified By 28 Coordinate Points


  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
```

Proposed I-69 Project Station 39+00 Line "S-2-A", Undrained

Ten Most Critical. C:I69MSE.PLT By: Shawn Marcum 04-12-07 3:09pm



#	FS
a	1.89
b	1.90
c	1.90
d	1.93
e	1.94
f	1.95
g	1.98
h	1.99
i	2.01
j	2.04

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
MSE Fill	2	125	125	9999	41	0	0	W1
Backfill	3	125	125	1000	0	0	0	W1
Str Fill	4	125	125	0	34	0	0	W1
Shale	5	140	140	9999	41	0	0	W1

STABL6H FSmin = 1.89 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                         ** STABL6H  **
                               by
                        Purdue University
--------------------------------------------------------------------------------

                   --Slope Stability Analysis--
                Simplified Janbu, Simplified Bishop
                   or Spencer`s Method of Slices


          Run Date:                  04-12-07
          Time of Run:               3:10pm
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69MSED
          Output Filename:           C:I69MSED.OUT
          Plotted Output Filename:   C:I69MSED.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 39+00 Line "S-2-A", Drained



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 400.00 to Y values listed.

              4 Top   Boundaries
             10 Total Boundaries

          Boundary     X-Left     Y-Left     X-Right    Y-Right    Soil Type
             No.        (ft)       (ft)       (ft)       (ft)      Below Bnd

              1          .00      42.00     100.00      42.00          1
              2       100.00      42.00     100.10      74.00          2
              3       100.10      74.00     123.10      74.00          2
              4       123.10      74.00     200.00      74.00          3
              5       100.00      42.00     123.00      42.00          4
              6       123.00      42.00     123.10      74.00          3
              7       123.00      42.00     200.00      42.00          1
              8        99.90      34.00     100.00      42.00          4
              9       122.90      34.00     123.00      42.00          1
             10          .00      34.00     200.00      34.00          5
--------------------------------------------------------------------------------

         ISOTROPIC SOIL PARAMETERS


           5 Type(s) of Soil


          Soil   Total  Saturated  Cohesion Friction    Pore    Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

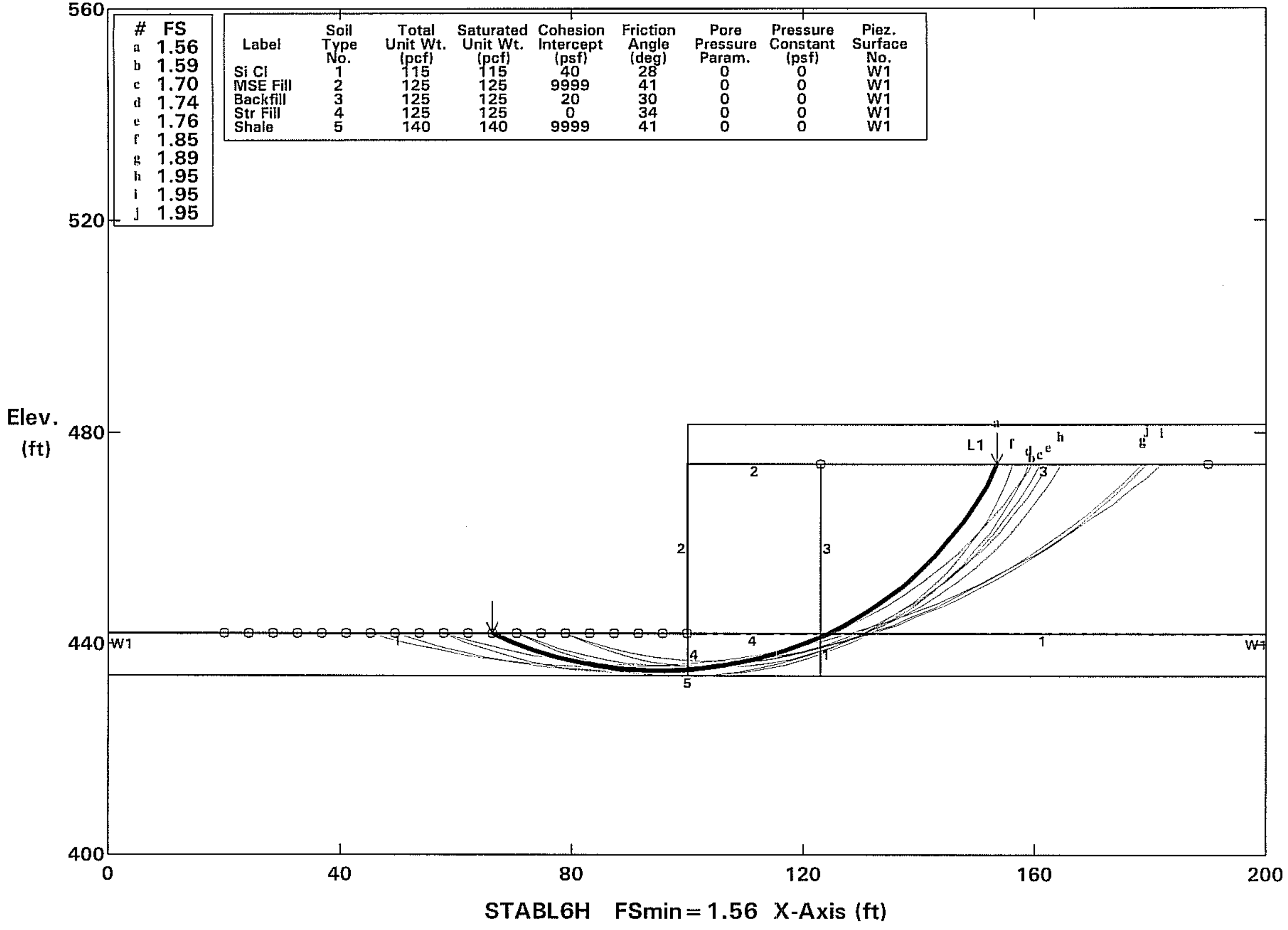
```
   No.  (pcf)    (pcf)     (psf)      (deg)   Param.     (psf)     No.

    1   115.0    115.0      40.0      28.0      .00        .0       1
    2   125.0    125.0    9999.0      41.0      .00        .0       1
    3   125.0    125.0      20.0      30.0      .00        .0       1
    4   125.0    125.0        .0      34.0      .00        .0       1
    5   140.0    140.0    9999.0      41.0      .00        .0       1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  2 Coordinate Points

            Point      X-Water     Y-Water
             No.        (ft)        (ft)

              1          .00       42.00
              2       200.00       42.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

              1 Load(s) Specified

          Load        X-Left      X-Right    Intensity     Deflection
           No.         (ft)         (ft)     (lb/sqft)       (deg)


            1         100.10      200.00       200.0            .0

          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  20.00 ft.
                                      and  X =  99.90 ft.


          Each Surface Terminates Between   X = 123.00 ft.
```

```
                                        and   X = 190.00 ft.


           Unless Further Limitations Were Imposed, The Minimum Elevation
           At Which A Surface Extends Is  Y =   .00 ft.


            4.00 ft. Line Segments Define Each Trial Failure Surface.



           ****  ERROR - RC11  ****
 >>200 attempts to generate failure surface have failed. Revise limitations

 --------------------------------------------------------------------------------

           Following Are Displayed The Ten Most Critical Of The Trial
           Failure Surfaces Examined.  They Are Ordered - Most Critical
           First.


           * * Safety Factors Are Calculated By The Modified Bishop Method * *


           Failure Surface Specified By 28 Coordinate Points


             Point        X-Surf       Y-Surf
              No.          (ft)         (ft)

               1          66.26        42.00
               2          69.86        40.27
               3          73.57        38.77
               4          77.37        37.51
               5          81.24        36.49
               6          85.16        35.72
               7          89.13        35.20
               8          93.12        34.94
               9          97.12        34.93
              10         101.11        35.17
              11         105.08        35.67
              12         109.01        36.41
              13         112.89        37.41
              14         116.69        38.65
              15         120.41        40.13
              16         124.02        41.84
              17         127.52        43.77
              18         130.89        45.93
              19         134.12        48.30
              20         137.18        50.86
              21         140.08        53.62
              22         142.80        56.55
              23         145.33        59.65
              24         147.66        62.91
              25         149.77        66.30
              26         151.66        69.83
              27         153.33        73.46
              28         153.54        74.00
```

```
Circle Center At X =   95.3 ; Y =   97.8  and Radius,   62.9

      ***     1.561   ***


Failure Surface Specified By 31 Coordinate Points

  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)

    1          57.85        42.00
    2          61.50        40.36
    3          65.23        38.92
    4          69.02        37.66
    5          72.88        36.60
    6          76.79        35.74
    7          80.73        35.08
    8          84.71        34.63
    9          88.70        34.38
   10          92.70        34.33
   11          96.70        34.49
   12         100.68        34.85
   13         104.64        35.42
   14         108.57        36.19
   15         112.45        37.15
   16         116.27        38.32
   17         120.03        39.68
   18         123.72        41.23
   19         127.32        42.97
   20         130.83        44.89
   21         134.24        46.99
   22         137.53        49.26
   23         140.71        51.69
   24         143.75        54.29
   25         146.66        57.03
   26         149.42        59.93
   27         152.03        62.96
   28         154.49        66.11
   29         156.77        69.40
   30         158.89        72.79
   31         159.56        74.00
Circle Center At X =   91.6 ; Y =  112.4  and Radius,   78.1

      ***     1.594   ***


--------------------------------------------------------------------------------
Failure Surface Specified By 29 Coordinate Points


  Point       X-Surf       Y-Surf
```

Proposed I-69 Project Station 39+00 Line "S-2-A", Drained

Ten Most Critical. C:I69MSED.PLT By: Shawn Marcum 04-12-07 3:10pm



#	FS
a	1.56
b	1.59
c	1.70
d	1.74
e	1.76
f	1.85
g	1.89
h	1.95
i	1.95
j	1.95

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	40	28	0	0	W1
MSE Fill	2	125	125	9999	41	0	0	W1
Backfill	3	125	125	20	30	0	0	W1
Str Fill	4	125	125	0	34	0	0	W1
Shale	5	140	140	9999	41	0	0	W1

Factors Of Safety Calculated By The Modified Bishop Method

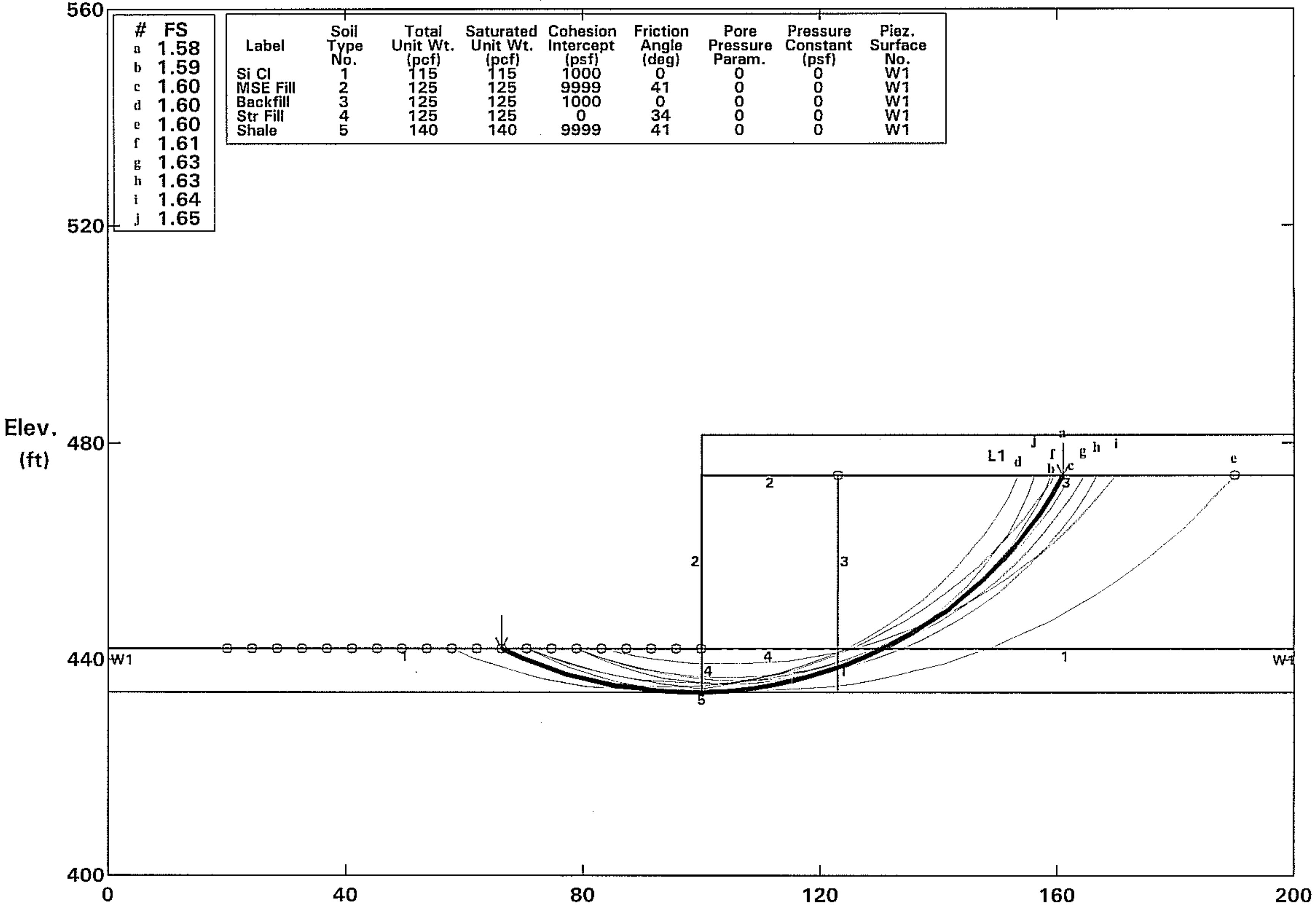
```
                        ** STABL6H  **
                              by
                       Purdue University
--------------------------------------------------------------------------------

                  --Slope Stability Analysis--
               Simplified Janbu, Simplified Bishop
                  or Spencer`s Method of Slices


          Run Date:                  04-12-07
          Time of Run:               3:10pm
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69MSEE
          Output Filename:           C:I69MSEE.OUT
          Plotted Output Filename:   C:I69MSEE.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 39+00 Line "S-2-A", Earthquake



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 400.00 to Y values listed.

              4 Top   Boundaries
             10 Total Boundaries

          Boundary      X-Left      Y-Left     X-Right      Y-Right     Soil Type
             No.         (ft)        (ft)        (ft)         (ft)      Below Bnd

              1           .00       42.00      100.00        42.00          1
              2        100.00       42.00      100.10        74.00          2
              3        100.10       74.00      123.10        74.00          2
              4        123.10       74.00      200.00        74.00          3
              5        100.00       42.00      123.00        42.00          4
              6        123.00       42.00      123.10        74.00          3
              7        123.00       42.00      200.00        42.00          1
              8         99.90       34.00      100.00        42.00          4
              9        122.90       34.00      123.00        42.00          1
             10           .00       34.00      200.00        34.00          5
--------------------------------------------------------------------------------

         ISOTROPIC SOIL PARAMETERS


           5 Type(s) of Soil


          Soil   Total   Saturated  Cohesion Friction    Pore    Pressure    Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

```
           No.  (pcf)     (pcf)      (psf)      (deg)   Param.    (psf)    No.

            1   115.0     115.0     1000.0        .0      .00        .0      1
            2   125.0     125.0     9999.0      41.0      .00        .0      1
            3   125.0     125.0     1000.0        .0      .00        .0      1
            4   125.0     125.0         .0      34.0      .00        .0      1
            5   140.0     140.0     9999.0      41.0      .00        .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  2 Coordinate Points


            Point      X-Water     Y-Water
             No.         (ft)        (ft)

              1           .00       42.00
              2        200.00       42.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

              1 Load(s) Specified


          Load         X-Left       X-Right     Intensity     Deflection
           No.          (ft)          (ft)      (lb/sqft)        (deg)


            1          100.10       200.00        200.0            .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.


          A Horizontal Earthquake Loading Coefficient
          Of .100 Has Been Assigned

          A Vertical Earthquake Loading Coefficient
          Of .000 Has Been Assigned

          Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.
```

```
          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  20.00 ft.
                                       and  X =  99.90 ft.


          Each Surface Terminates Between   X = 123.00 ft.
                                      and   X = 190.00 ft.


          Unless Further Limitations Were Imposed, The Minimum Elevation
          At Which A Surface Extends Is  Y =   .00 ft.


           4.00 ft. Line Segments Define Each Trial Failure Surface.



          ****  ERROR - RC11  ****
>>200 attempts to generate failure surface have failed. Revise limitations



          The Factor Of Safety For The Trial Failure Surface Defined
          By The Coordinates Listed Below Is Misleading.


          Failure Surface Defined By 32 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)


              1         99.90       42.00
              2        100.00       39.17
              3        101.77       36.80
              4        105.07       34.54
              5        108.52       32.53
              6        112.12       30.77
              7        115.83       29.27
              8        119.63       28.05
              9        123.52       27.10
             10        127.46       26.44
             11        131.45       26.06
             12        135.45       25.97
             13        139.44       26.17
             14        143.41       26.66
             15        147.34       27.44
             16        151.19       28.49
             17        154.97       29.82
             18        158.63       31.42
             19        162.17       33.28
             20        165.57       35.40
             21        168.81       37.75
```

Proposed I-69 Project Station 39 + 00 Line "S-2-A", Earthquake

Ten Most Critical. C:I69MSEE.PLT By: Shawn Marcum 04-12-07 3:10pm



#	FS
a	1.58
b	1.59
c	1.60
d	1.60
e	1.60
f	1.61
g	1.63
h	1.63
i	1.64
j	1.65

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
MSE Fill	2	125	125	9999	41	0	0	W1
Backfill	3	125	125	1000	0	0	0	W1
Str Fill	4	125	125	0	34	0	0	W1
Shale	5	140	140	9999	41	0	0	W1

STABL6H FSmin = 1.58 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

APPENDIX F

BEARING CAPACITY CALCULATIONS

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Bridge Structure No. 1

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 4/5/07
COMPUTED BY SM
CHECKED BY

Bridge Structure No. 1 (Nobles Chapel Road over I-69)
Station 37+60 Line "S-2-A-PR"

Boring No	Auger Refusal Elevation	
TB-1	436.4	⇒ 436
TB-1-S	437.0	
TB-2	427.7	⇒ 427
TB-2-S	434.0	
TB-3	419.0	⇒ 413
TB-3-S	412.8	

Recommend driving steel H-piles to bearing in the shale bedrock. Use HP 12×53 piles for 70 ton/pile and HP 12×74 piles for 100 ton/pile.

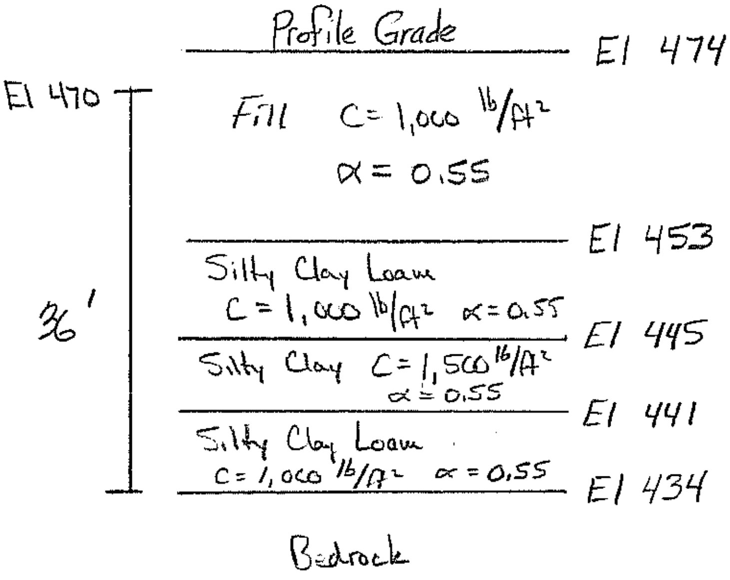
Alternatively, spread footings that bear at a depth of at least 2 ft into competent bedrock can be designed for an allowable bearing pressure of 8,000 lbs/ft^2

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Nobles Chapel Road over I-69

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 5/11/07
COMPUTED BY SM
CHECKED BY Tom S.

Downdrag Calculations



East end-bent (TB-3)
39+00 Line "S-2-A-PR"
Profile Grade at El 474

Assume top-of-pile at
El 470

Surface area = S = 4 ft

Adhesion = a

$$a_F = a_{SCL} = \alpha C = (0.55)(1{,}000\ \text{lb/ft}^2) = 550\ \text{lb/ft}^2$$

$$a_{SC} = (0.55)(1{,}500\ \text{lb/ft}^2) = 825\ \text{lb/ft}^2$$

Downdrag = aLS

$$= (550\ \text{lb/ft}^2)(470-445\ \text{ft})(4\ \text{ft}) + (825\ \text{lb/ft}^2)(445-441\ \text{ft})(4\ \text{ft}) + (550\ \text{lb/ft}^2)(441-434)(4\ \text{f}$$

$$= 83{,}600\ \text{lbs} = 42\ \text{tons}$$

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69 Project

SR 68 Bridge over I-69

PROJECT NUMBER 86.00481.0181

SHEET 1 OF 1

DATE 4/5/07

COMPUTED BY SM

CHECKED BY

Structure No. 4 - SR 68 over I-69
Station 246+63 Line D

Boring No.	Auger Refusal Elevation	
TB-4 TB-4-S	380.1 377.8	⇒ 377
TB-5 TB-5-S	383.6 390.6	⇒ 384
TB-6 TB-6-S	390.2 392.5	⇒ 390
TB-7 TB-7-S	390.7 391.2	⇒ 391

Recommend driving steel H-piles to bearing in the bedrock. Use HP 12×53 piles for 70 ton piles and HP 12×74 piles for 100 ton piles

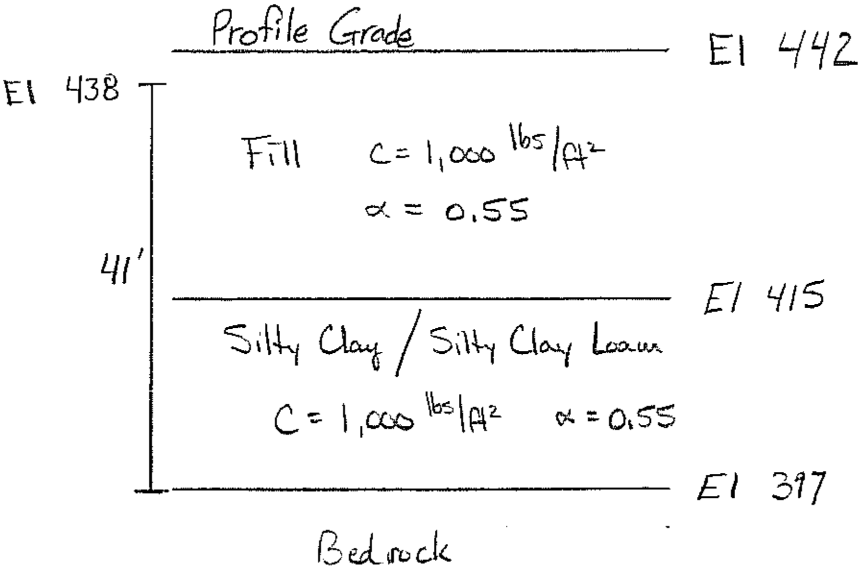
CLIENT American Structurepoint

PROJECT Proposed Interstate 69 Project
SR 68 Bridge over I-69

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 5/11/07
COMPUTED BY SM
CHECKED BY Tom S.

Downdrag Calculations

East end-bent (TB-7)
248+00 Line "D"



Assume top-of-pile at El 438

L = 41 ft

Surface area = S = 4 ft for HP 12×53 and 12×74 piles

$\text{Adhesion} = a = \alpha c = (0.55)(1{,}000\ \text{lb/ft}^2) = 550\ \text{lb/ft}^2$

$\text{Downdrag} = a L S = (550\ \text{lb/ft}^2)(41\ \text{ft})(4\ \text{ft}) = 90{,}200\ \text{lbs}$

$= 45\ \text{tons/pile}$

Where L = Length of pile
S = Surface Area ("Box Area") of pile/ft.

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Structure No. 2

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 3/5/07
COMPUTED BY SM
CHECKED BY

Pre-cast Three-sided Reinforced Concrete Culvert

Structure No. 2 350 ft by 20 ft by 5.5 ft

Station 1561 + 83 Line "A", Boring Nos. TB-8 and TB-9

- Assume that all soil will be removed such that the footings will bear on compentent bedrock encountered in the borings below about El 410.5 with a minimum footing width of 3 ft

Recommend using an allowable bearing pressure of 8,000 lbs/sq.ft provided that all soils are removed at the footing locations and that the footings will bear on competent bedrock

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Structure No. 3 (Des. No. 0600798)

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 2
DATE 3/5/07
COMPUTED BY SM
CHECKED BY

Pre-cast Three-sided Reinforced Concrete Culvert
Structure No. 3, 255 ft by 32 ft by 9 ft
Station 1590 + 11 Line "A", Boring Nos. TB-10 and TB-11

- Assumed footing bearing elevation at about El 400

- Due to the presence of soft silty clay encountered in Boring No. TB-10 between about El 398 and El 392, it is recommended that all soil be removed below the footings and that the footings bear on flowable backfill (in accordance with INDOT Standard Specifications Section 213) placed above the bedrock to reestablish the footing bearing elevation.

- Use

  $S_u = 40\ \text{lb/in}^2$ (in accordance with INDOT Standard Specifications Section 213.04)

  $S_u = 40\ \text{lbs/in}^2\ (144\ \text{in}^2/\text{ft}^2) = 5{,}760\ \text{lbs/ft}^2$

  $C = \frac{1}{2} S = \frac{1}{2}(5{,}760\ \text{lb/ft}^2) = 2{,}880\ \text{lbs/ft}^2$

  $q_{ult} = 5.7(2{,}880\ \text{lbs/ft}^2) = 16{,}400\ \text{lb/ft}^2$

  $q_{all} = \frac{16{,}400\ \text{lb/ft}^2}{3} = 5{,}460\ \text{lb/ft}^2 \Rightarrow 5{,}000\ \text{lbs/ft}^2$

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Structure No. 3 (Des. No. 0600798)

PROJECT NUMBER 86.00481.0181
SHEET 2 OF 2
DATE 3/5/07
COMPUTED BY
CHECKED BY

Recommend using an allowable bearing pressure of 5,000 lbs/ft² for footings that bear on flowable backfill placed over bedrock after all soils have been removed

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Structure No. 5 (Des No. 0600797)

PROJECT NUMBER 86.00481.0181
SHEET 1 OF
DATE 4/5/07
COMPUTED BY SM
CHECKED BY

Pre-cast Three-sided Reinforced Concrete Culvert
Structure No. 5
Station 16+45 Ramp "B", Boring Nos. TB-12 and TB-13

- Assume footing bearing elevation at or below El 400 such that the footings will bear on medium stiff to very stiff silty clay and silty clay loam

Use

$c = 1{,}500\ \text{lbs/ft}^2 \quad \phi = 0 \quad N_c = 5.7 \quad F.S. = 3$

$q_{ult} = c N_c = (1{,}500\ \text{lbs/ft}^2)(5.7) = 8{,}550\ \text{lbs/ft}^2$

$q_{all} = \frac{q_{ult}}{F.S.} = \frac{8{,}550}{3}\ \text{lbs/ft}^2 = 2{,}850\ \text{lbs/ft}^2 \Rightarrow 2{,}800$

Recommend using an allowable bearing pressure of 2,800 lbs/ft² provided that any soft soils are removed and that the footings bear on medium stiff to very stiff silty clay or silty clay loam

CLIENT American Structurepoint

PROJECT Proposed I-69 Project

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 4/5/07
COMPUTED BY SM
CHECKED BY

Pre-cast Concrete Arch Culvert - Station 8+92 Ramp "C"
Boring Nos. TB-14 and TB-15

- Assume bearing elevation at about El 406
- Assume that all very soft and soft soils are removed such that the footings will bear in the medium stiff silty clay encountered in the test borings below about El 405 or on structure backfill placed over the medium stiff silty clay

Use:

$c = 1{,}000 \text{ lbs/ft}^2 \quad \phi = 0 \quad N_c = 5.7$

$q_{ult} = c N_c = (1{,}000 \text{ lbs/ft}^2)(5.7) = 5{,}700 \text{ lb/sq.ft}$

$q_{all} = \frac{q_{ult}}{3} = \frac{5{,}700 \text{ lb/sq.ft}}{3} = 1{,}900 \text{ lb/ft}^2$

Recommend using an allowable bearing pressure of 1,900 lb/ft² provided that all soft soils are removed at the base of the footing excavations and that the footings will bear on firm material

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 4/5/07
COMPUTED BY SM
CHECKED BY

Pre-cast Concrete Arch Culvert - Station 14+05 Ramp "A-1"
Boring Nos. TB-25 and TB-26

- Assume that all soil will be removed such that the footings will bear on competent bedrock encountered in the borings below about El 441 to 442 with a minimum footing width of 3 ft

Recommend using an allowable bearing pressure of 8,000 $^{lb}/_{ft^2}$ provided that all soils are removed at the footing locations and that the footings will bear on competent bedrock.

APPENDIX G

STABL6H SLOPE STABILITY OUTPUT

```
                           ** STABL6H   **
                                by
                          Purdue University
------------------------------------------------------------------------------

                     --Slope Stability Analysis--
                  Simplified Janbu, Simplified Bishop
                     or Spencer`s Method of Slices


         Run Date:                 04-10-07
         Time of Run:              11:14am
         Run By:                   Shawn Marcum
         Input Data Filename:      C:I69D
         Output Filename:          C:I69D.OUT
         Plotted Output Filename:  C:I69D.PLT



         PROBLEM DESCRIPTION    Proposed I-69 Project
                                Station 244+50 Line "D" - Undrained Cond
```

3H to 1V slope

```
         BOUNDARY COORDINATES
              NOTE:  User defined origin was specified.
              Add 00.00 to X values and 350.00 to Y values listed.

             6 Top   Boundaries
            10 Total Boundaries

         Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
            No.        (ft)       (ft)        (ft)        (ft)      Below Bnd

             1           .00      55.00      100.00       55.00          1
             2        100.00      55.00      199.00       88.00          2
             3        199.00      88.00      218.00       92.00          2
             4        218.00      92.00      262.00       92.00          2
             5        262.00      92.00      281.00       88.00          2
             6        281.00      88.00      350.00       65.00          2
             7        100.00      55.00      184.00       65.00          1
             8        184.00      65.00      350.00       65.00          1
             9           .00      52.00      350.00       52.00          3
            10           .00      30.00      350.00       30.00          4
------------------------------------------------------------------------------


        ISOTROPIC SOIL PARAMETERS


          4 Type(s) of Soil


         Soil   Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
         Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

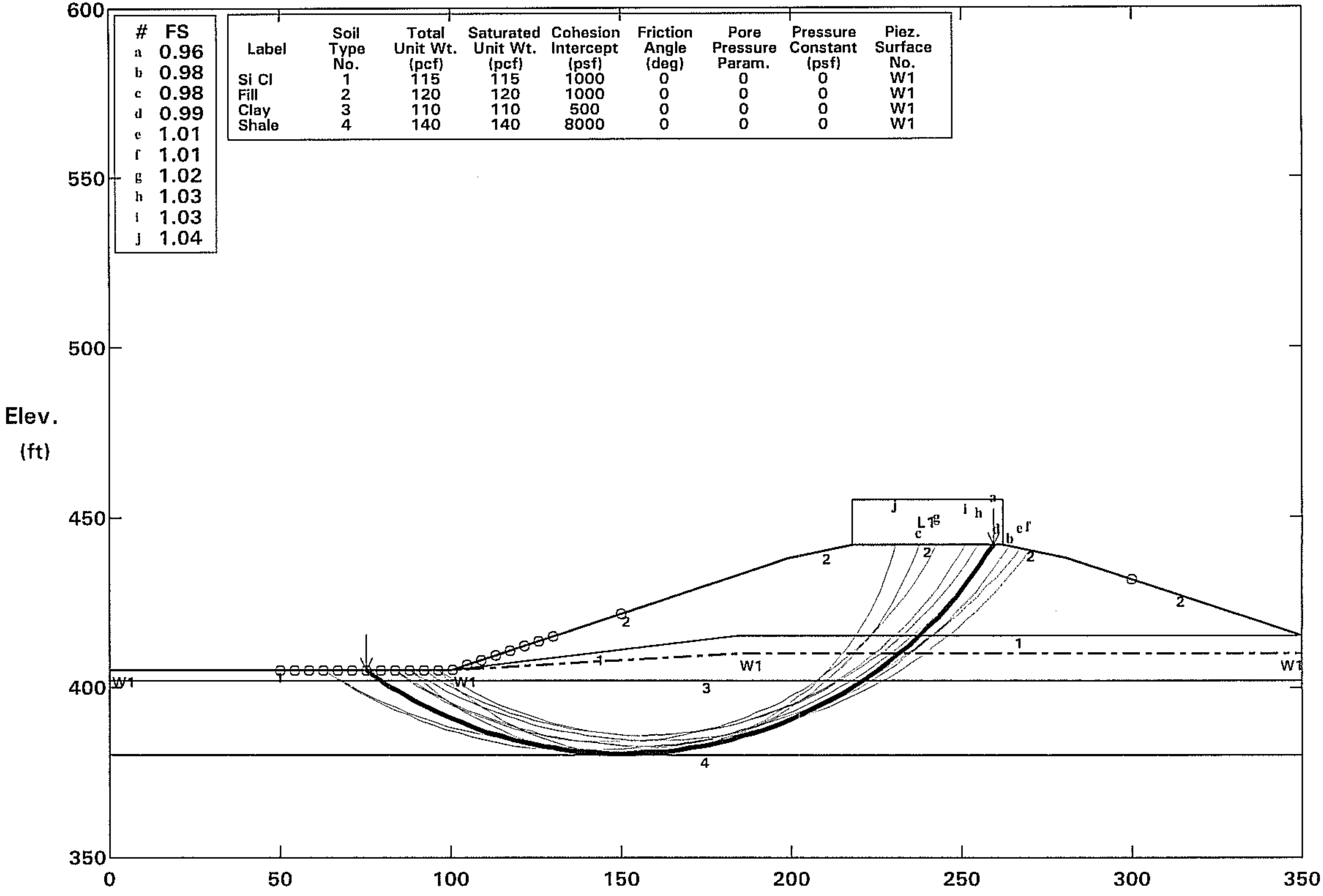
```
     No.  (pcf)     (pcf)      (psf)      (deg)   Param.     (psf)    No.

      1   115.0     115.0     1000.0        .0      .00        .0      1
      2   120.0     120.0     1000.0        .0      .00        .0      1
      3   110.0     110.0      500.0        .0      .00        .0      1
      4   140.0     140.0     8000.0        .0      .00        .0      1
--------------------------------------------------------------------------------


     1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


     Unit Weight of Water =  62.40


     Piezometric Surface No.  1 Specified by  4 Coordinate Points


       Point       X-Water      Y-Water
        No.          (ft)         (ft)

         1            .00        55.00
         2         100.00        55.00
         3         184.00        60.00
         4         350.00        60.00
--------------------------------------------------------------------------------


    BOUNDARY LOAD(S)

        1 Load(s) Specified


     Load         X-Left       X-Right      Intensity     Deflection
      No.          (ft)          (ft)       (lb/sqft)        (deg)


       1         218.00        262.00        200.0             .0


     NOTE - Intensity Is Specified As A Uniformly Distributed
            Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


     A Critical Failure Surface Searching Method, Using A Random
     Technique For Generating Circular Surfaces, Has Been Specified.


     400 Trial Surfaces Have Been Generated.


      20 Surfaces Initiate From Each Of 20 Points Equally Spaced
     Along The Ground Surface Between  X =  50.00 ft.
                                 and  X = 130.00 ft.
```

```
        Each Surface Terminates Between    X = 150.00 ft.
                                 and       X = 300.00 ft.


        Unless Further Limitations Were Imposed, The Minimum Elevation
        At Which A Surface Extends Is  Y =   .00 ft.


         4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------

        Following Are Displayed The Ten Most Critical Of The Trial
        Failure Surfaces Examined.  They Are Ordered - Most Critical
        First.


        * * Safety Factors Are Calculated By The Modified Bishop Method * *


        Failure Surface Specified By 54 Coordinate Points


          Point        X-Surf        Y-Surf
           No.          (ft)          (ft)

            1          75.26         55.00
            2          78.54         52.70
            3          81.88         50.51
            4          85.30         48.42
            5          88.77         46.44
            6          92.31         44.57
            7          95.90         42.81
            8          99.55         41.17
            9         103.24         39.64
           10         106.98         38.22
           11         110.77         36.93
           12         114.59         35.75
           13         118.45         34.70
           14         122.34         33.76
           15         126.25         32.95
           16         130.19         32.26
           17         134.15         31.69
           18         138.13         31.25
           19         142.12         30.93
           20         146.11         30.74
           21         150.11         30.68
           22         154.11         30.73
           23         158.11         30.92
           24         162.10         31.23
           25         166.07         31.66
           26         170.03         32.22
           27         173.97         32.90
           28         177.89         33.70
           29         181.78         34.63
           30         185.64         35.68
           31         189.47         36.85
```

```
    32          193.26          38.14
    33          197.00          39.54
    34          200.70          41.07
    35          204.35          42.70
    36          207.95          44.45
    37          211.49          46.32
    38          214.96          48.29
    39          218.38          50.37
    40          221.73          52.56
    41          225.01          54.85
    42          228.22          57.24
    43          231.34          59.73
    44          234.39          62.32
    45          237.36          65.00
    46          240.24          67.78
    47          243.04          70.64
    48          245.74          73.59
    49          248.35          76.62
    50          250.86          79.73
    51          253.28          82.92
    52          255.59          86.19
    53          257.80          89.52
    54          259.33          92.00

Circle Center At X =  150.2 ; Y =  158.4  and Radius,  127.7

      ***       .960   ***


Failure Surface Specified By 53 Coordinate Points


  Point         X-Surf          Y-Surf
   No.           (ft)            (ft)

    1            83.68          55.00
    2            87.04          52.81
    3            90.45          50.73
    4            93.93          48.76
    5            97.47          46.90
    6           101.06          45.14
    7           104.71          43.50
    8           108.41          41.97
    9           112.15          40.56
   10           115.93          39.26
   11           119.76          38.08
   12           123.61          37.02
   13           127.50          36.08
   14           131.42          35.26
   15           135.35          34.56
   16           139.31          33.99
   17           143.29          33.54
   18           147.27          33.21
   19           151.27          33.00
   20           155.27          32.92
   21           159.27          32.96
```

Proposed I-69 Project Station 244+50 Line "D" - Undrained Cond

Ten Most Critical. C:I69D.PLT By: Shawn Marcum 04-10-07 11:14am



#	FS
a	0.96
b	0.98
c	0.98
d	0.99
e	1.01
f	1.01
g	1.02
h	1.03
i	1.03
j	1.04

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

STABL6H FSmin = 0.96 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                             ** STABL6H  **
                                   by
                            Purdue University
--------------------------------------------------------------------------------

                       --Slope Stability Analysis--
                    Simplified Janbu, Simplified Bishop
                       or Spencer`s Method of Slices


          Run Date:                  04-10-07
          Time of Run:               2:38pm
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69DE
          Output Filename:           C:I69DE.OUT
          Plotted Output Filename:   C:I69DE.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 244+50 Line "D" - Earthquake
                                  3H to 1V slope


          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 350.00 to Y values listed.

              6 Top   Boundaries
             10 Total Boundaries

          Boundary      X-Left     Y-Left     X-Right    Y-Right    Soil Type
             No.         (ft)       (ft)        (ft)       (ft)     Below Bnd

              1            .00      55.00      100.00      55.00        1
              2         100.00      55.00      199.00      88.00        2
              3         199.00      88.00      218.00      92.00        2
              4         218.00      92.00      262.00      92.00        2
              5         262.00      92.00      281.00      88.00        2
              6         281.00      88.00      350.00      65.00        2
              7         100.00      55.00      184.00      65.00        1
              8         184.00      65.00      350.00      65.00        1
              9            .00      52.00      350.00      52.00        3
             10            .00      30.00      350.00      30.00        4
--------------------------------------------------------------------------------

         ISOTROPIC SOIL PARAMETERS


           4 Type(s) of Soil


          Soil   Total  Saturated  Cohesion Friction    Pore   Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

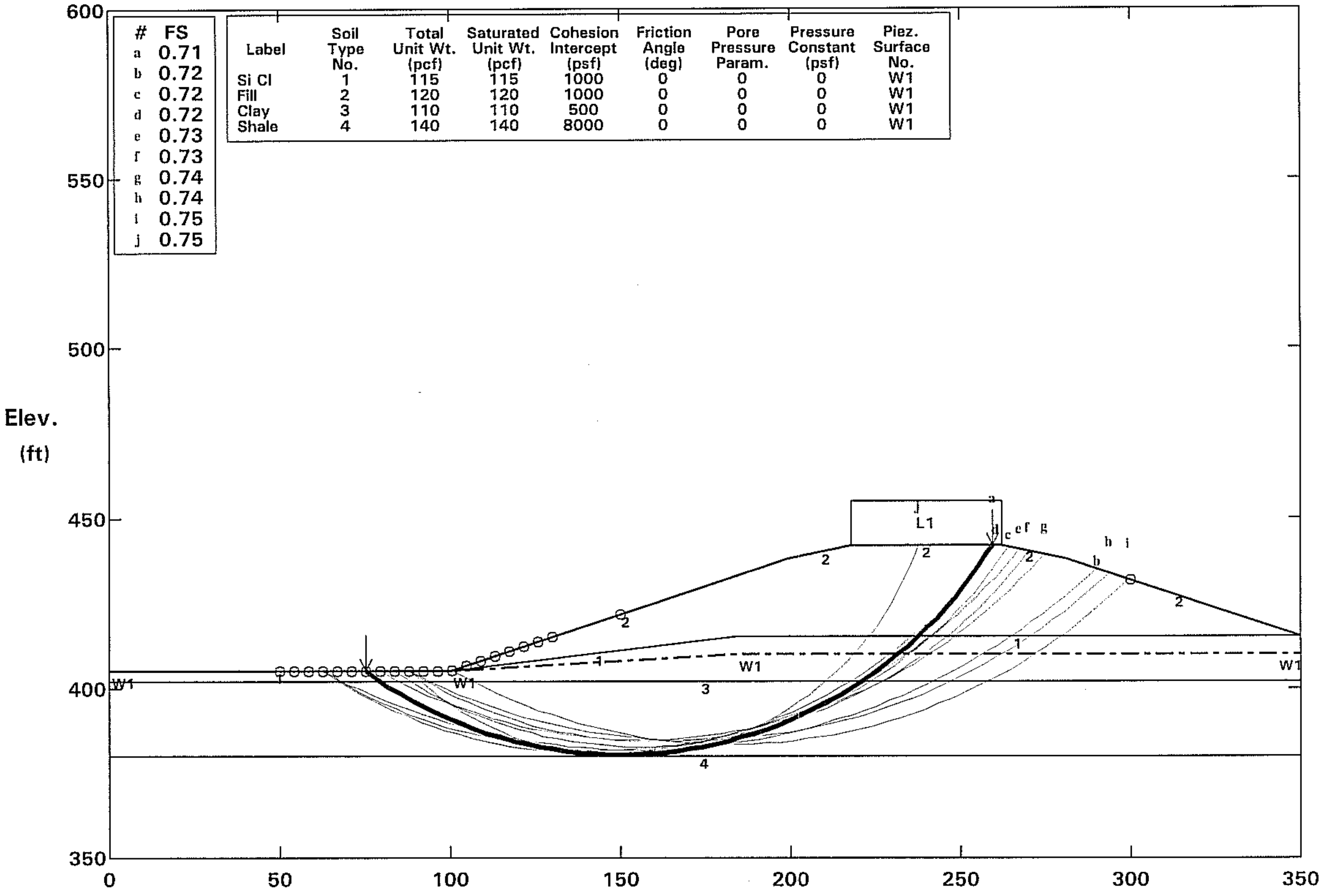
```
   No.  (pcf)    (pcf)     (psf)      (deg)   Param.    (psf)    No.

    1   115.0    115.0    1000.0        .0     .00        .0      1
    2   120.0    120.0    1000.0        .0     .00        .0      1
    3   110.0    110.0     500.0        .0     .00        .0      1
    4   140.0    140.0    8000.0        .0     .00        .0      1
-------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  4 Coordinate Points


            Point       X-Water     Y-Water
             No.          (ft)        (ft)

              1            .00       55.00
              2         100.00       55.00
              3         184.00       60.00
              4         350.00       60.00
-------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

             1 Load(s) Specified


          Load        X-Left      X-Right    Intensity     Deflection
           No.         (ft)         (ft)     (lb/sqft)       (deg)


            1         218.00      262.00       200.0            .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.



          A Horizontal Earthquake Loading Coefficient
          Of .100 Has Been Assigned

          A Vertical Earthquake Loading Coefficient
          Of .000 Has Been Assigned

          Cavitation Pressure =     .0 psf
-------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.
```

```
400 Trial Surfaces Have Been Generated.


 20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between  X =  50.00 ft.
                             and  X = 130.00 ft.


Each Surface Terminates Between   X = 150.00 ft.
                            and   X = 300.00 ft.


Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =    .00 ft.


 4.00 ft. Line Segments Define Each Trial Failure Surface.

--------------------------------------------------------------------------------

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined.  They Are Ordered - Most Critical
First.


* * Safety Factors Are Calculated By The Modified Bishop Method * *


Failure Surface Specified By 54 Coordinate Points


  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)

    1         75.26       55.00
    2         78.54       52.70
    3         81.88       50.51
    4         85.30       48.42
    5         88.77       46.44
    6         92.31       44.57
    7         95.90       42.81
    8         99.55       41.17
    9        103.24       39.64
   10        106.98       38.22
   11        110.77       36.93
   12        114.59       35.75
   13        118.45       34.70
   14        122.34       33.76
   15        126.25       32.95
   16        130.19       32.26
   17        134.15       31.69
   18        138.13       31.25
   19        142.12       30.93
   20        146.11       30.74
   21        150.11       30.68
```

```
     22           154.11          30.73
     23           158.11          30.92
     24           162.10          31.23
     25           166.07          31.66
     26           170.03          32.22
     27           173.97          32.90
     28           177.89          33.70
     29           181.78          34.63
     30           185.64          35.68
     31           189.47          36.85
     32           193.26          38.14
     33           197.00          39.54
     34           200.70          41.07
     35           204.35          42.70
     36           207.95          44.45
     37           211.49          46.32
     38           214.96          48.29
     39           218.38          50.37
     40           221.73          52.56
     41           225.01          54.85
     42           228.22          57.24
     43           231.34          59.73
     44           234.39          62.32
     45           237.36          65.00
     46           240.24          67.78
     47           243.04          70.64
     48           245.74          73.59
     49           248.35          76.62
     50           250.86          79.73
     51           253.28          82.92
     52           255.59          86.19
     53           257.80          89.52
     54           259.33          92.00

 Circle Center At X =  150.2 ; Y =  158.4  and Radius,  127.7

       ***       .706    ***


 Failure Surface Specified By 63 Coordinate Points

    Point         X-Surf         Y-Surf
     No.           (ft)           (ft)

      1            62.63          55.00
      2            66.18          53.16
      3            69.77          51.40
      4            73.40          49.70
      5            77.06          48.09
      6            80.75          46.54
      7            84.47          45.07
      8            88.22          43.68
      9            91.99          42.36
     10            95.80          41.12
     11            99.62          39.96
```

Proposed I-69 Project Station 244+50 Line "D" - Earthquake

Ten Most Critical. C:I69DE.PLT By: Shawn Marcum 04-10-07 2:38pm



#	FS
a	0.71
b	0.72
c	0.72
d	0.72
e	0.73
f	0.73
g	0.74
h	0.74
i	0.75
j	0.75

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

STABL6H FSmin=0.71 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                    ** STABL6H  **
                          by
                   Purdue University
------------------------------------------------------------------------------

                --Slope Stability Analysis--
             Simplified Janbu, Simplified Bishop
                or Spencer`s Method of Slices


          Run Date:                  04-10-07
          Time of Run:               11:07am
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69D5
          Output Filename:           C:I69D5.OUT
          Plotted Output Filename:   C:I69D5.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 244+50 Line "D" - Undrained Cond
```

5H to 1V slope

```
          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 350.00 to Y values listed.

              6 Top   Boundaries
             10 Total Boundaries

          Boundary      X-Left      Y-Left     X-Right     Y-Right    Soil Type
             No.         (ft)        (ft)        (ft)        (ft)     Below Bnd

             1             .00       55.00      134.00       55.00        1
             2          134.00       55.00      299.00       88.00        2
             3          299.00       88.00      318.00       92.00        2
             4          318.00       92.00      362.00       92.00        2
             5          362.00       92.00      381.00       88.00        2
             6          381.00       88.00      496.00       65.00        2
             7          134.00       55.00      284.00       65.00        1
             8          284.00       65.00      496.00       65.00        1
             9             .00       52.00      496.00       52.00        3
            10             .00       30.00      496.00       30.00        4
------------------------------------------------------------------------------


         ISOTROPIC SOIL PARAMETERS


           4 Type(s) of Soil


          Soil  Total  Saturated  Cohesion Friction   Pore    Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
```

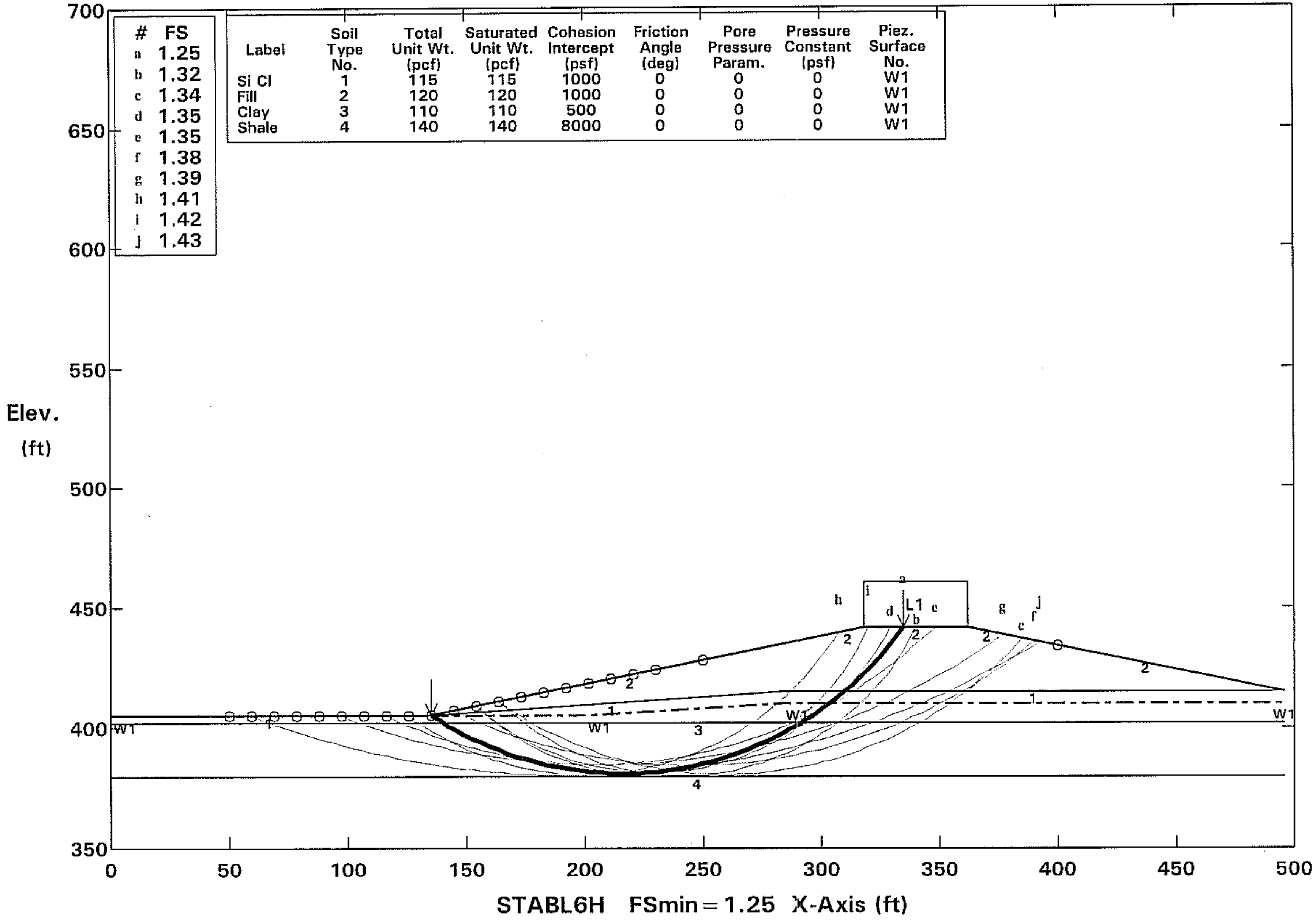
```
   No.  (pcf)     (pcf)      (psf)      (deg)   Param.     (psf)    No.

    1   115.0     115.0     1000.0        .0      .00         .0      1
    2   120.0     120.0     1000.0        .0      .00         .0      1
    3   110.0     110.0      500.0        .0      .00         .0      1
    4   140.0     140.0     8000.0        .0      .00         .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  4 Coordinate Points

            Point       X-Water      Y-Water
             No.          (ft)         (ft)

              1            .00        55.00
              2         200.00        55.00
              3         284.00        60.00
              4         496.00        60.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

             1 Load(s) Specified

          Load          X-Left       X-Right     Intensity      Deflection
           No.           (ft)          (ft)      (lb/sqft)        (deg)


            1          318.00        362.00        200.0             .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  50.00 ft.
                                       and  X = 230.00 ft.
```

```
        Each Surface Terminates Between   X = 250.00 ft.
                                    and   X = 400.00 ft.


        Unless Further Limitations Were Imposed, The Minimum Elevation
        At Which A Surface Extends Is  Y =   .00 ft.


         4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------

        Following Are Displayed The Ten Most Critical Of The Trial
        Failure Surfaces Examined.  They Are Ordered - Most Critical
        First.


        * * Safety Factors Are Calculated By The Modified Bishop Method * *


        Failure Surface Specified By 58 Coordinate Points


          Point        X-Surf      Y-Surf
           No.          (ft)        (ft)

            1          135.26       55.25
            2          138.64       53.10
            3          142.06       51.04
            4          145.55       49.08
            5          149.08       47.21
            6          152.67       45.43
            7          156.30       43.76
            8          159.98       42.18
            9          163.70       40.71
           10          167.46       39.34
           11          171.25       38.07
           12          175.08       36.90
           13          178.93       35.84
           14          182.82       34.89
           15          186.73       34.04
           16          190.66       33.30
           17          194.61       32.66
           18          198.57       32.13
           19          202.55       31.71
           20          206.54       31.40
           21          210.53       31.20
           22          214.53       31.11
           23          218.53       31.12
           24          222.53       31.25
           25          226.52       31.48
           26          230.51       31.82
           27          234.48       32.28
           28          238.44       32.83
           29          242.39       33.50
           30          246.31       34.27
           31          250.21       35.15
```

```
     32          254.09        36.14
     33          257.94        37.23
     34          261.75        38.43
     35          265.54        39.73
     36          269.28        41.13
     37          272.99        42.63
     38          276.65        44.24
     39          280.27        45.94
     40          283.85        47.74
     41          287.37        49.64
     42          290.83        51.63
     43          294.25        53.72
     44          297.60        55.90
     45          300.90        58.17
     46          304.13        60.52
     47          307.29        62.97
     48          310.39        65.50
     49          313.42        68.11
     50          316.37        70.81
     51          319.25        73.59
     52          322.06        76.44
     53          324.78        79.37
     54          327.43        82.37
     55          329.99        85.44
     56          332.47        88.58
     57          334.86        91.79
     58          335.01        92.00

Circle Center At X =  215.9 ; Y =  177.9  and Radius,  146.8


      ***      1.247    ***



Failure Surface Specified By 54 Coordinate Points


   Point        X-Surf        Y-Surf
    No.          (ft)          (ft)

      1         163.68         60.94
      2         166.63         58.23
      3         169.66         55.62
      4         172.79         53.13
      5         176.01         50.75
      6         179.31         48.49
      7         182.69         46.35
      8         186.14         44.33
      9         189.66         42.44
     10         193.25         40.67
     11         196.90         39.04
     12         200.61         37.54
     13         204.37         36.17
     14         208.18         34.94
     15         212.02         33.84
     16         215.91         32.89
     17         219.82         32.07
```

Proposed I-69 Project Station 244+50 Line "D" - Undrained Cond

Ten Most Critical. C:I69D5.PLT By: Shawn Marcum 04-10-07 11:07am



#	FS
a	1.25
b	1.32
c	1.34
d	1.35
e	1.35
f	1.38
g	1.39
h	1.41
i	1.42
j	1.43

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

Factors Of Safety Calculated By The Modified Bishop Method

```
                          **  STABL6H   **
                                by
                          Purdue University
--------------------------------------------------------------------------------

                      --Slope Stability Analysis--
                   Simplified Janbu, Simplified Bishop
                      or Spencer`s Method of Slices


         Run Date:                  04-10-07
         Time of Run:               11:17am
         Run By:                    Shawn Marcum
         Input Data Filename:       C:I69E5
         Output Filename:           C:I69E5.OUT
         Plotted Output Filename:   C:I69E5.PLT



         PROBLEM DESCRIPTION    Proposed I-69 Project
                                Station 244+50 Line "D" - Earthquake Con
```

5H to 1V Slope

```
         BOUNDARY COORDINATES
              NOTE:  User defined origin was specified.
              Add 00.00 to X values and 350.00 to Y values listed.

             6 Top   Boundaries
            10 Total Boundaries

         Boundary      X-Left      Y-Left     X-Right     Y-Right    Soil Type
            No.         (ft)        (ft)        (ft)        (ft)     Below Bnd

             1            .00       55.00      134.00       55.00        1
             2         134.00       55.00      299.00       88.00        2
             3         299.00       88.00      318.00       92.00        2
             4         318.00       92.00      362.00       92.00        2
             5         362.00       92.00      381.00       88.00        2
             6         381.00       88.00      496.00       65.00        2
             7         134.00       55.00      284.00       65.00        1
             8         284.00       65.00      496.00       65.00        1
             9            .00       52.00      496.00       52.00        3
            10            .00       30.00      496.00       30.00        4
--------------------------------------------------------------------------------


        ISOTROPIC SOIL PARAMETERS


          4 Type(s) of Soil


         Soil   Total   Saturated  Cohesion Friction   Pore    Pressure   Piez.
         Type Unit Wt.  Unit Wt. Intercept   Angle   Pressure Constant Surface
```

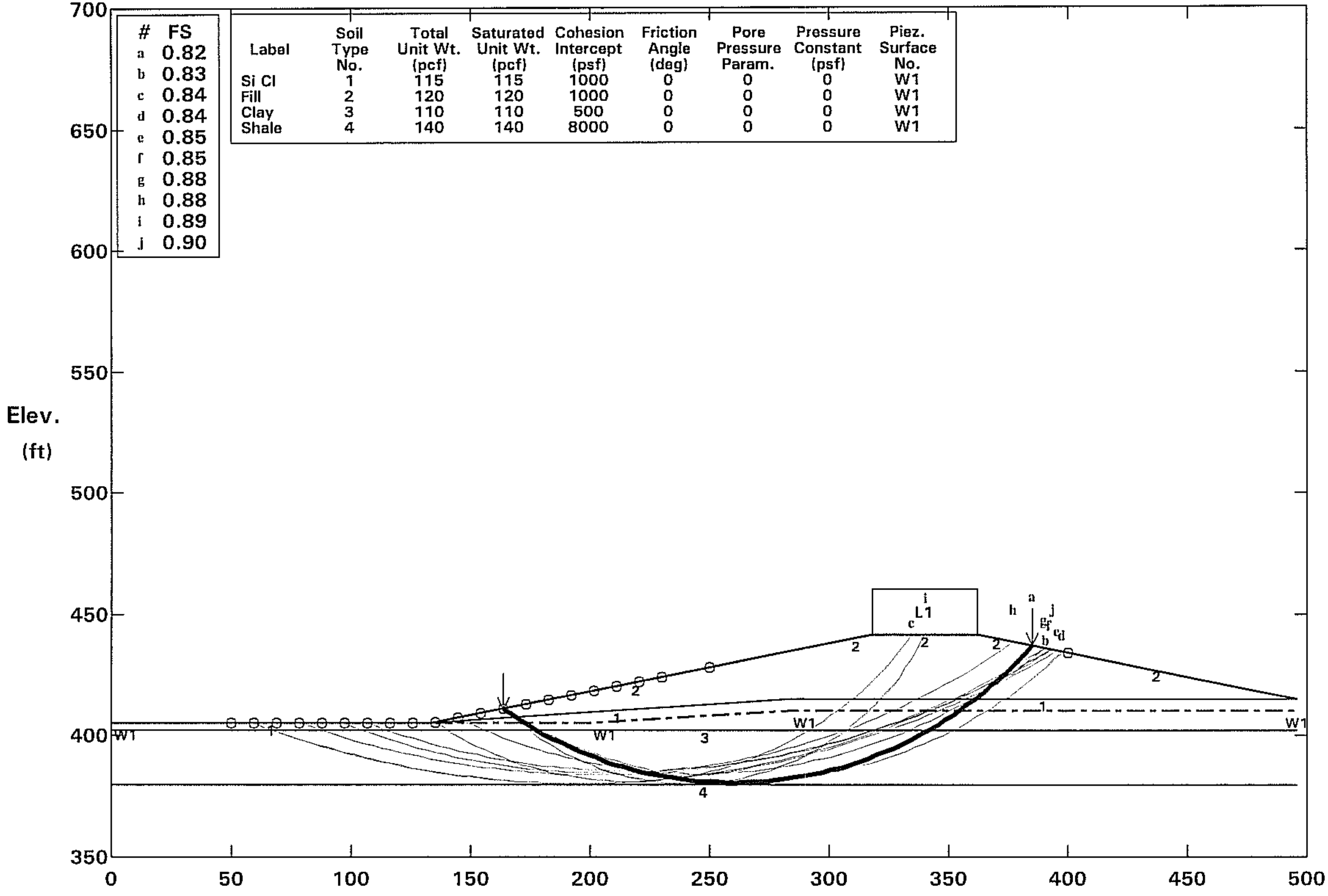
```
    No.  (pcf)    (pcf)     (psf)      (deg)   Param.     (psf)    No.

     1   115.0    115.0    1000.0        .0      .00        .0      1
     2   120.0    120.0    1000.0        .0      .00        .0      1
     3   110.0    110.0     500.0        .0      .00        .0      1
     4   140.0    140.0    8000.0        .0      .00        .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  4 Coordinate Points


            Point       X-Water      Y-Water
             No.          (ft)         (ft)

              1             .00        55.00
              2          200.00        55.00
              3          284.00        60.00
              4          496.00        60.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

              1 Load(s) Specified


          Load        X-Left       X-Right      Intensity     Deflection
           No.         (ft)          (ft)       (lb/sqft)       (deg)


            1         318.00        362.00        200.0             .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.


          A Horizontal Earthquake Loading Coefficient
          Of .100 Has Been Assigned

          A Vertical Earthquake Loading Coefficient
          Of .000 Has Been Assigned

          Cavitation Pressure =      .0 psf
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.
```

```
400 Trial Surfaces Have Been Generated.


 20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between  X =  50.00 ft.
                             and  X = 230.00 ft.


Each Surface Terminates Between   X = 250.00 ft.
                            and   X = 400.00 ft.


Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =    .00 ft.


 4.00 ft. Line Segments Define Each Trial Failure Surface.

--------------------------------------------------------------------------------

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined.  They Are Ordered - Most Critical
First.


* * Safety Factors Are Calculated By The Modified Bishop Method * *


Failure Surface Specified By 63 Coordinate Points


  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)

    1        163.68       60.94
    2        166.99       58.68
    3        170.34       56.50
    4        173.75       54.40
    5        177.20       52.39
    6        180.70       50.45
    7        184.25       48.60
    8        187.84       46.84
    9        191.47       45.17
   10        195.14       43.58
   11        198.85       42.08
   12        202.59       40.66
   13        206.37       39.34
   14        210.18       38.11
   15        214.01       36.97
   16        217.87       35.93
   17        221.75       34.97
   18        225.66       34.11
   19        229.59       33.34
   20        233.53       32.67
   21        237.49       32.09
```

```
      22          241.46          31.60
      23          245.44          31.22
      24          249.43          30.92
      25          253.42          30.72
      26          257.42          30.62
      27          261.42          30.62
      28          265.42          30.70
      29          269.42          30.89
      30          273.41          31.17
      31          277.39          31.55
      32          281.36          32.02
      33          285.32          32.58
      34          289.27          33.24
      35          293.19          34.00
      36          297.10          34.85
      37          300.99          35.79
      38          304.85          36.82
      39          308.69          37.95
      40          312.50          39.17
      41          316.28          40.48
      42          320.03          41.88
      43          323.74          43.36
      44          327.42          44.94
      45          331.06          46.61
      46          334.65          48.36
      47          338.21          50.19
      48          341.71          52.11
      49          345.18          54.12
      50          348.59          56.20
      51          351.95          58.37
      52          355.26          60.62
      53          358.51          62.95
      54          361.71          65.35
      55          364.85          67.83
      56          367.93          70.38
      57          370.95          73.01
      58          373.90          75.71
      59          376.79          78.48
      60          379.61          81.31
      61          382.36          84.21
      62          385.04          87.18
      63          385.05          87.19

 Circle Center At X =  259.7 ; Y =  197.7  and Radius,  167.1


       ***       .818   ***


 Failure Surface Specified By 67 Coordinate Points


   Point        X-Surf        Y-Surf
    No.          (ft)          (ft)

     1          144.74         57.15
     2          148.36         55.44
```

Proposed I-69 Project Station 244+50 Line "D" - Earthquake Con

Ten Most Critical. C:I69E5.PLT By: Shawn Marcum 04-10-07 11:17am



#	FS
a	0.82
b	0.83
c	0.84
d	0.84
e	0.85
f	0.85
g	0.88
h	0.88
i	0.89
j	0.90

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

STABL6H FSmin = 0.82 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                              ** STABL6H  **
                                    by
                            Purdue University
--------------------------------------------------------------------------------

                       --Slope Stability Analysis--
                    Simplified Janbu, Simplified Bishop
                       or Spencer`s Method of Slices


          Run Date:                    04-10-07
          Time of Run:                 11:20am
          Run By:                      Shawn Marcum
          Input Data Filename:         C:I69DB
          Output Filename:             C:I69DB.OUT
          Plotted Output Filename:     C:I69DB.PLT



          PROBLEM DESCRIPTION   Proposed I-69 Project
                                Station 244+50 Line "D" - Undrained Cond
```

3H to 1V Slope with toe berm

```
          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 350.00 to Y values listed.

             8 Top   Boundaries
            13 Total Boundaries

          Boundary     X-Left      Y-Left      X-Right     Y-Right    Soil Type
            No.         (ft)        (ft)        (ft)        (ft)      Below Bnd

             1            .00       55.00        50.00       55.00        1
             2          50.00       55.00        65.00       65.00        2
             3          65.00       65.00       130.00       65.00        2
             4         130.00       65.00       199.00       88.00        2
             5         199.00       88.00       218.00       92.00        2
             6         218.00       92.00       262.00       92.00        2
             7         262.00       92.00       281.00       88.00        2
             8         281.00       88.00       350.00       65.00        2
             9          50.00       55.00       100.00       55.00        1
            10         100.00       55.00       184.00       65.00        1
            11         184.00       65.00       350.00       65.00        1
            12            .00       52.00       350.00       52.00        3
            13            .00       30.00       350.00       30.00        4
--------------------------------------------------------------------------------


         ISOTROPIC SOIL PARAMETERS


          4 Type(s) of Soil
```

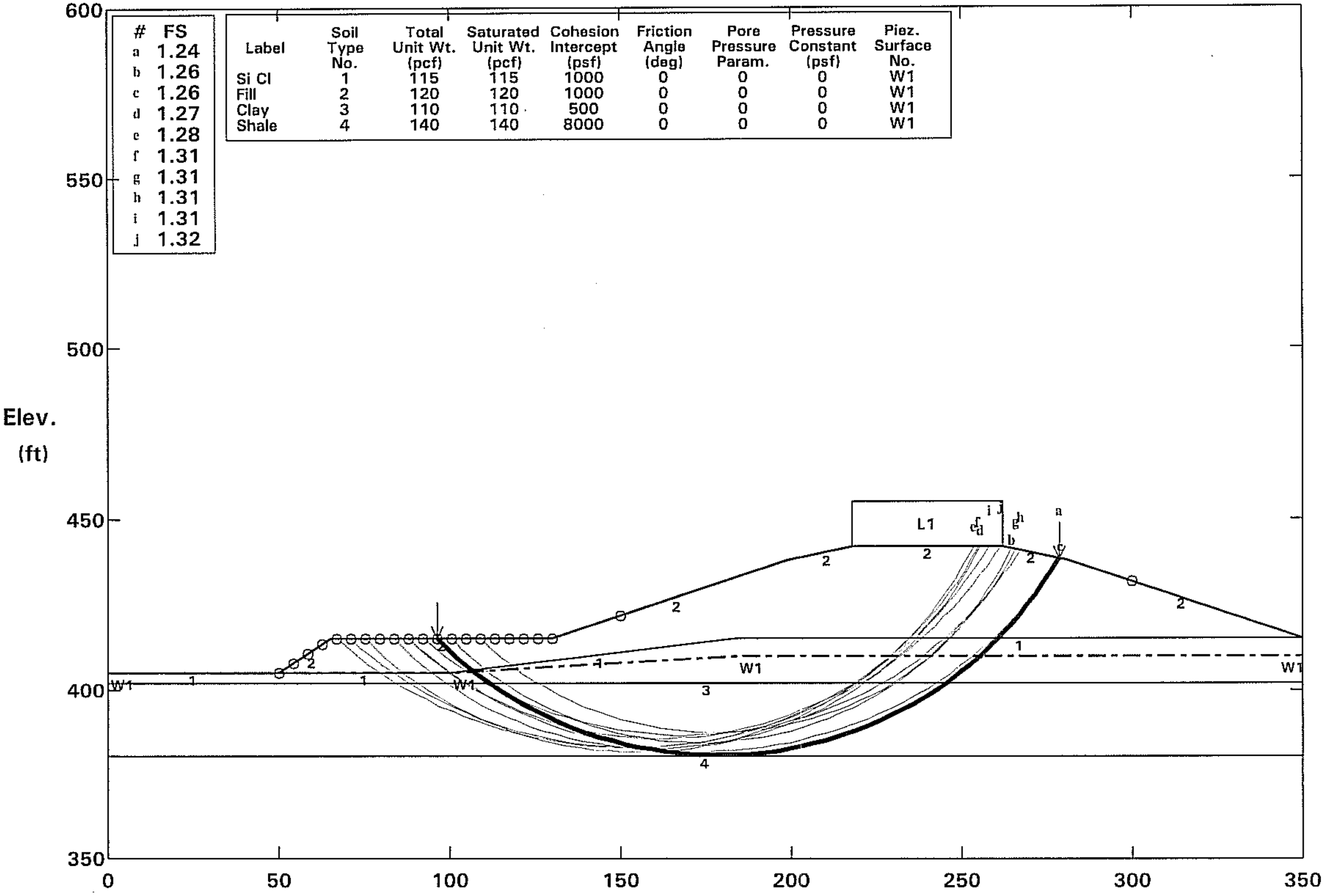
```
          Soil  Total  Saturated  Cohesion Friction    Pore    Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
           No.  (pcf)     (pcf)     (psf)     (deg)    Param.    (psf)    No.

            1   115.0     115.0    1000.0       .0      .00        .0      1
            2   120.0     120.0    1000.0       .0      .00        .0      1
            3   110.0     110.0     500.0       .0      .00        .0      1
            4   140.0     140.0    8000.0       .0      .00        .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  4 Coordinate Points


            Point       X-Water     Y-Water
             No.          (ft)        (ft)

              1            .00        55.00
              2         100.00        55.00
              3         184.00        60.00
              4         350.00        60.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

             1 Load(s) Specified


          Load        X-Left       X-Right      Intensity      Deflection
           No.         (ft)          (ft)       (lb/sqft)        (deg)


            1        218.00        262.00        200.0             .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  50.00 ft.
```

```
                                and   X = 130.00 ft.


          Each Surface Terminates Between   X = 150.00 ft.
                                     and   X = 300.00 ft.


          Unless Further Limitations Were Imposed, The Minimum Elevation
          At Which A Surface Extends Is  Y =   .00 ft.


           4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------

          Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Examined.  They Are Ordered - Most Critical
          First.


          * * Safety Factors Are Calculated By The Modified Bishop Method * *


          Failure Surface Specified By 55 Coordinate Points


            Point        X-Surf       Y-Surf
             No.          (ft)         (ft)

              1           96.32        65.00
              2           99.17        62.20
              3          102.12        59.49
              4          105.16        56.89
              5          108.28        54.40
              6          111.50        52.02
              7          114.79        49.75
              8          118.16        47.59
              9          121.60        45.56
             10          125.12        43.64
             11          128.69        41.85
             12          132.33        40.18
             13          136.02        38.64
             14          139.76        37.23
             15          143.55        35.95
             16          147.38        34.80
             17          151.25        33.79
             18          155.16        32.91
             19          159.09        32.17
             20          163.04        31.56
             21          167.01        31.09
             22          171.00        30.76
             23          174.99        30.57
             24          178.99        30.52
             25          182.99        30.61
             26          186.99        30.83
             27          190.97        31.19
             28          194.94        31.69
```

```
      29          198.89         32.33
      30          202.81         33.11
      31          206.71         34.02
      32          210.57         35.07
      33          214.39         36.25
      34          218.17         37.56
      35          221.90         39.00
      36          225.58         40.57
      37          229.20         42.27
      38          232.76         44.09
      39          236.26         46.03
      40          239.68         48.10
      41          243.04         50.28
      42          246.31         52.57
      43          249.50         54.98
      44          252.61         57.50
      45          255.63         60.13
      46          258.55         62.86
      47          261.38         65.68
      48          264.11         68.61
      49          266.74         71.63
      50          269.26         74.73
      51          271.67         77.93
      52          273.96         81.20
      53          276.15         84.55
      54          278.21         87.98
      55          278.51         88.52

  Circle Center At X =  178.5 ; Y =  145.7  and Radius,  115.2


        ***      1.240    ***


  Failure Surface Specified By 50 Coordinate Points


     Point        X-Surf        Y-Surf
      No.          (ft)          (ft)

       1          100.53         65.00
       2          103.37         62.19
       3          106.32         59.48
       4          109.37         56.90
       5          112.53         54.44
       6          115.78         52.11
       7          119.12         49.91
       8          122.54         47.84
       9          126.04         45.90
      10          129.62         44.11
      11          133.26         42.46
      12          136.96         40.95
      13          140.73         39.59
      14          144.54         38.38
      15          148.40         37.32
      16          152.29         36.42
      17          156.22         35.66
```

Proposed I-69 Project Station 244+50 Line "D" - Undrained Cond

Ten Most Critical. C:I69DB.PLT By: Shawn Marcum 04-10-07 11:20am



#	FS
a	1.24
b	1.26
c	1.26
d	1.27
e	1.28
f	1.31
g	1.31
h	1.31
i	1.31
j	1.32

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

STABL6H FSmin = 1.24 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                          ** STABL6H  **
                               by
                        Purdue University
--------------------------------------------------------------------------------

                    --Slope Stability Analysis--
                 Simplified Janbu, Simplified Bishop
                    or Spencer`s Method of Slices


      Run Date:                  04-10-07
      Time of Run:               5:06pm
      Run By:                    Shawn Marcum
      Input Data Filename:       C:I69DBE
      Output Filename:           C:I69DBE.OUT
      Plotted Output Filename:   C:I69DBE.PLT



      PROBLEM DESCRIPTION    Proposed I-69 Project
                             Station 244+50 Line "D" - Earthquake
```

3H to 1V with toe berm

```
      BOUNDARY COORDINATES
           NOTE:  User defined origin was specified.
           Add 00.00 to X values and 350.00 to Y values listed.

            8 Top   Boundaries
           13 Total Boundaries

      Boundary      X-Left     Y-Left     X-Right     Y-Right    Soil Type
         No.         (ft)       (ft)       (ft)        (ft)      Below Bnd

          1           .00      55.00       50.00       55.00         1
          2         50.00      55.00       65.00       65.00         1
          3         65.00      65.00      130.00       65.00         1
          4        130.00      65.00      199.00       88.00         2
          5        199.00      88.00      218.00       92.00         2
          6        218.00      92.00      262.00       92.00         2
          7        262.00      92.00      281.00       88.00         2
          8        281.00      88.00      350.00       65.00         2
          9         50.00      55.00      100.00       55.00         1
         10        100.00      55.00      184.00       65.00         1
         11        184.00      65.00      350.00       65.00         1
         12           .00      52.00      350.00       52.00         3
         13           .00      30.00      350.00       30.00         4
--------------------------------------------------------------------------------


     ISOTROPIC SOIL PARAMETERS


      4 Type(s) of Soil
```

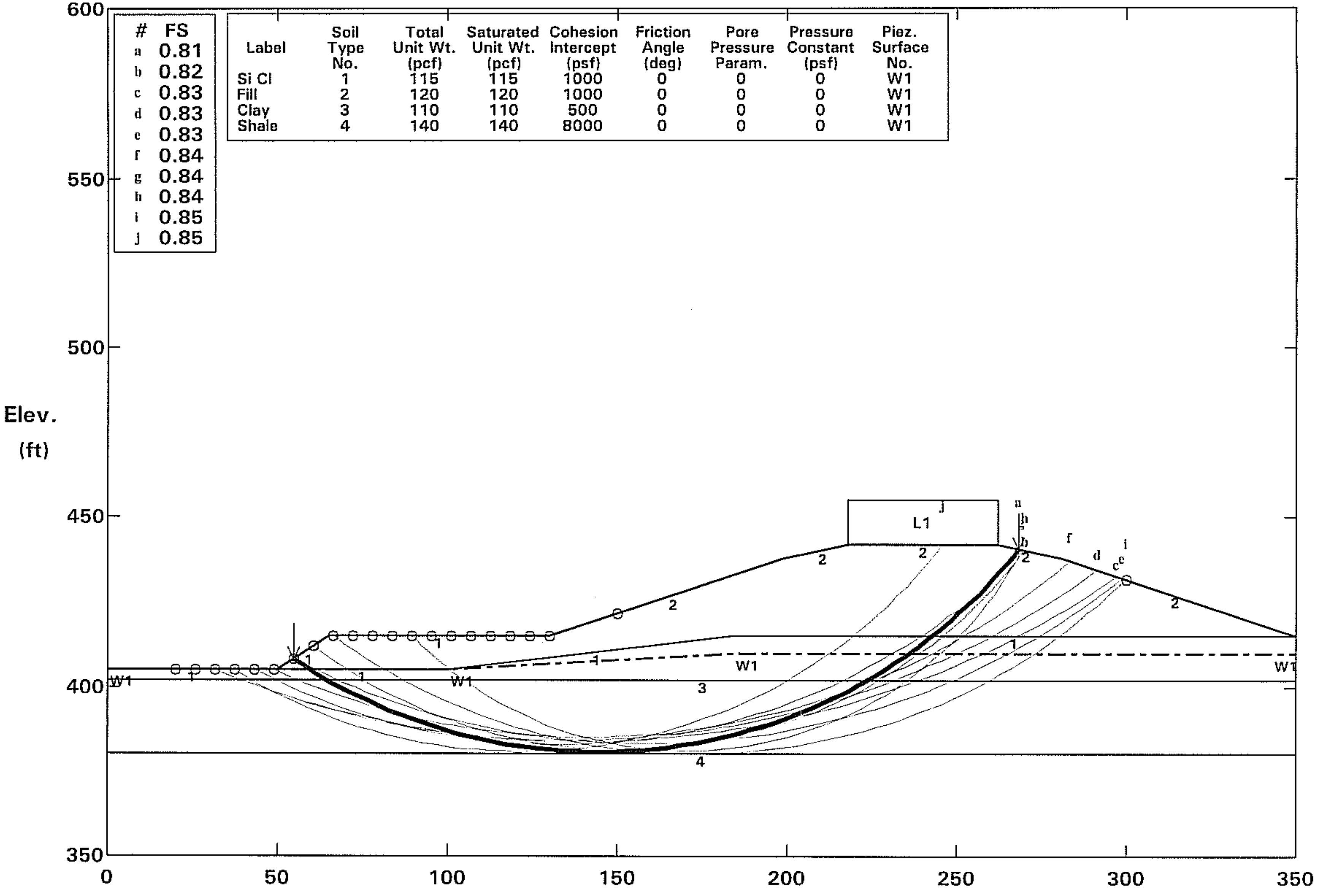
```
          Soil   Total  Saturated  Cohesion Friction   Pore    Pressure   Piez.
          Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
           No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.

            1   115.0    115.0    1000.0       .0      .00        .0      1
            2   120.0    120.0    1000.0       .0      .00        .0      1
            3   110.0    110.0     500.0       .0      .00        .0      1
            4   140.0    140.0    8000.0       .0      .00        .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  4 Coordinate Points


            Point      X-Water     Y-Water
             No.         (ft)        (ft)

              1            .00        55.00
              2         100.00        55.00
              3         184.00        60.00
              4         350.00        60.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

             1 Load(s) Specified


          Load        X-Left       X-Right      Intensity     Deflection
           No.         (ft)          (ft)       (lb/sqft)        (deg)


            1         218.00       262.00        200.0             .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.


          A Horizontal Earthquake Loading Coefficient
          Of .100 Has Been Assigned

          A Vertical Earthquake Loading Coefficient
          Of .000 Has Been Assigned

          Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------
```

```
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.


400 Trial Surfaces Have Been Generated.


 20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between  X =  20.00 ft.
                             and  X = 130.00 ft.


Each Surface Terminates Between   X = 150.00 ft.
                            and   X = 300.00 ft.


Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =   .00 ft.


 4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined.  They Are Ordered - Most Critical
First.


* * Safety Factors Are Calculated By The Modified Bishop Method * *


Failure Surface Specified By 61 Coordinate Points


  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)

    1         54.74        58.16
    2         58.07        55.95
    3         61.47        53.83
    4         64.91        51.80
    5         68.40        49.85
    6         71.95        47.99
    7         75.53        46.22
    8         79.16        44.54
    9         82.84        42.96
   10         86.55        41.46
   11         90.29        40.06
   12         94.08        38.76
   13         97.89        37.55
   14        101.73        36.44
   15        105.60        35.42
   16        109.49        34.50
   17        113.41        33.69
   18        117.34        32.96
```

```
     19          121.29          32.34
     20          125.26          31.82
     21          129.24          31.40
     22          133.22          31.08
     23          137.22          30.86
     24          141.22          30.74
     25          145.22          30.72
     26          149.22          30.80
     27          153.21          30.98
     28          157.20          31.26
     29          161.18          31.64
     30          165.15          32.13
     31          169.11          32.71
     32          173.05          33.39
     33          176.98          34.17
     34          180.88          35.05
     35          184.76          36.03
     36          188.61          37.10
     37          192.43          38.28
     38          196.23          39.54
     39          199.99          40.91
     40          203.71          42.36
     41          207.40          43.91
     42          211.05          45.56
     43          214.65          47.29
     44          218.21          49.11
     45          221.73          51.03
     46          225.19          53.03
     47          228.60          55.11
     48          231.96          57.29
     49          235.26          59.54
     50          238.51          61.88
     51          241.69          64.30
     52          244.82          66.80
     53          247.88          69.38
     54          250.87          72.03
     55          253.79          74.76
     56          256.65          77.56
     57          259.43          80.43
     58          262.15          83.37
     59          264.78          86.38
     60          267.34          89.45
     61          268.31          90.67

Circle Center At X =  144.0 ; Y =  189.6  and Radius,  158.9


      ***        .808    ***


Failure Surface Specified By 63 Coordinate Points


    Point        X-Surf        Y-Surf
     No.          (ft)          (ft)

      1           43.16         55.00
```

Proposed I-69 Project Station 244+50 Line "D" - Earthquake

Ten Most Critical. C:I69DBE.PLT By: Shawn Marcum 04-10-07 5:06pm



#	FS
a	0.81
b	0.82
c	0.83
d	0.83
e	0.83
f	0.84
g	0.84
h	0.84
i	0.85
j	0.85

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Clay	3	110	110	500	0	0	0	W1
Shale	4	140	140	8000	0	0	0	W1

STABL6H FSmin = 0.81 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                              ** STABL6H  **
                                   by
                            Purdue University
--------------------------------------------------------------------------------

                        --Slope Stability Analysis--
                     Simplified Janbu, Simplified Bishop
                        or Spencer`s Method of Slices


         Run Date:                   04-10-07
         Time of Run:                10:51am
         Run By:                     Shawn Marcum
         Input Data Filename:        C:I69A
         Output Filename:            C:I69A.OUT
         Plotted Output Filename:    C:I69A.PLT



         PROBLEM DESCRIPTION    Proposed I-69 Project
                                Station 247+50 Line "D" - Undrained Cond



         BOUNDARY COORDINATES
              NOTE:  User defined origin was specified.
              Add 00.00 to X values and 340.00 to Y values listed.

             6 Top   Boundaries
             8 Total Boundaries

         Boundary     X-Left     Y-Left     X-Right     Y-Right    Soil Type
            No.        (ft)       (ft)       (ft)        (ft)      Below Bnd

            1            .00      72.00      100.00       72.00        1
            2         100.00      72.00      189.00       99.00        2
            3         189.00      99.00      208.00      102.00        2
            4         208.00     102.00      252.00      102.00        2
            5         252.00     102.00      271.00       99.00        2
            6         271.00      99.00      353.00       72.00        2
            7         100.00      72.00      353.00       72.00        1
            8            .00      52.00      353.00       52.00        3
--------------------------------------------------------------------------------


        ISOTROPIC SOIL PARAMETERS


          3 Type(s) of Soil


         Soil  Total   Saturated  Cohesion Friction   Pore   Pressure   Piez.
         Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant  Surface
          No.  (pcf)     (pcf)     (psf)    (deg)    Param.   (psf)     No.
```

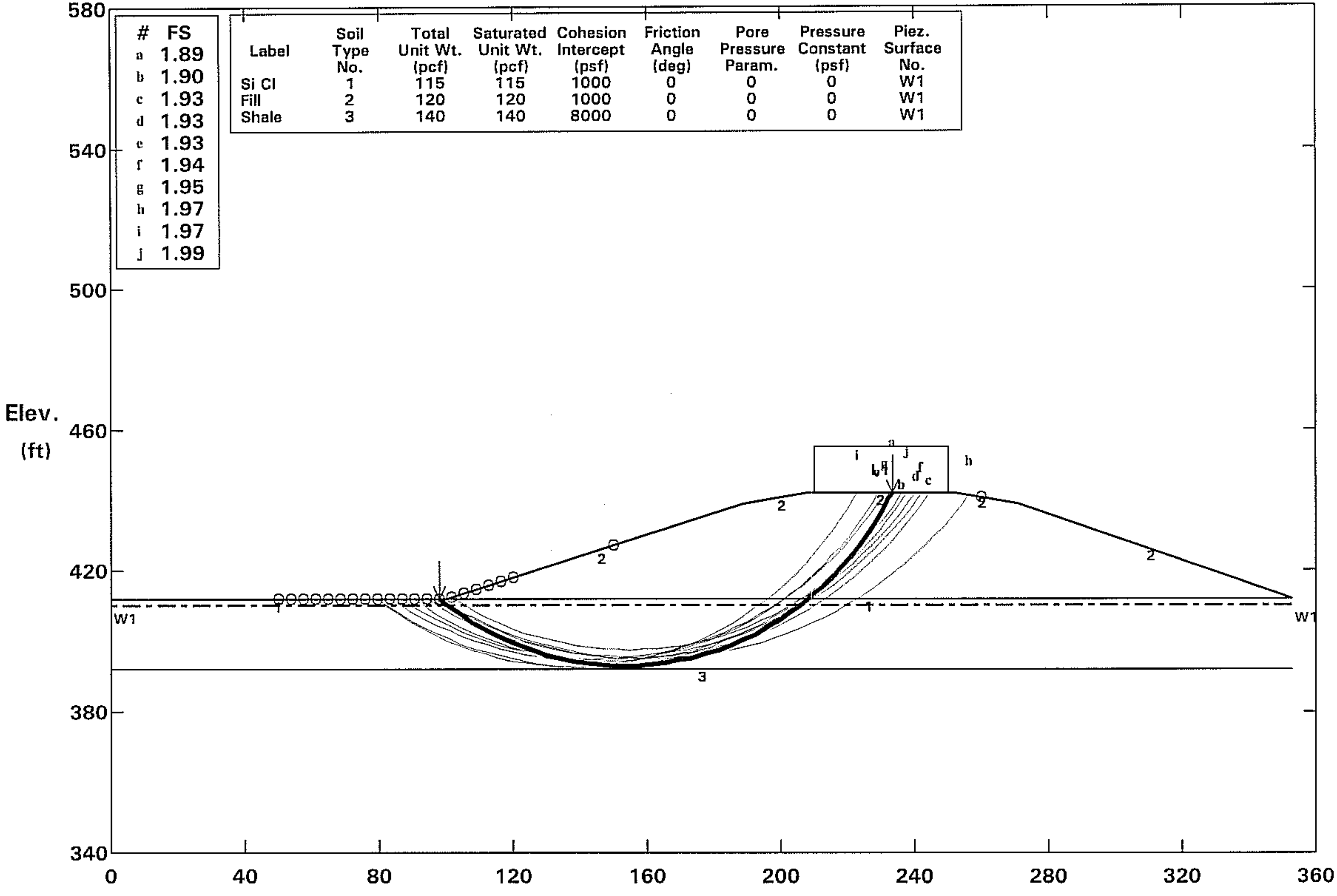
```
   1   115.0    115.0    1000.0        .0      .00          .0      1
   2   120.0    120.0    1000.0        .0      .00          .0      1
   3   140.0    140.0    8000.0        .0      .00          .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  2 Coordinate Points


            Point        X-Water     Y-Water
             No.           (ft)        (ft)

              1             .00       70.00
              2          353.00       70.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

             1 Load(s) Specified


          Load         X-Left       X-Right      Intensity     Deflection
           No.          (ft)          (ft)       (lb/sqft)        (deg)


            1         210.00       250.00        200.0             .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  50.00 ft.
                                       and  X = 120.00 ft.


          Each Surface Terminates Between   X = 150.00 ft.
                                      and   X = 260.00 ft.


          Unless Further Limitations Were Imposed, The Minimum Elevation
```

```
          At Which A Surface Extends Is  Y =   .00 ft.

           4.00 ft. Line Segments Define Each Trial Failure Surface.

--------------------------------------------------------------------------

          Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Examined.  They Are Ordered - Most Critical
          First.

          * * Safety Factors Are Calculated By The Modified Bishop Method * *

          Failure Surface Specified By 41 Coordinate Points

            Point        X-Surf       Y-Surf
             No.          (ft)         (ft)

              1           97.90        72.00
              2          101.11        69.62
              3          104.42        67.38
              4          107.83        65.29
              5          111.33        63.35
              6          114.92        61.57
              7          118.57        59.95
              8          122.30        58.50
              9          126.09        57.21
             10          129.93        56.09
             11          133.81        55.15
             12          137.74        54.37
             13          141.69        53.78
             14          145.67        53.35
             15          149.66        53.11
             16          153.66        53.04
             17          157.66        53.15
             18          161.65        53.44
             19          165.62        53.90
             20          169.57        54.54
             21          173.49        55.36
             22          177.36        56.34
             23          181.19        57.50
             24          184.97        58.83
             25          188.68        60.32
             26          192.32        61.98
             27          195.88        63.80
             28          199.36        65.77
             29          202.75        67.90
             30          206.04        70.17
             31          209.23        72.59
             32          212.30        75.15
             33          215.26        77.84
             34          218.10        80.66
             35          220.81        83.60
             36          223.38        86.66
```

```
    37          225.82        89.83
    38          228.12        93.11
    39          230.26        96.48
    40          232.26        99.95
    41          233.32       102.00

Circle Center At X =  153.2 ; Y =  143.1  and Radius,   90.1


      ***      1.889   ***



Failure Surface Specified By 46 Coordinate Points


   Point        X-Surf        Y-Surf
    No.          (ft)          (ft)

     1           79.47         72.00
     2           82.82         69.81
     3           86.25         67.75
     4           89.75         65.81
     5           93.31         63.99
     6           96.94         62.30
     7          100.62         60.74
     8          104.35         59.31
     9          108.14         58.01
    10          111.97         56.85
    11          115.83         55.82
    12          119.73         54.94
    13          123.66         54.19
    14          127.61         53.58
    15          131.59         53.11
    16          135.57         52.78
    17          139.57         52.59
    18          143.57         52.55
    19          147.57         52.64
    20          151.56         52.88
    21          155.54         53.26
    22          159.51         53.78
    23          163.45         54.44
    24          167.37         55.24
    25          171.26         56.17
    26          175.11         57.25
    27          178.93         58.46
    28          182.69         59.80
    29          186.41         61.28
    30          190.08         62.88
    31          193.68         64.62
    32          197.22         66.48
    33          200.69         68.47
    34          204.09         70.58
    35          207.41         72.81
    36          210.65         75.15
    37          213.81         77.61
    38          216.88         80.17
    39          219.85         82.85
```

Proposed I-69 Project Station 247+50 Line "D" - Undrained Cond

Ten Most Critical. C:I69A.PLT By: Shawn Marcum 04-10-07 10:51am



#	FS
a	1.89
b	1.90
c	1.93
d	1.93
e	1.93
f	1.94
g	1.95
h	1.97
i	1.97
j	1.99

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Shale	3	140	140	8000	0	0	0	W1

STABL6H FSmin = 1.89 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

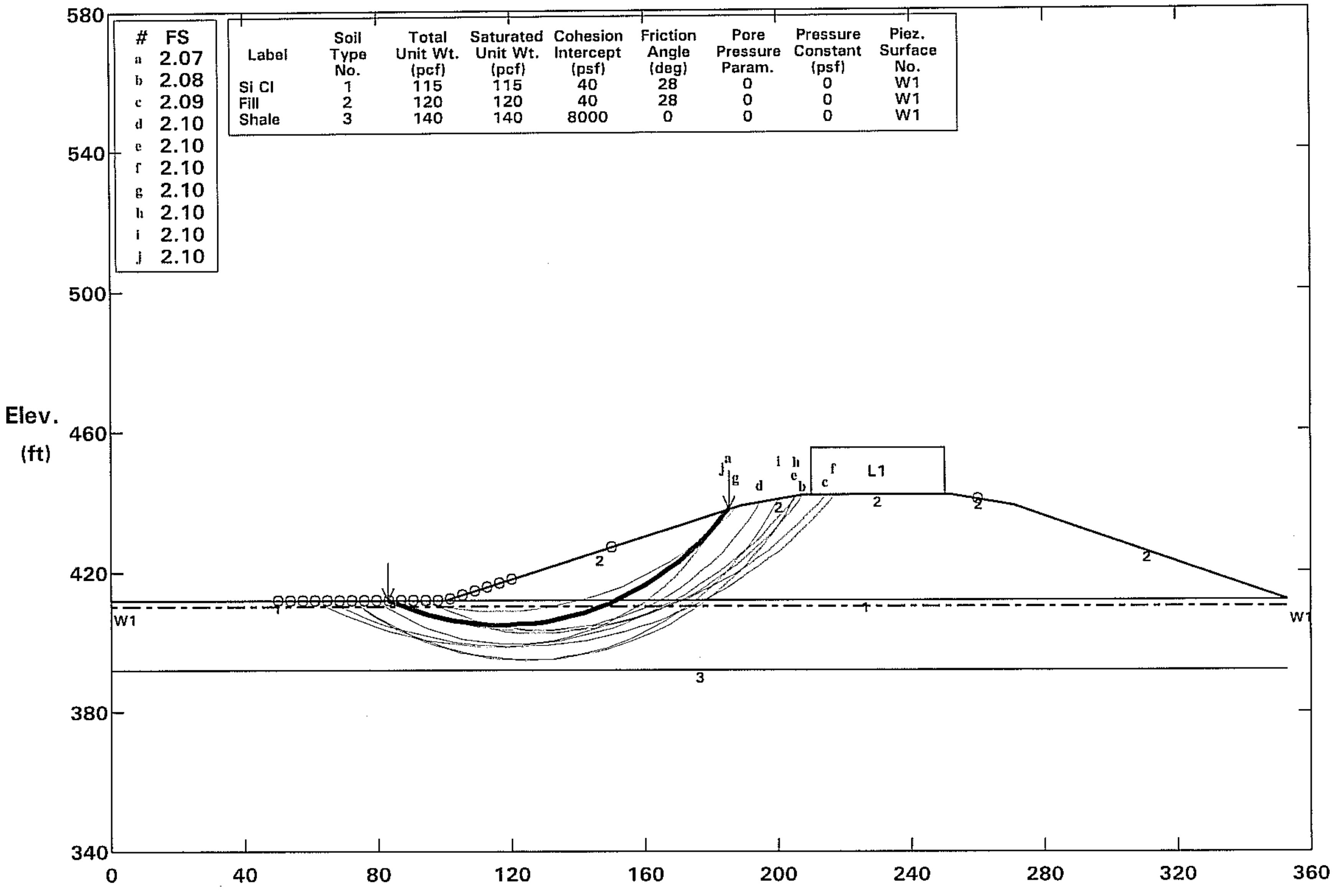
```
                              **  STABL6H  **
                                    by
                             Purdue University
--------------------------------------------------------------------------------

                         --Slope Stability Analysis--
                      Simplified Janbu, Simplified Bishop
                         or Spencer`s Method of Slices


          Run Date:                 04-10-07
          Time of Run:              10:53am
          Run By:                   Shawn Marcum
          Input Data Filename:      C:I69C
          Output Filename:          C:I69C.OUT
          Plotted Output Filename:  C:I69C.PLT



          PROBLEM DESCRIPTION   Proposed I-69 Project
                                Station 247+50 Line "D" - Drained Cond



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 340.00 to Y values listed.

              6 Top   Boundaries
              8 Total Boundaries

          Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
             No.        (ft)       (ft)       (ft)       (ft)     Below Bnd

              1            .00      72.00     100.00      72.00        1
              2         100.00      72.00     189.00      99.00        2
              3         189.00      99.00     208.00     102.00        2
              4         208.00     102.00     252.00     102.00        2
              5         252.00     102.00     271.00      99.00        2
              6         271.00      99.00     353.00      72.00        2
              7         100.00      72.00     353.00      72.00        1
              8            .00      52.00     353.00      52.00        3
--------------------------------------------------------------------------------

         ISOTROPIC SOIL PARAMETERS


           3 Type(s) of Soil


          Soil  Total   Saturated  Cohesion Friction   Pore    Pressure   Piez.
          Type Unit Wt. Unit Wt.  Intercept   Angle  Pressure Constant  Surface
           No.  (pcf)     (pcf)     (psf)     (deg)   Param.    (psf)     No.
```

```
            1   115.0    115.0      40.0     28.0     .00          .0      1
            2   120.0    120.0      40.0     28.0     .00          .0      1
            3   140.0    140.0    8000.0       .0     .00          .0      1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  2 Coordinate Points


            Point      X-Water     Y-Water
             No.         (ft)        (ft)

              1           .00       70.00
              2        353.00       70.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

              1 Load(s) Specified


          Load        X-Left      X-Right     Intensity     Deflection
           No.         (ft)         (ft)      (lb/sqft)       (deg)


            1         210.00       250.00       200.0            .0


          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  50.00 ft.
                                       and  X = 120.00 ft.


          Each Surface Terminates Between   X = 150.00 ft.
                                      and   X = 260.00 ft.


          Unless Further Limitations Were Imposed, The Minimum Elevation
```

```
         At Which A Surface Extends Is  Y =   .00 ft.

          4.00 ft. Line Segments Define Each Trial Failure Surface.

--------------------------------------------------------------------------------

         Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Examined.  They Are Ordered - Most Critical
         First.

         * * Safety Factors Are Calculated By The Modified Bishop Method * *

         Failure Surface Specified By 30 Coordinate Points

           Point        X-Surf       Y-Surf
            No.          (ft)         (ft)

             1           83.16        72.00
             2           86.87        70.50
             3           90.64        69.18
             4           94.48        68.04
             5           98.36        67.07
             6          102.28        66.28
             7          106.23        65.68
             8          110.21        65.25
             9          114.20        65.02
            10          118.20        64.97
            11          122.20        65.10
            12          126.19        65.42
            13          130.16        65.92
            14          134.10        66.60
            15          138.00        67.47
            16          141.86        68.52
            17          145.67        69.74
            18          149.42        71.14
            19          153.10        72.71
            20          156.70        74.45
            21          160.22        76.36
            22          163.64        78.42
            23          166.97        80.64
            24          170.19        83.01
            25          173.30        85.53
            26          176.28        88.19
            27          179.14        90.99
            28          181.87        93.91
            29          184.46        96.96
            30          185.13        97.83

         Circle Center At X =  117.3 ; Y =  151.4  and Radius,   86.4

               ***     2.073   ***
```

Proposed I-69 Project Station 247 + 50 Line "D" - Drained Cond

Ten Most Critical. C:I69C.PLT By: Shawn Marcum 04-10-07 10:53am



#	FS
a	2.07
b	2.08
c	2.09
d	2.10
e	2.10
f	2.10
g	2.10
h	2.10
i	2.10
j	2.10

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	40	28	0	0	W1
Fill	2	120	120	40	28	0	0	W1
Shale	3	140	140	8000	0	0	0	W1

STABL6H FSmin = 2.07 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                          ** STABL6H  **
                                by
                         Purdue University
--------------------------------------------------------------------------------

                     --Slope Stability Analysis--
                  Simplified Janbu, Simplified Bishop
                     or Spencer`s Method of Slices


         Run Date:                 04-10-07
         Time of Run:              10:52am
         Run By:                   Shawn Marcum
         Input Data Filename:      C:I69B
         Output Filename:          C:I69B.OUT
         Plotted Output Filename:  C:I69B.PLT




         PROBLEM DESCRIPTION    Proposed I-69 Project
                                Station 247+50 Line "D" - Earthquake




         BOUNDARY COORDINATES
              NOTE:  User defined origin was specified.
              Add 00.00 to X values and 340.00 to Y values listed.

             6 Top   Boundaries
             8 Total Boundaries

         Boundary      X-Left      Y-Left      X-Right     Y-Right     Soil Type
            No.         (ft)        (ft)         (ft)        (ft)      Below Bnd

             1           .00       72.00       100.00       72.00          1
             2        100.00       72.00       189.00       99.00          2
             3        189.00       99.00       208.00      102.00          2
             4        208.00      102.00       252.00      102.00          2
             5        252.00      102.00       271.00       99.00          2
             6        271.00       99.00       353.00       72.00          2
             7        100.00       72.00       353.00       72.00          1
             8           .00       52.00       353.00       52.00          3
--------------------------------------------------------------------------------


        ISOTROPIC SOIL PARAMETERS


          3 Type(s) of Soil


         Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
         Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
          No.  (pcf)     (pcf)     (psf)    (deg)   Param.    (psf)     No.
```

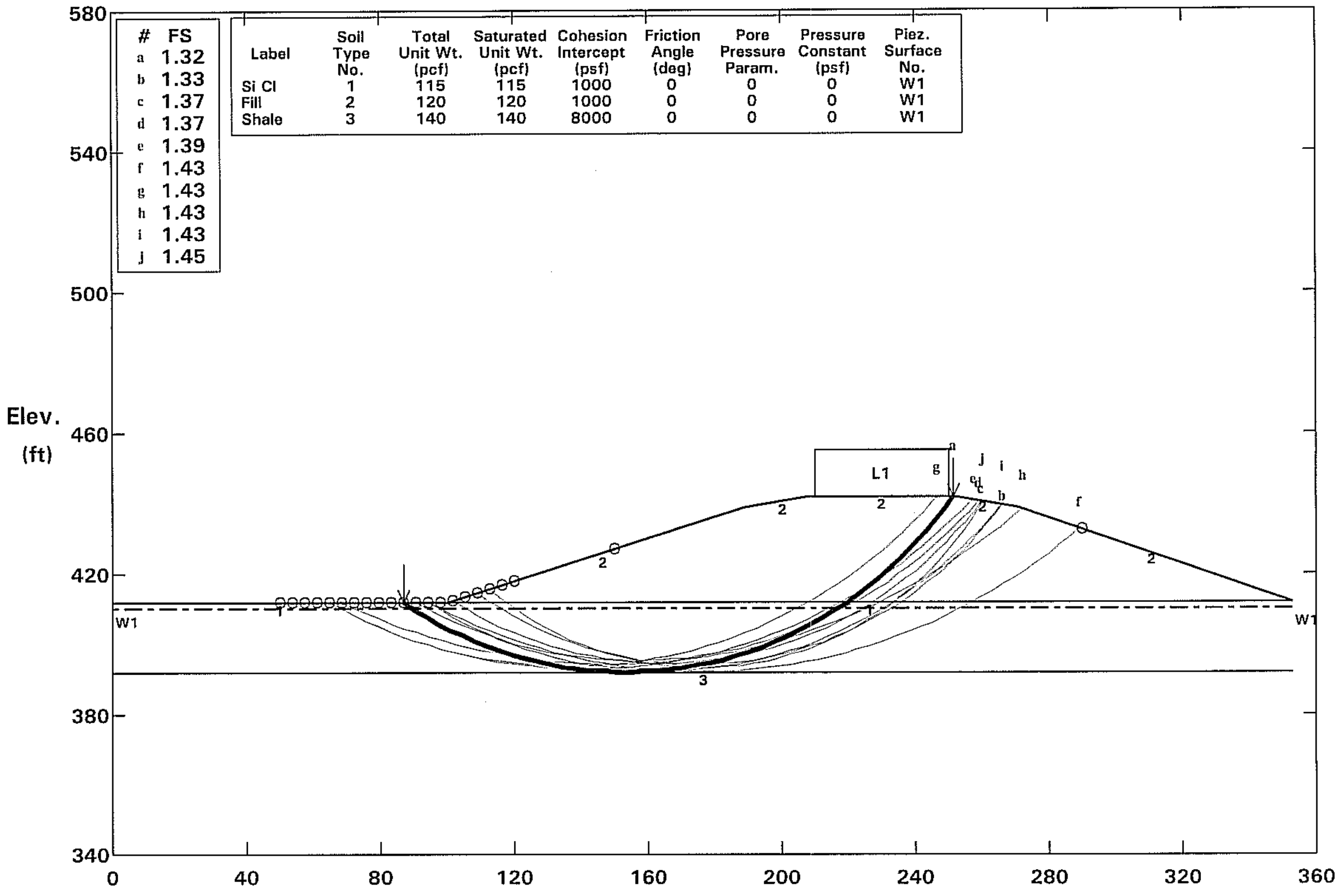
```
     1   115.0    115.0    1000.0        .0      .00          .0       1
     2   120.0    120.0    1000.0        .0      .00          .0       1
     3   140.0    140.0    8000.0        .0      .00          .0       1
--------------------------------------------------------------------------------


          1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


          Unit Weight of Water =  62.40


          Piezometric Surface No.  1 Specified by  2 Coordinate Points

            Point       X-Water      Y-Water
             No.          (ft)         (ft)

              1            .00        70.00
              2         353.00        70.00
--------------------------------------------------------------------------------


         BOUNDARY LOAD(S)

              1 Load(s) Specified

          Load          X-Left       X-Right      Intensity      Deflection
           No.           (ft)          (ft)       (lb/sqft)         (deg)


            1          210.00        250.00         200.0             .0

          NOTE - Intensity Is Specified As A Uniformly Distributed
                 Force Acting On A Horizontally Projected Surface.


          A Horizontal Earthquake Loading Coefficient
          Of .100 Has Been Assigned

          A Vertical Earthquake Loading Coefficient
          Of .000 Has Been Assigned

          Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.
```

```
  20 Surfaces Initiate From Each Of 20 Points Equally Spaced
 Along The Ground Surface Between   X =  50.00 ft.
                             and    X = 120.00 ft.


 Each Surface Terminates Between    X = 150.00 ft.
                             and    X = 290.00 ft.


 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =    .00 ft.


  4.00 ft. Line Segments Define Each Trial Failure Surface.

--------------------------------------------------------------------------------

 Following Are Displayed The Ten Most Critical Of The Trial
 Failure Surfaces Examined.  They Are Ordered - Most Critical
 First.


 * * Safety Factors Are Calculated By The Modified Bishop Method * *


 Failure Surface Specified By 48 Coordinate Points


   Point        X-Surf      Y-Surf
    No.          (ft)        (ft)

     1          86.84       72.00
     2          90.23       69.87
     3          93.68       67.85
     4          97.20       65.94
     5         100.77       64.15
     6         104.41       62.48
     7         108.10       60.93
     8         111.83       59.50
     9         115.61       58.20
    10         119.44       57.02
    11         123.30       55.97
    12         127.19       55.05
    13         131.11       54.25
    14         135.05       53.58
    15         139.01       53.05
    16         142.99       52.64
    17         146.98       52.37
    18         150.98       52.22
    19         154.98       52.21
    20         158.98       52.33
    21         162.97       52.58
    22         166.95       52.97
    23         170.92       53.48
    24         174.87       54.13
    25         178.79       54.90
    26         182.69       55.80
```

```
     27          186.55        56.83
     28          190.38        57.99
     29          194.17        59.27
     30          197.92        60.68
     31          201.61        62.21
     32          205.26        63.86
     33          208.84        65.63
     34          212.37        67.51
     35          215.84        69.51
     36          219.23        71.63
     37          222.56        73.85
     38          225.81        76.19
     39          228.98        78.62
     40          232.06        81.17
     41          235.07        83.81
     42          237.98        86.55
     43          240.81        89.38
     44          243.53        92.31
     45          246.17        95.32
     46          248.70        98.42
     47          251.12       101.60
     48          251.41       102.00

Circle Center At X =  153.3 ; Y =  173.7  and Radius,  121.5


      ***      1.319    ***


Failure Surface Specified By 49 Coordinate Points


   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)

      1           94.21        72.00
      2           97.66        69.98
      3          101.17        68.06
      4          104.74        66.24
      5          108.35        64.54
      6          112.02        62.94
      7          115.73        61.45
      8          119.49        60.07
      9          123.28        58.81
     10          127.11        57.66
     11          130.98        56.62
     12          134.87        55.70
     13          138.79        54.89
     14          142.73        54.21
     15          146.69        53.64
     16          150.66        53.18
     17          154.65        52.85
     18          158.64        52.63
     19          162.64        52.54
     20          166.64        52.56
     21          170.64        52.70
     22          174.63        52.96
```

Proposed I-69 Project Station 247 + 50 Line "D" - Earthquake

Ten Most Critical. C:I69B.PLT By: Shawn Marcum 04-10-07 10:52am



#	FS
a	1.32
b	1.33
c	1.37
d	1.37
e	1.39
f	1.43
g	1.43
h	1.43
i	1.43
j	1.45

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Si Cl	1	115	115	1000	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
Shale	3	140	140	8000	0	0	0	W1

STABL6H FSmin = 1.32 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

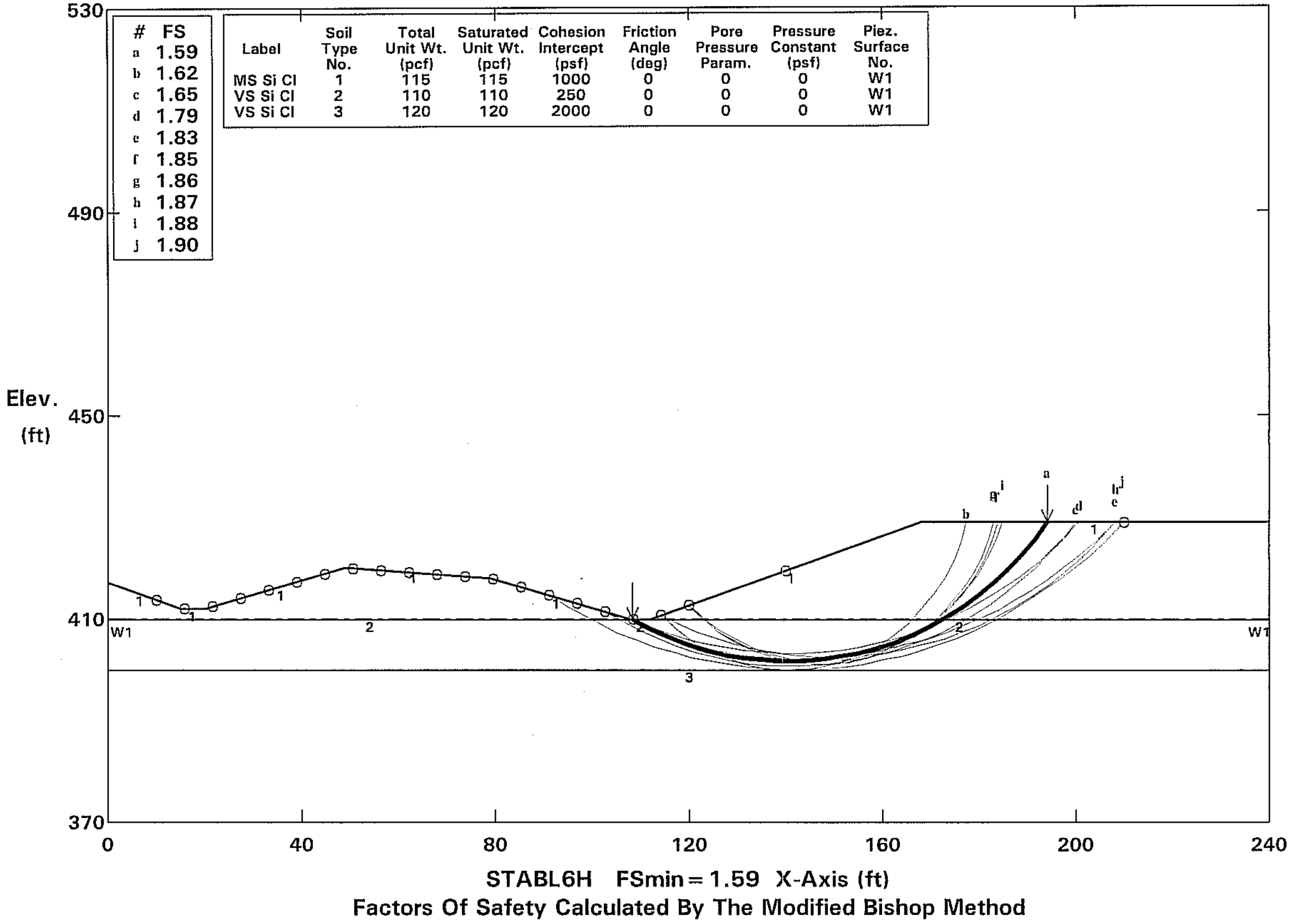
```
                              ** STABL6H  **
                                    by
                              Purdue University
--------------------------------------------------------------------------------

                         --Slope Stability Analysis--
                      Simplified Janbu, Simplified Bishop
                         or Spencer`s Method of Slices


          Run Date:                    04-09-07
          Time of Run:                 1:21pm
          Run By:                      Shawn Marcum
          Input Data Filename:         C:I69RPCU
          Output Filename:             C:I69RPCU.OUT
          Plotted Output Filename:     C:I69RPCU.PLT



          PROBLEM DESCRIPTION   Proposed I-69 Project
                                Station 17+00 Ramp C - Undrained Cond



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 370.00 to Y values listed.

              8 Top   Boundaries
             11 Total Boundaries

          Boundary      X-Left      Y-Left     X-Right     Y-Right    Soil Type
             No.         (ft)        (ft)        (ft)        (ft)     Below Bnd

              1            .00       47.00       15.00       42.00        1
              2          15.00       42.00       20.00       42.00        1
              3          20.00       42.00       49.00       50.00        1
              4          49.00       50.00       79.00       48.00        1
              5          79.00       48.00      108.00       40.00        1
              6         108.00       40.00      112.00       40.00        2
              7         112.00       40.00      168.00       59.00        1
              8         168.00       59.00      240.00       59.00        1
              9            .00       40.00      108.00       40.00        2
             10         112.00       40.00      240.00       40.00        2
             11            .00       30.00      240.00       30.00        3
--------------------------------------------------------------------------------

         ISOTROPIC SOIL PARAMETERS


           3 Type(s) of Soil


          Soil   Total   Saturated  Cohesion Friction    Pore    Pressure    Piez.
```

```
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)    (psf)      (deg)   Param.    (psf)    No.

  1   115.0    115.0    1000.0       .0      .00        .0      1
  2   110.0    110.0     250.0       .0      .00        .0      1
  3   120.0    120.0    2000.0       .0      .00        .0      1
--------------------------------------------------------------------------------


1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


Unit Weight of Water =  62.40


Piezometric Surface No.  1 Specified by  2 Coordinate Points


  Point       X-Water     Y-Water
   No.         (ft)        (ft)

    1           .00        40.00
    2        240.00        40.00
--------------------------------------------------------------------------------


A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.


400 Trial Surfaces Have Been Generated.


 20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between  X =  10.00 ft.
                             and  X = 120.00 ft.


Each Surface Terminates Between   X = 140.00 ft.
                            and   X = 210.00 ft.


Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =   .00 ft.


 4.00 ft. Line Segments Define Each Trial Failure Surface.



The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.


Failure Surface Defined By 41 Coordinate Points
```

```
      23          142.49         49.54
      24          143.77         50.78



    Factor Of Safety For The Preceding Specified Surface =-16.886
------------------------------------------------------------------------------

    Following Are Displayed The Ten Most Critical Of The Trial
    Failure Surfaces Examined.  They Are Ordered - Most Critical
    First.


    * * Safety Factors Are Calculated By The Modified Bishop Method * *


    Failure Surface Specified By 25 Coordinate Points


      Point       X-Surf        Y-Surf
       No.         (ft)          (ft)

        1         108.42         40.00
        2         111.98         38.17
        3         115.64         36.57
        4         119.40         35.18
        5         123.23         34.03
        6         127.12         33.10
        7         131.06         32.41
        8         135.03         31.97
        9         139.03         31.76
       10         143.03         31.79
       11         147.02         32.06
       12         150.98         32.57
       13         154.91         33.32
       14         158.79         34.31
       15         162.60         35.53
       16         166.33         36.97
       17         169.97         38.64
       18         173.50         40.52
       19         176.91         42.61
       20         180.18         44.91
       21         183.32         47.39
       22         186.29         50.06
       23         189.11         52.91
       24         191.74         55.92
       25         194.13         59.00

    Circle Center At X =  140.5 ; Y =   98.1  and Radius,   66.4


          ***      1.590    ***



    Failure Surface Specified By 21 Coordinate Points
```

Proposed I-69 Project Station 17 + 00 Ramp C - Undrained Cond

Ten Most Critical. C:I69RPCU.PLT By: Shawn Marcum 04-09-07 1:21pm



#	FS
a	1.59
b	1.62
c	1.65
d	1.79
e	1.83
f	1.85
g	1.86
h	1.87
i	1.88
j	1.90

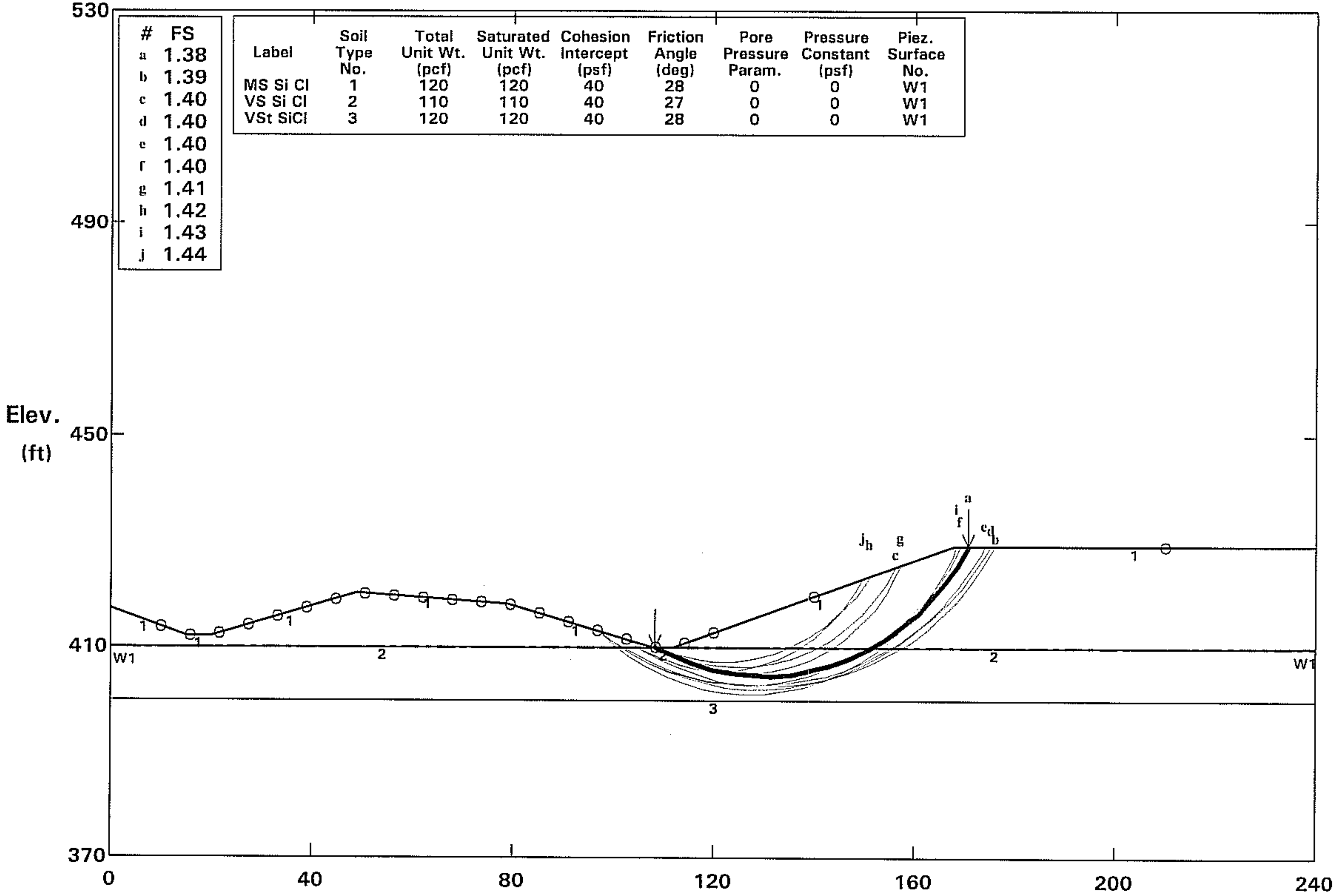
Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
MS Si Cl	1	115	115	1000	0	0	0	W1
VS Si Cl	2	110	110	250	0	0	0	W1
VS Si Cl	3	120	120	2000	0	0	0	W1

```
                          ** STABL6H  **
                               by
                        Purdue University
----------------------------------------------------------------------------

                  --Slope Stability Analysis--
               Simplified Janbu, Simplified Bishop
                  or Spencer`s Method of Slices


       Run Date:                     04-10-07
       Time of Run:                  10:28am
       Run By:                       Shawn Marcum
       Input Data Filename:          C:I69RPCD
       Output Filename:              C:I69RPCD.OUT
       Plotted Output Filename:      C:I69RPCD.PLT



       PROBLEM DESCRIPTION    Proposed I-69 Project
                              Station 17+00 Ramp C - Drained Cond



       BOUNDARY COORDINATES
            NOTE:  User defined origin was specified.
            Add 00.00 to X values and 370.00 to Y values listed.

           8 Top   Boundaries
          11 Total Boundaries

       Boundary     X-Left      Y-Left     X-Right     Y-Right    Soil Type
         No.         (ft)        (ft)        (ft)        (ft)     Below Bnd

          1            .00       47.00       15.00       42.00        1
          2          15.00       42.00       20.00       42.00        1
          3          20.00       42.00       49.00       50.00        1
          4          49.00       50.00       79.00       48.00        1
          5          79.00       48.00      108.00       40.00        1
          6         108.00       40.00      112.00       40.00        2
          7         112.00       40.00      168.00       59.00        1
          8         168.00       59.00      240.00       59.00        1
          9            .00       40.00      108.00       40.00        2
         10         112.00       40.00      240.00       40.00        2
         11            .00       30.00      240.00       30.00        3
----------------------------------------------------------------------------

      ISOTROPIC SOIL PARAMETERS


        3 Type(s) of Soil


       Soil   Total  Saturated  Cohesion Friction    Pore    Pressure    Piez.
```

```
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.

   1   120.0    120.0      40.0      28.0     .00        .0       1
   2   110.0    110.0      40.0      27.0     .00        .0       1
   3   120.0    120.0      40.0      28.0     .00        .0       1
-------------------------------------------------------------------------------


 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


 Unit Weight of Water =  62.40


 Piezometric Surface No.  1 Specified by  2 Coordinate Points


   Point       X-Water      Y-Water
    No.          (ft)         (ft)

     1            .00        40.00
     2         240.00        40.00


 A Horizontal Earthquake Loading Coefficient
 Of .100 Has Been Assigned

 A Vertical Earthquake Loading Coefficient
 Of .000 Has Been Assigned

 Cavitation Pressure =       .0 psf
--------------------------------------------------------------------------------


 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.


 400 Trial Surfaces Have Been Generated.


  20 Surfaces Initiate From Each Of 20 Points Equally Spaced
 Along The Ground Surface Between  X =  10.00 ft.
                              and  X = 120.00 ft.


 Each Surface Terminates Between   X = 140.00 ft.
                             and   X = 210.00 ft.


 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =   .00 ft.


  4.00 ft. Line Segments Define Each Trial Failure Surface.
```

Proposed I-69 Project Station 17+00 Ramp C - Drained Cond

Ten Most Critical. C:I69RPCD.PLT By: Shawn Marcum 04-10-07 10:28am



#	FS
a	1.38
b	1.39
c	1.40
d	1.40
e	1.40
f	1.40
g	1.41
h	1.42
i	1.43
j	1.44

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
MS Si Cl	1	120	120	40	28	0	0	W1
VS Si Cl	2	110	110	40	27	0	0	W1
VSt SiCl	3	120	120	40	28	0	0	W1

STABL6H FSmin = 1.38 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

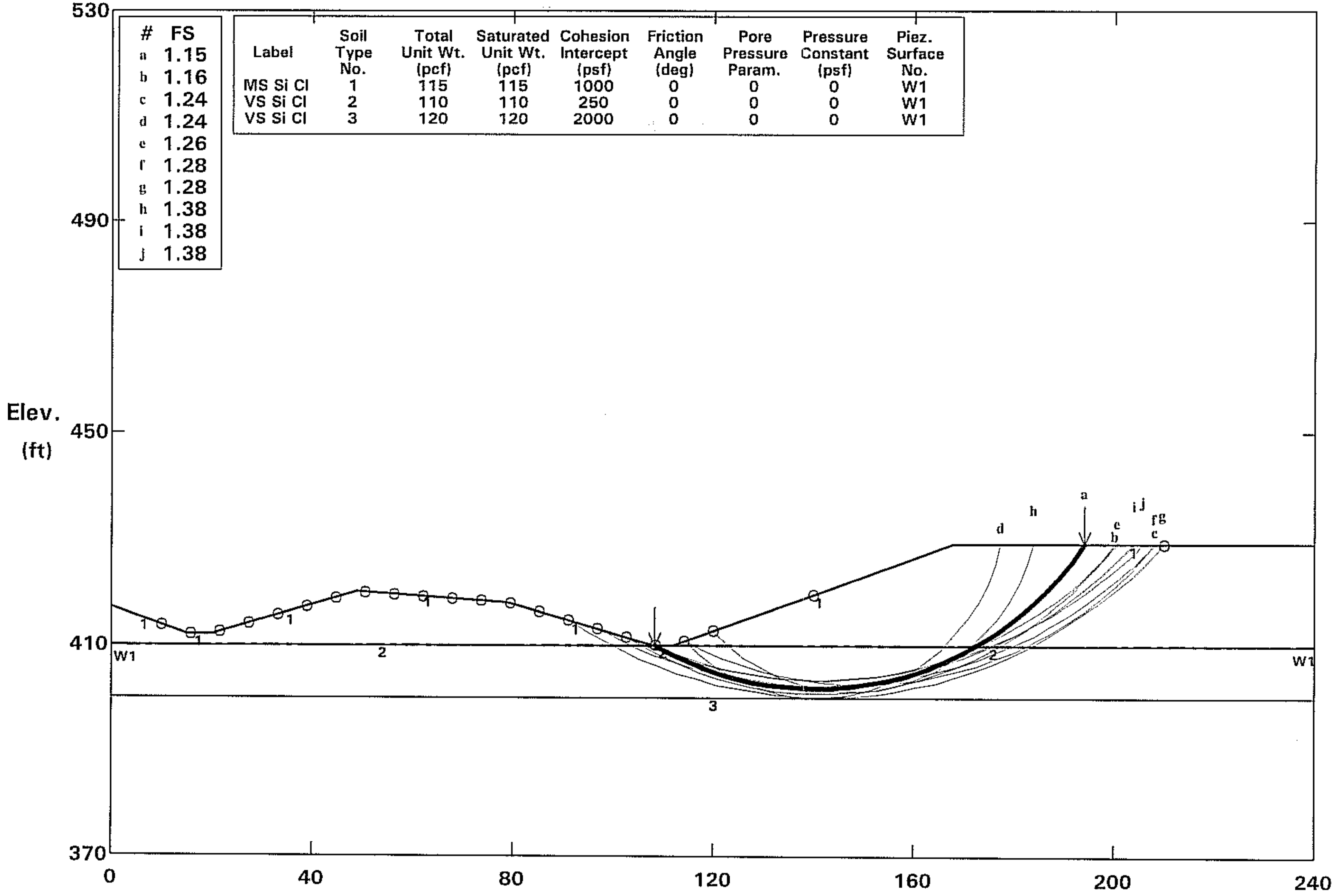
```
                         ** STABL6H  **
                              by
                       Purdue University
--------------------------------------------------------------------------------

                   --Slope Stability Analysis--
                Simplified Janbu, Simplified Bishop
                   or Spencer`s Method of Slices


          Run Date:                    04-09-07
          Time of Run:                 2:03pm
          Run By:                      Shawn Marcum
          Input Data Filename:         C:I69RPCE
          Output Filename:             C:I69RPCE.OUT
          Plotted Output Filename:     C:I69RPCE.PLT



          PROBLEM DESCRIPTION    Proposed I-69 Project
                                 Station 17+00 Ramp C - Earthquake Cond



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 370.00 to Y values listed.

              8 Top   Boundaries
             11 Total Boundaries

          Boundary     X-Left      Y-Left      X-Right     Y-Right     Soil Type
             No.        (ft)        (ft)        (ft)        (ft)       Below Bnd

              1          .00       47.00       15.00       42.00           1
              2        15.00       42.00       20.00       42.00           1
              3        20.00       42.00       49.00       50.00           1
              4        49.00       50.00       79.00       48.00           1
              5        79.00       48.00      108.00       40.00           1
              6       108.00       40.00      112.00       40.00           2
              7       112.00       40.00      168.00       59.00           1
              8       168.00       59.00      240.00       59.00           1
              9          .00       40.00      108.00       40.00           2
             10       112.00       40.00      240.00       40.00           2
             11          .00       30.00      240.00       30.00           3
--------------------------------------------------------------------------------


         ISOTROPIC SOIL PARAMETERS


           3 Type(s) of Soil


          Soil   Total   Saturated  Cohesion Friction    Pore    Pressure    Piez.
```

```
         Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
          No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)    No.

           1   115.0    115.0    1000.0       .0     .00        .0      1
           2   110.0    110.0     250.0       .0     .00        .0      1
           3   120.0    120.0    2000.0       .0     .00        .0      1
--------------------------------------------------------------------------------


         1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


         Unit Weight of Water =  62.40



         Piezometric Surface No.  1 Specified by  2 Coordinate Points


           Point       X-Water      Y-Water
            No.          (ft)         (ft)

             1            .00        40.00
             2         240.00        40.00



         A Horizontal Earthquake Loading Coefficient
         Of .100 Has Been Assigned

         A Vertical Earthquake Loading Coefficient
         Of .000 Has Been Assigned

         Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------


         A Critical Failure Surface Searching Method, Using A Random
         Technique For Generating Circular Surfaces, Has Been Specified.


         400 Trial Surfaces Have Been Generated.


          20 Surfaces Initiate From Each Of 20 Points Equally Spaced
         Along The Ground Surface Between  X =  10.00 ft.
                                     and  X = 120.00 ft.


         Each Surface Terminates Between   X = 140.00 ft.
                                    and   X = 210.00 ft.


         Unless Further Limitations Were Imposed, The Minimum Elevation
         At Which A Surface Extends Is  Y =   .00 ft.


          4.00 ft. Line Segments Define Each Trial Failure Surface.
```

```
--------------------------------------------------------------------------------

         Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Examined.  They Are Ordered - Most Critical
         First.


         * * Safety Factors Are Calculated By The Modified Bishop Method * *


         Failure Surface Specified By 25 Coordinate Points


           Point        X-Surf        Y-Surf
            No.          (ft)          (ft)

             1          108.42         40.00
             2          111.98         38.17
             3          115.64         36.57
             4          119.40         35.18
             5          123.23         34.03
             6          127.12         33.10
             7          131.06         32.41
             8          135.03         31.97
             9          139.03         31.76
            10          143.03         31.79
            11          147.02         32.06
            12          150.98         32.57
            13          154.91         33.32
            14          158.79         34.31
            15          162.60         35.53
            16          166.33         36.97
            17          169.97         38.64
            18          173.50         40.52
            19          176.91         42.61
            20          180.18         44.91
            21          183.32         47.39
            22          186.29         50.06
            23          189.11         52.91
            24          191.74         55.92
            25          194.13         59.00

         Circle Center At X =  140.5 ; Y =   98.1  and Radius,   66.4


               ***      1.150   ***



         Failure Surface Specified By 29 Coordinate Points


           Point        X-Surf        Y-Surf
            No.          (ft)          (ft)

             1          102.63         41.48
```

Proposed I-69 Project Station 17+00 Ramp C - Earthquake Cond

Ten Most Critical. C:I69RPCE.PLT By: Shawn Marcum 04-09-07 2:03pm



#	FS
a	1.15
b	1.16
c	1.24
d	1.24
e	1.26
f	1.28
g	1.28
h	1.38
i	1.38
j	1.38

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
MS Si Cl	1	115	115	1000	0	0	0	W1
VS Si Cl	2	110	110	250	0	0	0	W1
VS Si Cl	3	120	120	2000	0	0	0	W1

STABL6H FSmin = 1.15 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                              ** STABL6H  **
                                   by
                            Purdue University
--------------------------------------------------------------------------------

                       --Slope Stability Analysis--
                    Simplified Janbu, Simplified Bishop
                       or Spencer`s Method of Slices


           Run Date:                  04-09-07
           Time of Run:               2:28pm
           Run By:                    Shawn Marcum
           Input Data Filename:       C:I69RPDU
           Output Filename:           C:I69RPDU.OUT
           Plotted Output Filename:   C:I69RPDU.PLT



           PROBLEM DESCRIPTION    Proposed I-69 Project
                                  20+00 Ramp D - Undrained Cond



           BOUNDARY COORDINATES
                NOTE:  User defined origin was specified.
                Add 00.00 to X values and 350.00 to Y values listed.

              10 Top   Boundaries
              14 Total Boundaries

           Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
              No.        (ft)       (ft)        (ft)        (ft)      Below Bnd

               1          .00      68.00       74.00       66.00          1
               2        74.00      66.00       90.00       60.00          1
               3        90.00      60.00       94.00       60.00          1
               4        94.00      60.00      110.00       65.00          1
               5       110.00      65.00      145.00       77.00          2
               6       145.00      77.00      151.00       78.00          2
               7       151.00      78.00      181.00       76.00          2
               8       181.00      76.00      187.00       75.00          2
               9       187.00      75.00      230.00       64.00          2
              10       230.00      64.00      240.00       60.00          1
              11       110.00      65.00      230.00       64.00          1
              12          .00      57.00      240.00       57.00          3
              13          .00      50.00      240.00       50.00          4
              14          .00      40.00      240.00       40.00          5
--------------------------------------------------------------------------------


          ISOTROPIC SOIL PARAMETERS


            5 Type(s) of Soil
```

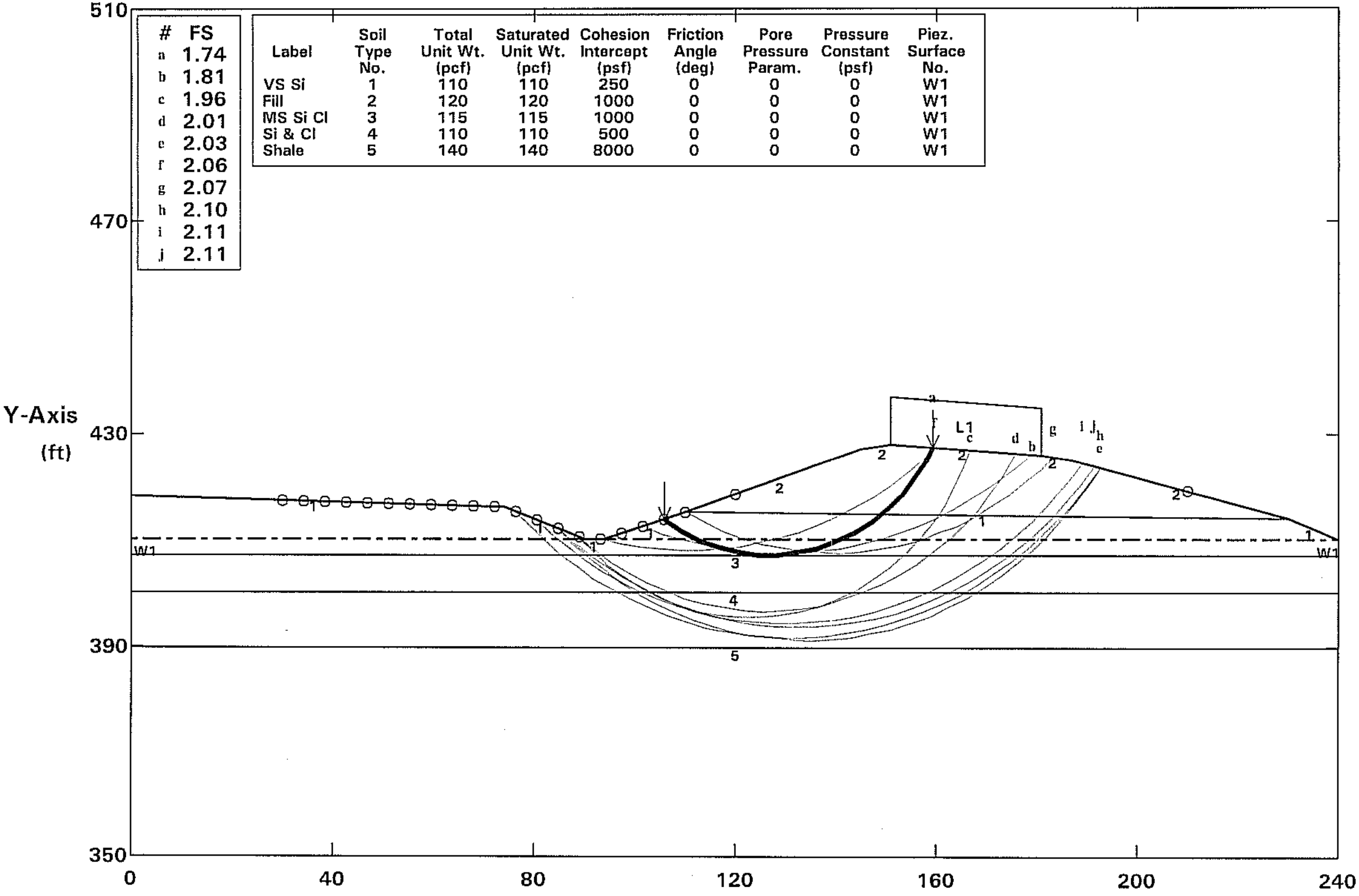
```
         Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
         Type Unit Wt. Unit Wt. Intercept  Angle  Pressure Constant Surface
          No.  (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)    No.

           1   110.0    110.0     250.0      .0      .00       .0      1
           2   120.0    120.0    1000.0      .0      .00       .0      1
           3   115.0    115.0    1000.0      .0      .00       .0      1
           4   110.0    110.0     500.0      .0      .00       .0      1
           5   140.0    140.0    8000.0      .0      .00       .0      1
--------------------------------------------------------------------------------


         1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


         Unit Weight of Water =  62.40


         Piezometric Surface No.  1 Specified by  2 Coordinate Points


           Point      X-Water     Y-Water
            No.         (ft)        (ft)

             1           .00       60.00
             2        240.00       60.00
--------------------------------------------------------------------------------


        BOUNDARY LOAD(S)

            1 Load(s) Specified

         Load         X-Left      X-Right     Intensity     Deflection
          No.          (ft)         (ft)      (lb/sqft)       (deg)


           1         151.00       181.00        200.0           .0


         NOTE - Intensity Is Specified As A Uniformly Distributed
                Force Acting On A Horizontally Projected Surface.
--------------------------------------------------------------------------------


         A Critical Failure Surface Searching Method, Using A Random
         Technique For Generating Circular Surfaces, Has Been Specified.


         400 Trial Surfaces Have Been Generated.


          20 Surfaces Initiate From Each Of 20 Points Equally Spaced
         Along The Ground Surface Between  X =   30.00 ft.
```

```
      Point        X-Surf        Y-Surf
       No.          (ft)          (ft)


        1           51.05         66.62
        2           54.66         64.90
        3           58.36         63.37
        4           62.13         62.04
        5           65.97         60.91
        6           69.86         59.99
        7           73.80         59.28
        8           77.77         58.77
        9           81.76         58.48
       10           85.75         58.40
       11           89.75         58.53
       12           93.74         58.88
       13           97.70         59.43
       14          101.62         60.20
       15          105.50         61.17
       16          109.33         62.35
       17          113.08         63.73
       18          116.76         65.31
       19          120.34         67.08
       20          123.83         69.04
       21          126.26         70.58


    Factor Of Safety For The Preceding Specified Surface =-28.714
------------------------------------------------------------------------------

    Following Are Displayed The Ten Most Critical Of The Trial
    Failure Surfaces Examined.  They Are Ordered - Most Critical
    First.


    * * Safety Factors Are Calculated By The Modified Bishop Method * *


    Failure Surface Specified By 17 Coordinate Points


      Point        X-Surf        Y-Surf
       No.          (ft)          (ft)

        1          105.79         63.68
        2          109.18         61.56
        3          112.78         59.83
        4          116.56         58.50
        5          120.45         57.59
        6          124.42         57.12
        7          128.42         57.08
        8          132.40         57.49
        9          136.31         58.33
       10          140.11         59.59
```

```
         11         143.74        61.27
         12         147.17        63.33
         13         150.35        65.76
         14         153.24        68.52
         15         155.81        71.59
         16         158.03        74.91
         17         159.35        77.44

      Circle Center At X =   126.7 ; Y =    93.4  and Radius,    36.3


            ***       1.737    ***



      Failure Surface Specified By 22 Coordinate Points


        Point         X-Surf         Y-Surf
         No.           (ft)           (ft)

          1         101.58        62.37
          2         105.35        61.04
          3         109.19        59.91
          4         113.08        58.98
          5         117.01        58.26
          6         120.98        57.74
          7         124.97        57.44
          8         128.97        57.34
          9         132.97        57.45
         10         136.95        57.77
         11         140.92        58.30
         12         144.85        59.04
         13         148.74        59.98
         14         152.57        61.13
         15         156.34        62.47
         16         160.03        64.01
         17         163.64        65.74
         18         167.15        67.66
         19         170.55        69.75
         20         173.84        72.03
         21         177.01        74.47
         22         178.95        76.14

      Circle Center At X =   128.8 ; Y =   133.7  and Radius,    76.3


            ***       1.813    ***


--------------------------------------------------------------------------------
      Failure Surface Specified By 25 Coordinate Points


        Point         X-Surf         Y-Surf
         No.           (ft)           (ft)
```

Proposed I-69 Project 20+00 Ramp D - Undrained Cond

Ten Most Critical. C:I69RPDU.PLT By: Shawn Marcum 04-09-07 2:28pm



#	FS
a	1.74
b	1.81
c	1.96
d	2.01
e	2.03
f	2.06
g	2.07
h	2.10
i	2.11
j	2.11

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
VS Si	1	110	110	250	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
MS Si Cl	3	115	115	1000	0	0	0	W1
Si & Cl	4	110	110	500	0	0	0	W1
Shale	5	140	140	8000	0	0	0	W1

STABL6H FSmin=1.74 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                        ** STABL6H   **
                              by
                        Purdue University
-------------------------------------------------------------------------------

                    --Slope Stability Analysis--
                 Simplified Janbu, Simplified Bishop
                    or Spencer`s Method of Slices


         Run Date:                  04-10-07
         Time of Run:               10:32am
         Run By:                    Shawn Marcum
         Input Data Filename:       C:I69RPDD
         Output Filename:           C:I69RPDD.OUT
         Plotted Output Filename:   C:I69RPDD.PLT



         PROBLEM DESCRIPTION    Proposed I-69 Project
                                20+00 Ramp D - Drained Cond



         BOUNDARY COORDINATES
              NOTE:  User defined origin was specified.
              Add 00.00 to X values and 350.00 to Y values listed.

            10 Top   Boundaries
            14 Total Boundaries

         Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
            No.        (ft)       (ft)        (ft)        (ft)      Below Bnd

             1           .00      68.00       74.00       66.00         1
             2         74.00      66.00       90.00       60.00         1
             3         90.00      60.00       94.00       60.00         1
             4         94.00      60.00      110.00       65.00         1
             5        110.00      65.00      145.00       77.00         2
             6        145.00      77.00      151.00       78.00         2
             7        151.00      78.00      181.00       76.00         2
             8        181.00      76.00      187.00       75.00         2
             9        187.00      75.00      230.00       64.00         2
            10        230.00      64.00      240.00       60.00         1
            11        110.00      65.00      230.00       64.00         1
            12           .00      57.00      240.00       57.00         3
            13           .00      50.00      240.00       50.00         4
            14           .00      40.00      240.00       40.00         5
-------------------------------------------------------------------------------


        ISOTROPIC SOIL PARAMETERS


          5 Type(s) of Soil
```

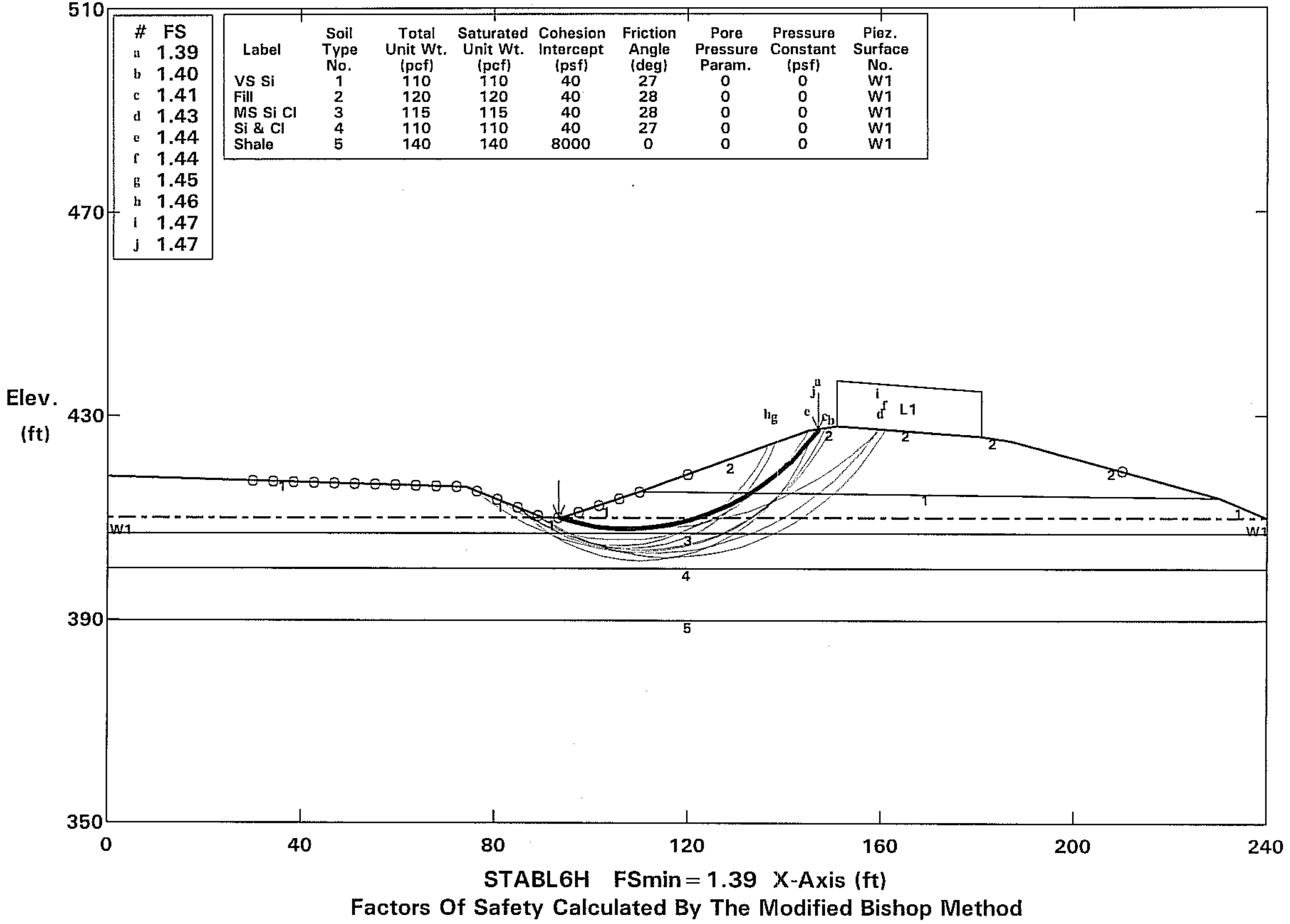
```
  Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
  Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
   No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)     No.

    1   110.0    110.0      40.0     27.0     .00        .0       1
    2   120.0    120.0      40.0     28.0     .00        .0       1
    3   115.0    115.0      40.0     28.0     .00        .0       1
    4   110.0    110.0      40.0     27.0     .00        .0       1
    5   140.0    140.0    8000.0       .0     .00        .0       1
--------------------------------------------------------------------------------


  1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


  Unit Weight of Water =  62.40


  Piezometric Surface No.  1 Specified by  2 Coordinate Points


    Point      X-Water     Y-Water
     No.         (ft)        (ft)

      1           .00       60.00
      2        240.00       60.00
--------------------------------------------------------------------------------


 BOUNDARY LOAD(S)

     1 Load(s) Specified


  Load         X-Left       X-Right      Intensity     Deflection
   No.          (ft)          (ft)       (lb/sqft)       (deg)


    1          151.00       181.00         200.0           .0


  NOTE - Intensity Is Specified As A Uniformly Distributed
         Force Acting On A Horizontally Projected Surface.


  A Horizontal Earthquake Loading Coefficient
  Of .100 Has Been Assigned

  A Vertical Earthquake Loading Coefficient
  Of .000 Has Been Assigned

  Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------
```

```
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.


400 Trial Surfaces Have Been Generated.


 20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between  X =  30.00 ft.
                             and  X = 110.00 ft.


Each Surface Terminates Between   X = 120.00 ft.
                            and   X = 210.00 ft.


Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =   .00 ft.


 4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------


Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined.  They Are Ordered - Most Critical
First.


* * Safety Factors Are Calculated By The Modified Bishop Method * *


Failure Surface Specified By 17 Coordinate Points


  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)

    1          93.16       60.00
    2          97.02       58.98
    3         100.96       58.27
    4         104.94       57.88
    5         108.94       57.82
    6         112.93       58.08
    7         116.89       58.66
    8         120.79       59.56
    9         124.60       60.77
   10         128.30       62.29
   11         131.87       64.10
   12         135.28       66.19
   13         138.50       68.55
   14         141.53       71.17
   15         144.34       74.02
   16         146.90       77.09
   17         147.08       77.35
```

```
Circle Center At X =  107.7 ; Y =  107.2  and Radius,   49.4

     ***     1.386    ***


Failure Surface Specified By 20 Coordinate Points

  Point        X-Surf        Y-Surf
   No.          (ft)          (ft)

    1           84.74         61.97
    2           88.09         59.79
    3           91.63         57.93
    4           95.32         56.39
    5           99.14         55.19
    6          103.05         54.34
    7          107.02         53.85
    8          111.01         53.72
    9          115.01         53.95
   10          118.96         54.54
   11          122.85         55.49
   12          126.63         56.78
   13          130.29         58.41
   14          133.78         60.37
   15          137.08         62.63
   16          140.16         65.18
   17          142.99         68.00
   18          145.56         71.06
   19          147.85         74.35
   20          149.81         77.80
Circle Center At X =  110.5 ; Y =   97.9  and Radius,   44.2

     ***     1.404    ***


-------------------------------------------------------------------------------
Failure Surface Specified By 20 Coordinate Points

  Point        X-Surf        Y-Surf
   No.          (ft)          (ft)

    1           84.74         61.97
    2           88.03         59.71
    3           91.53         57.77
    4           95.19         56.16
    5           98.99         54.91
    6          102.89         54.02
    7          106.86         53.50
    8          110.86         53.36
    9          114.85         53.60
   10          118.80         54.22
```

Proposed I-69 Project 20+00 Ramp D - Drained Cond

Ten Most Critical. C:I69RPDD.PLT By: Shawn Marcum 04-10-07 10:32am



#	FS
a	1.39
b	1.40
c	1.41
d	1.43
e	1.44
f	1.44
g	1.45
h	1.46
i	1.47
j	1.47

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
VS Si	1	110	110	40	27	0	0	W1
Fill	2	120	120	40	28	0	0	W1
MS Si Cl	3	115	115	40	28	0	0	W1
Si & Cl	4	110	110	40	27	0	0	W1
Shale	5	140	140	8000	0	0	0	W1

STABL6H FSmin = 1.39 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

```
                              ** STABL6H  **
                                   by
                            Purdue University
--------------------------------------------------------------------------------

                        --Slope Stability Analysis--
                     Simplified Janbu, Simplified Bishop
                        or Spencer`s Method of Slices


          Run Date:                  04-09-07
          Time of Run:               2:36pm
          Run By:                    Shawn Marcum
          Input Data Filename:       C:I69RPDE
          Output Filename:           C:I69RPDE.OUT
          Plotted Output Filename:   C:I69RPDE.PLT



          PROBLEM DESCRIPTION   Proposed I-69 Project
                                20+00 Ramp D - Earthquake Cond



          BOUNDARY COORDINATES
               NOTE:  User defined origin was specified.
               Add 00.00 to X values and 350.00 to Y values listed.

             10 Top   Boundaries
             14 Total Boundaries

          Boundary     X-Left     Y-Left     X-Right     Y-Right    Soil Type
             No.        (ft)       (ft)        (ft)        (ft)     Below Bnd

              1           .00      68.00       74.00       66.00        1
              2         74.00      66.00       90.00       60.00        1
              3         90.00      60.00       94.00       60.00        1
              4         94.00      60.00      110.00       65.00        1
              5        110.00      65.00      145.00       77.00        2
              6        145.00      77.00      151.00       78.00        2
              7        151.00      78.00      181.00       76.00        2
              8        181.00      76.00      187.00       75.00        2
              9        187.00      75.00      230.00       64.00        2
             10        230.00      64.00      240.00       60.00        1
             11        110.00      65.00      230.00       64.00        1
             12           .00      57.00      240.00       57.00        3
             13           .00      50.00      240.00       50.00        4
             14           .00      40.00      240.00       40.00        5
--------------------------------------------------------------------------------


         ISOTROPIC SOIL PARAMETERS


           5 Type(s) of Soil
```

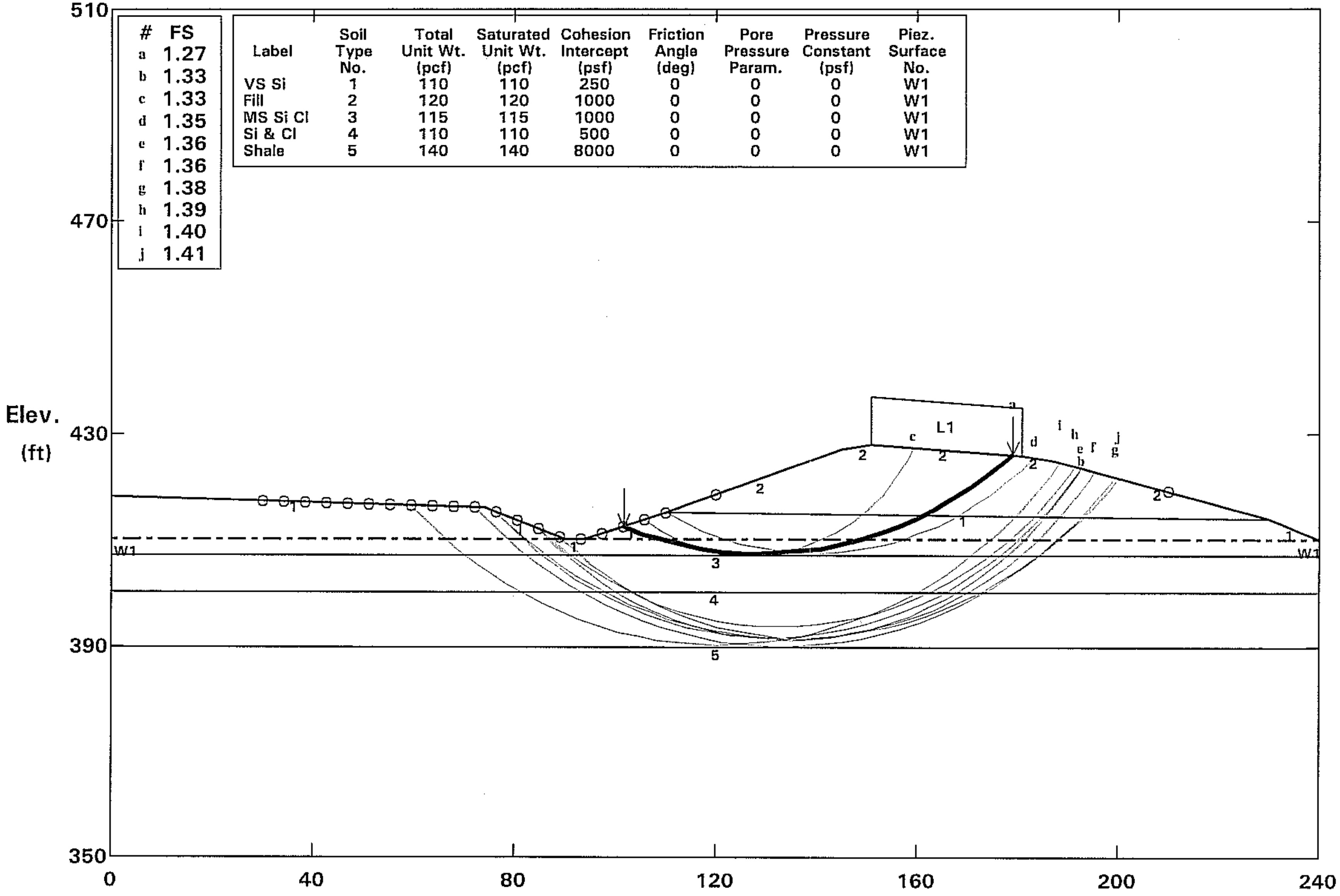
```
         Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
         Type Unit Wt. Unit Wt. Intercept  Angle  Pressure Constant Surface
          No.  (pcf)    (pcf)     (psf)    (deg)   Param.   (psf)     No.

           1   110.0    110.0     250.0      .0     .00       .0       1
           2   120.0    120.0    1000.0      .0     .00       .0       1
           3   115.0    115.0    1000.0      .0     .00       .0       1
           4   110.0    110.0     500.0      .0     .00       .0       1
           5   140.0    140.0    8000.0      .0     .00       .0       1
--------------------------------------------------------------------------------


         1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED


         Unit Weight of Water =  62.40


         Piezometric Surface No.  1 Specified by  2 Coordinate Points


           Point      X-Water     Y-Water
            No.        (ft)        (ft)

             1          .00        60.00
             2       240.00        60.00
--------------------------------------------------------------------------------


        BOUNDARY LOAD(S)

            1 Load(s) Specified


         Load        X-Left      X-Right     Intensity     Deflection
          No.         (ft)         (ft)      (lb/sqft)       (deg)


           1        151.00      181.00        200.0            .0


         NOTE - Intensity Is Specified As A Uniformly Distributed
                Force Acting On A Horizontally Projected Surface.


         A Horizontal Earthquake Loading Coefficient
         Of .100 Has Been Assigned

         A Vertical Earthquake Loading Coefficient
         Of .000 Has Been Assigned

         Cavitation Pressure =     .0 psf
--------------------------------------------------------------------------------
```

```
          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Circular Surfaces, Has Been Specified.


          400 Trial Surfaces Have Been Generated.


           20 Surfaces Initiate From Each Of 20 Points Equally Spaced
          Along The Ground Surface Between  X =  30.00 ft.
                                       and  X = 110.00 ft.


          Each Surface Terminates Between   X = 120.00 ft.
                                      and   X = 210.00 ft.


          Unless Further Limitations Were Imposed, The Minimum Elevation
          At Which A Surface Extends Is  Y =   .00 ft.


           4.00 ft. Line Segments Define Each Trial Failure Surface.


--------------------------------------------------------------------------------

          Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Examined.  They Are Ordered - Most Critical
          First.


          * * Safety Factors Are Calculated By The Modified Bishop Method * *


          Failure Surface Specified By 22 Coordinate Points


            Point       X-Surf       Y-Surf
             No.         (ft)         (ft)

              1         101.58        62.37
              2         105.35        61.04
              3         109.19        59.91
              4         113.08        58.98
              5         117.01        58.26
              6         120.98        57.74
              7         124.97        57.44
              8         128.97        57.34
              9         132.97        57.45
             10         136.95        57.77
             11         140.92        58.30
             12         144.85        59.04
             13         148.74        59.98
             14         152.57        61.13
             15         156.34        62.47
             16         160.03        64.01
             17         163.64        65.74
             18         167.15        67.66
```

```
   19          170.55         69.75
   20          173.84         72.03
   21          177.01         74.47
   22          178.95         76.14

Circle Center At X =  128.8 ; Y =  133.7  and Radius,   76.3


      ***      1.267    ***



Failure Surface Specified By 33 Coordinate Points


  Point        X-Surf         Y-Surf
   No.          (ft)           (ft)

    1           84.74          61.97
    2           87.62          59.20
    3           90.65          56.59
    4           93.83          54.17
    5           97.15          51.93
    6          100.59          49.89
    7          104.15          48.06
    8          107.80          46.43
    9          111.54          45.01
   10          115.36          43.82
   11          119.24          42.85
   12          123.17          42.10
   13          127.13          41.59
   14          131.12          41.30
   15          135.12          41.25
   16          139.12          41.42
   17          143.10          41.83
   18          147.05          42.47
   19          150.95          43.34
   20          154.80          44.43
   21          158.58          45.74
   22          162.28          47.27
   23          165.88          49.01
   24          169.37          50.96
   25          172.75          53.10
   26          175.99          55.44
   27          179.10          57.96
   28          182.05          60.66
   29          184.84          63.53
   30          187.47          66.55
   31          189.91          69.71
   32          192.16          73.02
   33          192.51          73.59

Circle Center At X =  134.1 ; Y =  110.3  and Radius,   69.0


      ***      1.329    ***
```

Proposed I-69 Project 20+00 Ramp D - Earthquake Cond

Ten Most Critical. C:I69RPDE.PLT By: Shawn Marcum 04-09-07 2:36pm



#	FS
a	1.27
b	1.33
c	1.33
d	1.35
e	1.36
f	1.36
g	1.38
h	1.39
i	1.40
j	1.41

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
VS Si	1	110	110	250	0	0	0	W1
Fill	2	120	120	1000	0	0	0	W1
MS Si Cl	3	115	115	1000	0	0	0	W1
Si & Cl	4	110	110	500	0	0	0	W1
Shale	5	140	140	8000	0	0	0	W1

STABL6H FSmin = 1.27 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

APPENDIX H

SETTLEMENT CALCULATIONS

ATC

CLIENT ASI

PROJECT I 69 DESIGN/BUILD

DES. No. 0500436

PROJECT NUMBER 86.00481.0181

SHEET ________ OF ________

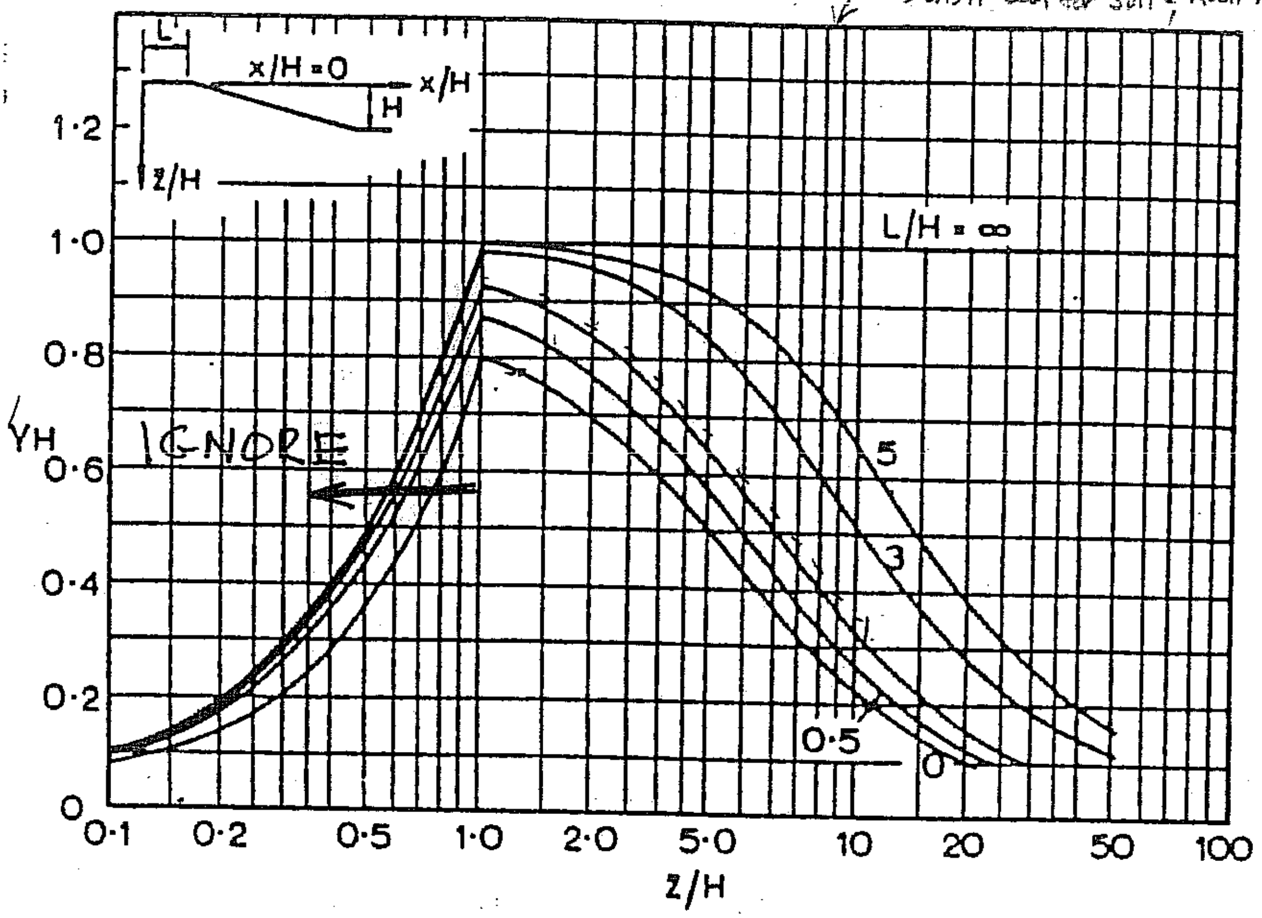
DATE 4-10-07

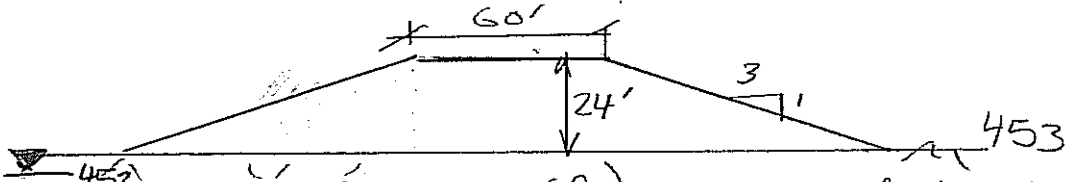
COMPUTED BY D. BIRD

CHECKED BY ________

38+96 LINE S-2-A (TB-3)

FROM POULOS & DAVIS "ELAST. SOL. for Soil & Rock Mech"



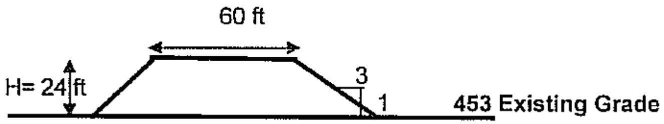


W%	LAYER	P_o	Δp	$\frac{P_c}{P_o}$	$\log(\frac{P_c}{P_o})$	RR	$\frac{P_o+\Delta p}{P_c}$	log	CR	γ
29%	①	301	24(120) 2,880	$\frac{903}{301}$	0.477	0.015	$\frac{3181}{903}$ = 3.52	0.55	0.114	122
	LL8 = 539				0.69"			6.0"	Σ = 6.69"	445
22%	②	672	.92(2880) 2650	$\frac{2688}{672}$	0.602	0.020	$\frac{672+2650}{2688}$ 1.23	0.092	0.121	129
					0.58"			0.53"		
	LL9 = 805						Σ = 1.11"			441
23%	③	1,035	.90(2880) 2,592	$\frac{3105}{1035}$	0.477	0.021	$\frac{1035+2592}{3105}$	1.17	0.067	0.125
					0.84"			0.71"		
						Σ = 1.55				

TOTAL ΔH = 9.35"

Embankment Settlement Calculations
Interstate 69 Design/Build
Des. No. 0500436
38+96 Line S-2-A (Boring TB-3)

ATC Project No. 86.00481.00181
4/10/2007



Existing Grade 453
Water Table Elevation: 452
Embankment Unit Wt. (pcf) 120

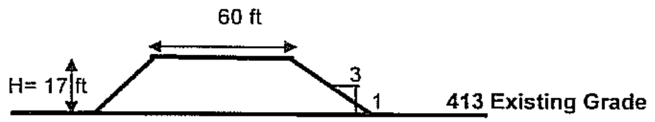
I at GS 0.94
I/ft depth 0.0021
Embankment Height (ft) 24

	Layer									ΔP (psf)								
Layer	Top Elev	Bottom Elev	W%	OCR	Wet Unit Wt. (pcf)	Effective Unit Wt. (pcf)	H (in.)	Layer Center (EL.)	Po (psf)	Embankment (psf)	ΔP Total (psf)	Po+ΔP (psf)	Pc (psf)	Initial Void Ratio e_0	Cc	RR= Cr/ $(1+e_0)$	CR= Cc/ $(1+e_0)$	Pc- $P_0+\Delta P$ (psf)
Siy CL Loam	453	445	29.0%	3.00	122	60	96	449	301	2880	2880	3181	902	0.78	0.26	0.015	0.114	-2279
Siy CL Loam	445	441	22.0%	4.00	129	67	48	443	672	2647	2647	3319	2689	0.59	0.19	0.020	0.121	-630
Clay	441	434	23.0%	3.00	128	66	84	437.5	1035	2613	2613	3648	3104	0.62	0.20	0.021	0.125	-544
Shale	434																	

	RR only			RR to Pc			Pc to Po+ΔP @ CR			
Settlement Type	Po+ΔP /Po (psf)	log(Po..)	ΔH (in)	Pc/Po	log(Pc/Po)	ΔH (in)	Po+ΔP/Pc (psf)	log(Po+ΔP/Po)- log(Pc/Po)	ΔH (in)	Total ΔH (in)
R & V Compression	0.0000	0	0.00	3.00	0.4771	0.69	3.53	0.54733	5.99	6.68
R & V Compression	0.0000	0	0.00	4.00	0.6021	0.59	1.23	0.09145	0.53	1.12
R & V Compression	0.0000	0	0.00	3.00	0.4771	0.83	1.18	0.07011	0.74	1.57
				Total Embankment Settlement (in.)						**9.37**

Embankment Settlement Calculations
Interstate 69 Design/Build
Des. No. 0500436
20+00 Ramp "D" (Boring RB-58)

ATC Project No. 86.00481.00181
4/10/2007



Existing Grade 413
Water Table Elevation: 412
Embankment Unit Wt. (pcf) 120

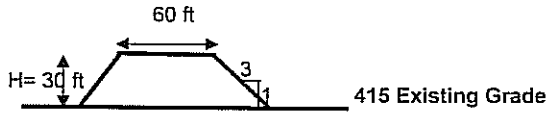
I at GS 0.94
I/ft depth 0.0021
Embankment Height (ft) 17

	Layer									ΔP (psf)								
Layer	Top Elev	Bottom Elev	W%	OCR	Wet Unit Wt. (pcf)	Effective Unit Wt. (pcf)	H (in.)	Layer Center (EL.)	Po (psf)	Embankment (psf)	ΔP Total (psf)	Po+ΔP (psf)	Pc (psf)	Initial Void Ratio e_0	Cc	RR= Cr/ $(1+e_0)$	CR= Cc/ $(1+e_0)$	Pc-P_0+ΔP (psf)
Silt	413	407	26.0%	-	125	62	72	410	250	1905	1905	2154	-	-	-	-	-	-
Siy CL	407	400	23.0%	3.00	128	66	84	403.5	666	1877	1877	2543	1998	0.62	0.20	0.021	0.125	-545
Silt	400	394	25.0%	-	126	63	72	397	1086	1849	1849	2935	-	-	-	-	-	-
Clay	394	390	53.0%	1.50	106	44	48	392	1363	1828	1828	3191	2045	1.39	0.47	0.032	0.195	-1146
Shale	390																	

	RR only			RR to Pc			Pc to Po+ΔP @ CR			
Settlement Type	Po+ΔP /Po (psf)	log(Po..)	ΔH (in)	Pc/Po	log(Pc/Po)	ΔH (in)	Po+ΔP/Pc (psf)	log(Po+ΔP/Po)-log(Pc/Po)	ΔH (in)	Total ΔH (in)
-	-	-	-	-	-	-	-	-	-	-
R & V Compression	0.0000	0	0.00	3.00	0.4771	0.83	1.27	0.10467	1.10	1.93
-	-	-	-	-	-	-	-	-	-	-
R & V Compression	0.0000	0	0.00	1.50	0.1761	0.27	1.56	0.19324	1.81	2.08
					Total Embankment Settlement (in.)					**4.01**

Embankment Settlement Calculations
Interstate 69 Design/Build
Des. No. 0500436
247+97 Line "D" (Boring TB-7)

ATC Project No. 86.00481.00181
4/10/2007



Existing Grade 415
Water Table Elevation: 404
Embankment Unit Wt. (pcf) 120

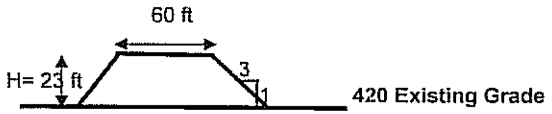
I at GS 0.94
I/ft depth 0.0021
Embankment Height (ft) 30

	Layer									ΔP (PSF)								
Layer	Top Elev	Bottom Elev	W%	OCR	Wet Unit Wt. (pcf)	Effective Unit Wt. (pcf)	H (in.)	Layer Center (EL.)	Po (psf)	Embankment (psf)	ΔP Total (psf)	Po+ΔP (psf)	Pc (psf)	Initial Void Ratio e_0	Cc	RR= Cr/ $(1+e_0)$	CR= Cc/ $(1+e_0)$	Pc- $P_0+\Delta P$ (psf)
Siy CL Fill	415	409	28.0%	3.00	123	123	72	412	369	3361	3361	3730	1106	0.75	0.25	0.023	0.141	-2624
Siy CL Loam	409	404	26.0%	3.00	125	125	60	406.5	1049	3320	3320	4369	3148	0.70	0.23	0.022	0.135	-1221
Clay	404	397	23.0%	4.00	128	66	84	400.5	1591	3274	3274	4865	6362	0.62	0.20	0.021	0.125	1497
Sandstone	397																	

	RR only			RR to Pc			Pc to Po+ΔP @ CR			
Settlement Type	Po+ΔP /Po (psf)	log(Po..)	ΔH (in)	Pc/Po	log(Pc/Po)	ΔH (in)	Po+ΔP/Pc (psf)	log(Po+ΔP/Po)-log(Pc/Po)	ΔH (in)	Total ΔH (in)
R & V Compression	0.0000	0	0.00	3.00	0.4771	0.81	3.37	0.52798	5.35	6.15
R & V Compression	0.0000	0	0.00	3.00	0.4771	0.64	1.39	0.14237	1.15	1.79
Recompression	3.0585	0.48551	0.85	0.00	0	0.00	0.00	0	0.00	0.85
					Total Embankment Settlement (in.)					8.79

Embankment Settlement Calculations
Interstate 69 Design/Build
Des. No. 0500436
244+32 Line "D" (Boring TB-4)

ATC Project No. 86.00481.00181
4/10/2007



Existing Grade 420
Water Table Elevation: 411
Embankment Unit Wt. (pcf) 120

I at GS 0.94
I/ft depth 0.0021
Embankment Height (ft) 23

	Layer									ΔP (PSF)								
Layer	Top Elev	Bottom Elev	W%	OCR	Wet Unit Wt. (pcf)	Effective Unit Wt. (pcf)	H (in.)	Layer Center (EL.)	Po (psf)	Embankment (psf)	ΔP Total (psf)	Po+ΔP (psf)	Pc (psf)	Initial Void Ratio e_0	Cc	RR= Cr/ $(1+e_0)$	CR= Cc/ $(1+e_0)$	Pc- P_0+ΔP (psf)
Siy CL Loam	420	411	25.0%	4.00	126	126	108	415.5	566	2568	2568	3134	2265	0.67	0.22	0.022	0.131	-870
Siy CL Loam	411	402	35.0%	2.00	117	55	108	406.5	1378	2516	2516	3894	2756	0.93	0.31	0.027	0.159	-1138
Clay	402	395	30.0%	2.00	121	59	84	398.5	1829	2470	2470	4299	3658	0.80	0.26	0.024	0.146	-641
Clay	395	380	47.0%	2.00	109	47	180	387.5	2385	2406	2406	4791	4771	1.24	0.41	0.031	0.184	-21
Shale	380																	

	RR only			RR to Pc			Pc to Po+ΔP @ CR			
Settlement Type	Po+ΔP /Po (psf)	log(Po..)	ΔH (in)	Pc/Po	log(Pc/Po)	ΔH (in)	Po+ΔP/Pc (psf)	log(Po+ΔP/Po)-log(Pc/Po)	ΔH (in)	Total ΔH (in)
R & V Compression	0.0000	0	0.00	4.00	0.6021	1.42	1.38	0.14118	2.00	3.43
R & V Compression	0.0000	0	0.00	2.00	0.301	0.86	1.41	0.15014	2.58	3.44
R & V Compression	0.0000	0	0.00	2.00	0.301	0.62	1.18	0.07009	0.86	1.48
R & V Compression	0.0000	0	0.00	2.00	0.301	1.67	1.00	0.00186	0.06	1.73
					Total Embankment Settlement (in.)					10.08

ATC

CLIENT American Structurepoint

PROJECT Proposed I-69 Project
Settlement Calculations

PROJECT NUMBER 86.00481.0181
SHEET 1 OF 1
DATE 5/10/07
COMPUTED BY SM
CHECKED BY

Calculation of C_v

Load Incr. ton/ft^2	d_0	d_{100}	d_{50}	t_{50}, min	Avg H_{dr}, in.	$\frac{0.197\ H_{dr}^2}{t_{50}}$
1	196	245	221	0.8	0.39	0.037
2	360	430	395	0.6	0.30	0.030

Avg = 0.034

Use $C_v = 0.034\ \text{in}^2/\text{min}$

Calculation of t_{90}

$H_{dr} = 19\ \text{ft} = 228\ \text{in}$

$T = 0.848$

$$t_{90} = \frac{T\ H_{dr}^2}{C_v} = \frac{0.848\,(228\ \text{in})^2}{0.034\ \text{in}^2/\text{min}} = 1{,}297{,}000\ \text{min}$$

$= 900$ days

$= 2.5$ years

ATC

CLIENT American Structurepoint

PROJECT NUMBER 86.00481.0181

SHEET 1 OF 1

DATE 5/10/07

COMPUTED BY SM

CHECKED BY

PROJECT Proposed I-69 Project
Settlement Calculations

Wick Drain Spacing vs Time

$C_v = 0.034 \text{ in}^2/\text{min}$ $\quad C_H = 1.5\, C_v = 0.05 \text{ in}^2/\text{min}$

Drain Spacing $= DS = 4 \text{ ft}$ $\quad r_e = 0.525\, DS = 0.525(4\text{ ft})(12 \text{ in}/\text{ft}) = 25.2 \text{ in}$

Radius well $= r_w = 2.5 \text{ in}$ $\quad n = \frac{r_e}{r_w} = 10.1$

$$F_n = \ln(n) - \frac{3}{4} = \ln(10.1) - \frac{3}{4} = 1.56$$

Degree of Consolidation $= U = 1 - \exp\left[\frac{-2T_R}{F_n}\right] = 0.9$ (for 90%)

$T_R = \frac{C_H t}{r_e^2}$ $\quad t = \text{time}$

$$t = \frac{-r_e^2 F_n (1-U)}{2 C_H}$$

$$t_{90\%} = \frac{-(25.2)^2(1.56)\ln(1-0.9)}{2(0.05 \text{ in}^2/\text{min})} = 22{,}800 \text{ min}$$

$$= 16 \text{ days}$$

Drain Spacing	Estimated 90% Consolidation Time
4 ft	16 days
5 ft	28 days
6 ft	45 days
8 ft	90 days

APPENDIX I

LPILE OUTPUT

High Mast Light
Station 1582+00 Line "A"
Offset 160 ft. Right

20 ft Long

```
Licensed to: Tom Struewing

          ATC Associates Inc.


  LATERALLY LOADED PILE ANALYSIS PROGRAM LPILE plus
   PC VERSION 3.0 (C) COPYRIGHT ENSOFT,INC. 1997
  THE PROGRAM WAS COMPILED USING MICROSOFT FORTRAN COMPILER,
 (C) COPYRIGHT MICROSOFT CORPORATION



  I-69 Light TL-20


       *************************************************************
       ULTIMATE BENDING RESISTANCE AND FLEXURAL RIGIDITY
       *************************************************************

       DIAMETER =  48.00 IN ✓

       CONCRETE COMPRESSIVE STRENGTH =  4.000000     KIP/IN**2 ✓

       REBAR YIELD STRENGTH =  60.000000     KIP/IN**2 ✓

       MODULUS OF ELASTICITY OF STEEL =  29000.000000     KIP/IN**2 ✓

       NUMBER OF REINFORCING BARS =  20 ✓

       AREA OF ONE REBAR =  .156E+01 IN**2 ✓

       NUMBER OF ROWS OF REINFORCING BARS = 11

       COVER THICKNESS = 4.000 IN ✓


       SQUASH LOAD CAPACITY =      7918.42 KIP

                 ROW          AREA OF        DISTANCE TO
                NUMBER     REINFORCEMENT   CENTROIDAL AXIS
                              IN**2              IN

                  1          1.560000          20.0000
                  2          3.120000          19.0211
                  3          3.120000          16.1804
                  4          3.120000          11.7557
                  5          3.120000           6.1804
                  6          3.120000            .0000
                  7          3.120000          -6.1804
                  8          3.120000         -11.7557
                  9          3.120000         -16.1804
                 10          3.120000         -19.0211
                 11          1.560000         -20.0000

         OUTPUT RESULTS FOR AN AXIAL LOAD =        4.00 KIP
        *****************************************************

          MOMENT         EI          PHI      MAX STR   N AXIS
          IN-KIP     KIP-IN**2       1/IN      IN/IN      IN

        .113E+04   .11269E+10    .000001    .00002    24.623
        .555E+04   .11103E+10    .000005    .00012    24.185
```

```
   .555E+04      .61684E+09    .000009     .00013    14.327
   .555E+04      .42704E+09    .000013     .00019    14.303
   .593E+04      .34899E+09    .000017     .00024    14.307
   .730E+04      .34767E+09    .000021     .00030    14.323
   .866E+04      .34649E+09    .000025     .00036    14.346
   .100E+05      .34537E+09    .000029     .00042    14.372
   .114E+05      .34427E+09    .000033     .00048    14.400
   .127E+05      .34328E+09    .000037     .00053    14.410
   .140E+05      .34225E+09    .000041     .00059    14.441
   .154E+05      .34122E+09    .000045     .00065    14.474
   .167E+05      .34019E+09    .000049     .00071    14.508
   .180E+05      .33917E+09    .000053     .00077    14.543
   .261E+05      .31500E+09    .000083     .00121    14.559
   .291E+05      .25770E+09    .000113     .00157    13.877
   .306E+05      .21431E+09    .000143     .00190    13.272
   .316E+05      .18278E+09    .000173     .00222    12.806
   .322E+05      .15854E+09    .000203     .00252    12.424
   .325E+05      .13956E+09    .000233     .00281    12.079
   .328E+05      .12489E+09    .000263     .00312    11.867
   .331E+05      .11293E+09    .000293     .00343    11.695
   .333E+05      .10304E+09    .000323     .00375    11.596
   .333E+05      .94371E+08    .000353     .00406    11.500


     THE ULTIMATE BENDING MOMENT AT A CONCRETE STRAIN OF 0.003
     IS :    .327E+05 IN-KIP

 PROGRAM LPILE plus Version 3.0
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```

32,700 in-kip

```
 I-69 Light TL-20


 UNITS--ENGLISH UNITS



                      I N P U T   I N F O R M A T I O N
                      *********************************


 THE LOADING IS CYCLIC
 NO. OF CYCLES =     .10E+05
 --------------------------
```

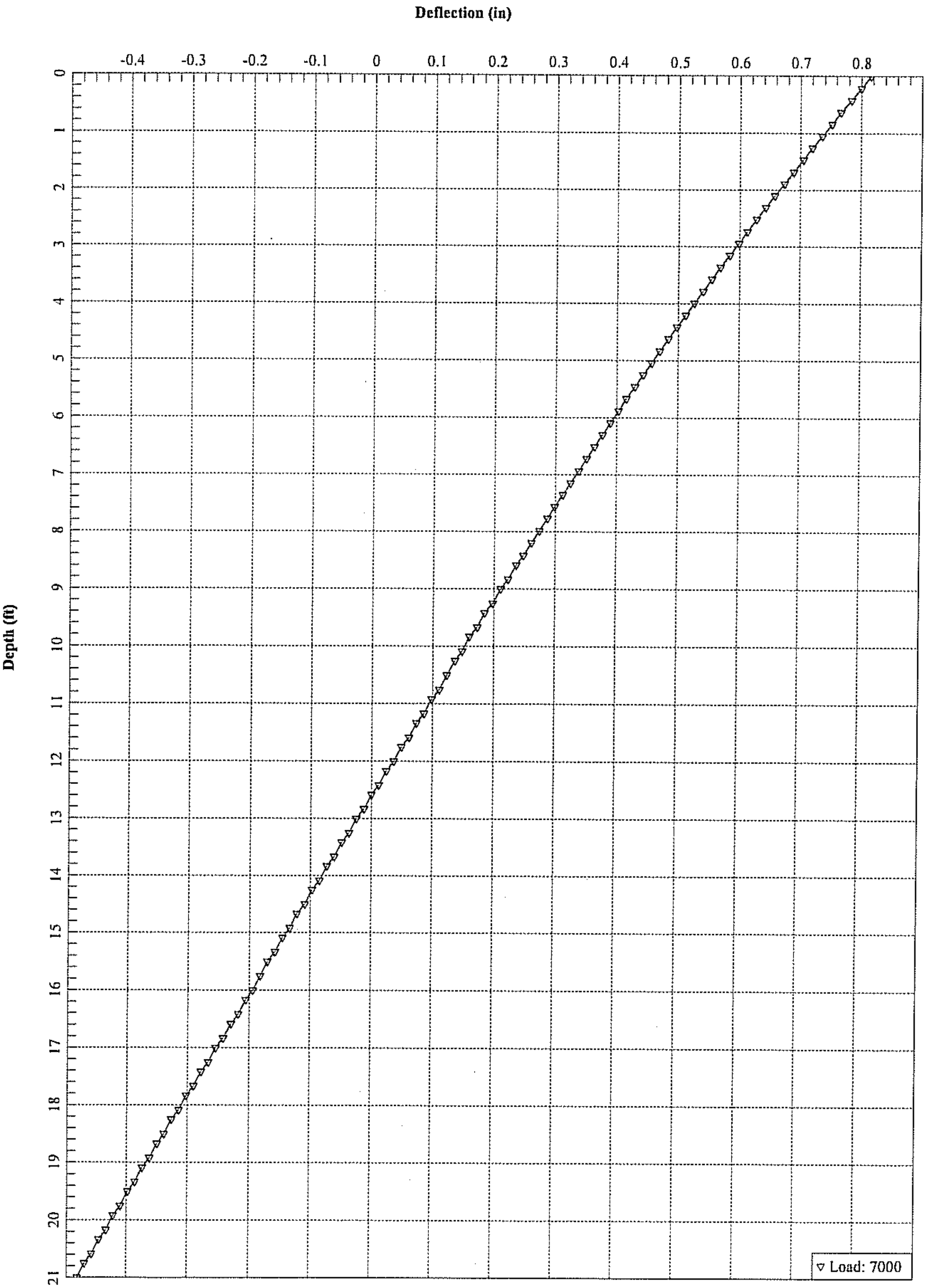
10000

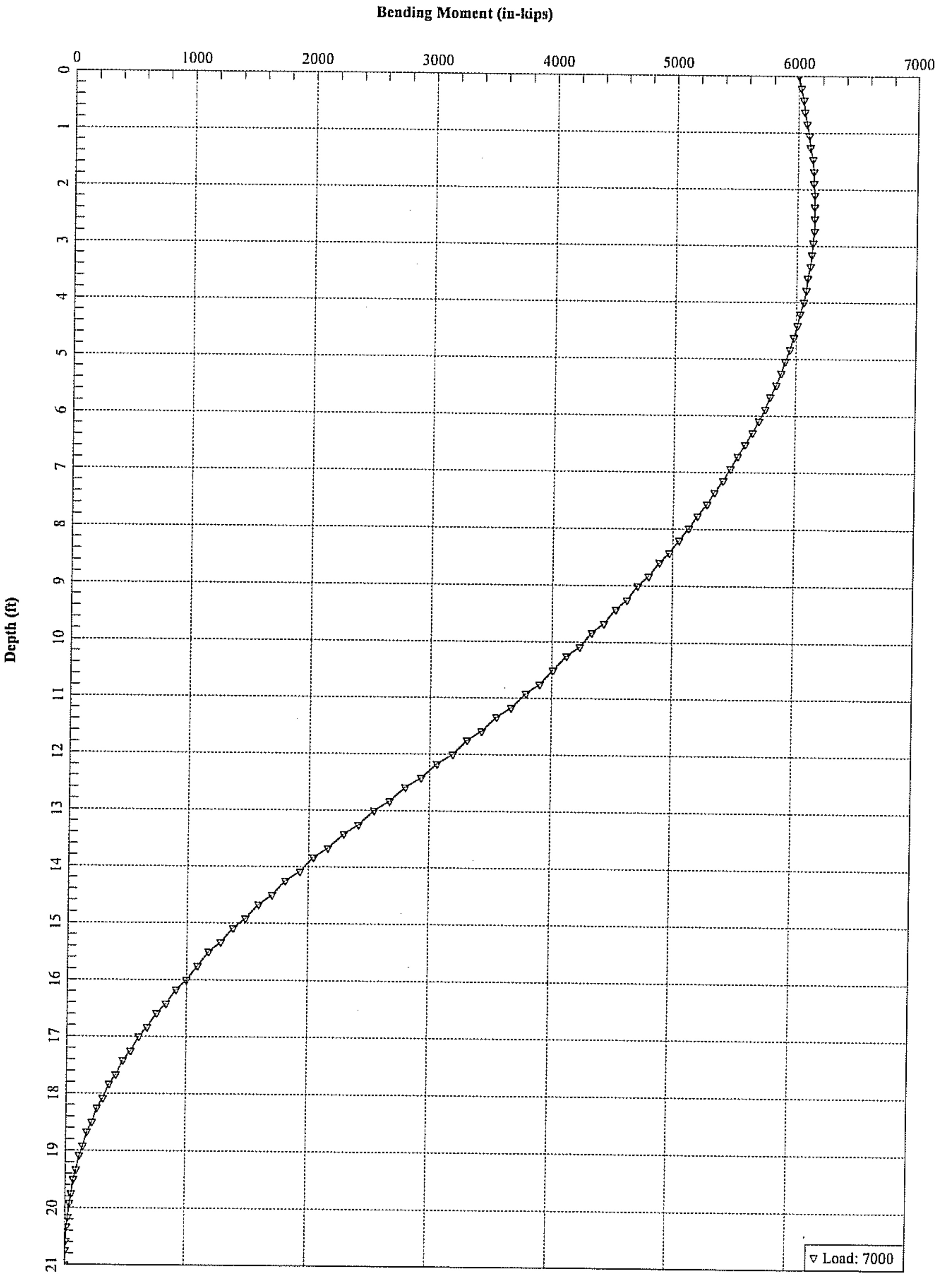
```
 PILE GEOMETRY AND PROPERTIES
 ----------------------------

     PILE LENGTH                          =      252.00 IN
      2 POINTS

         X             DIAMETER     MOMENT OF         AREA        MODULUS OF
                                     INERTIA                      ELASTICITY
         IN               IN          IN**4          IN**2         LBS/IN**2
        .00           48.000       .261E+06       .181E+04       .310E+07
     252.00           48.000       .261E+06       .181E+04       .310E+07


 SOILS INFORMATION
 -----------------
```

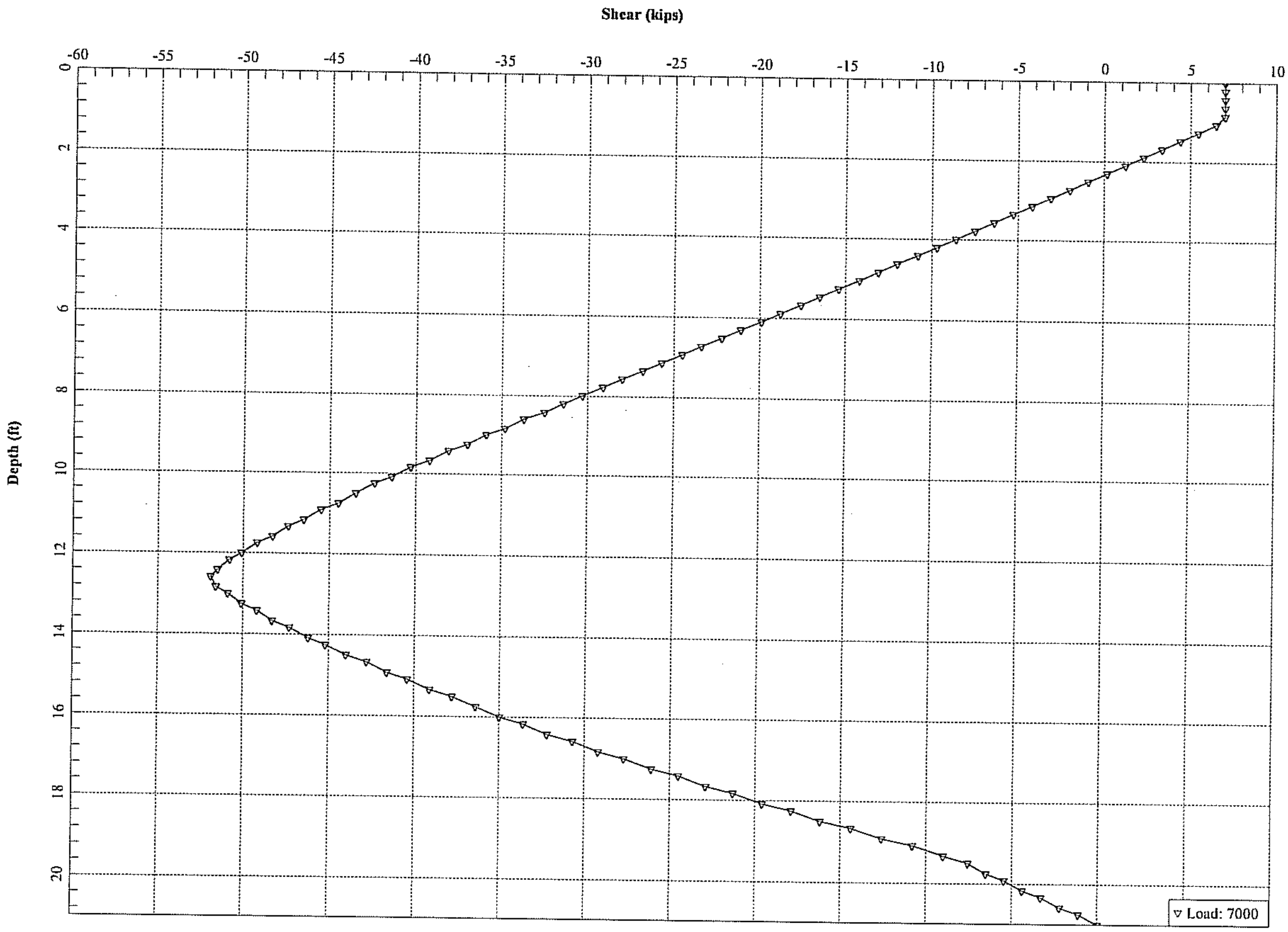
```
   X AT THE GROUND SURFACE              =       12.00 IN

   SLOPE ANGLE AT THE GROUND SURFACE        =          .00 DEG.

   3 LAYER(S) OF SOIL

   LAYER  1
   THE SOIL IS A STIFF CLAY WITH NO FREE WATER
   X AT THE TOP OF THE LAYER            =      12.00 IN
   X AT THE BOTTOM OF THE LAYER         =     234.00 IN
   MODULUS OF SUBGRADE REACTION         =   .100E+03 LBS/IN**3 k=100 #/in.³

   LAYER  2
   THE SOIL IS A SOFT CLAY
   X AT THE TOP OF THE LAYER            =     234.00 IN
   X AT THE BOTTOM OF THE LAYER         =     300.00 IN
   MODULUS OF SUBGRADE REACTION         =   .500E+02 LBS/IN**3    k = 50 #/in.³

   LAYER  3
   THE SOIL IS A STIFF CLAY WITH NO FREE WATER
   X AT THE TOP OF THE LAYER            =     300.00 IN
   X AT THE BOTTOM OF THE LAYER         =     600.00 IN
   MODULUS OF SUBGRADE REACTION         =   .100E+04 LBS/IN**3    k= 1,000 #/in³


   DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
                    6 POINTS
              X,IN     WEIGHT,LBS/IN**3
             12.00          .40E-01
            234.00          .40E-01
            234.00          .40E-01
            300.00          .40E-01
            300.00          .40E-01
            600.00          .40E-01

   DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
                    6 POINTS
              X,IN       C,LBS/IN**2       PHI,DEGREES      E50
             12.00       .870E+01 1,250 #/ft².000         .100E-01
            234.00       .870E+01             .000         .100E-01
            234.00       .350E+01 500 #/ft².000           .200E-01
            300.00       .350E+01             .000         .200E-01
            300.00       .500E+02             .000         .400E-02
            600.00       .500E+02             .000         .400E-02


BOUNDARY AND LOADING CONDITIONS
-------------------------------


   LOADING NUMBER  1

   BOUNDARY-CONDITION CODE                   =          1
   LATERAL LOAD AT THE PILE HEAD             =   .700E+04 LBS       7,000 #
   MOMENT AT THE PILE HEAD                   =   .600E+07 IN-LBS    500,000 ft-lbs.
   AXIAL LOAD AT THE PILE HEAD               =   .500E+04 LBS


FINITE-DIFFERENCE PARAMETERS
   NUMBER OF PILE INCREMENTS                                  =        100
   DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE           =   .100E-04 IN
   MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS     =        100
   MAXIMUM ALLOWABLE DEFLECTION                               =    .10E+03 IN
```

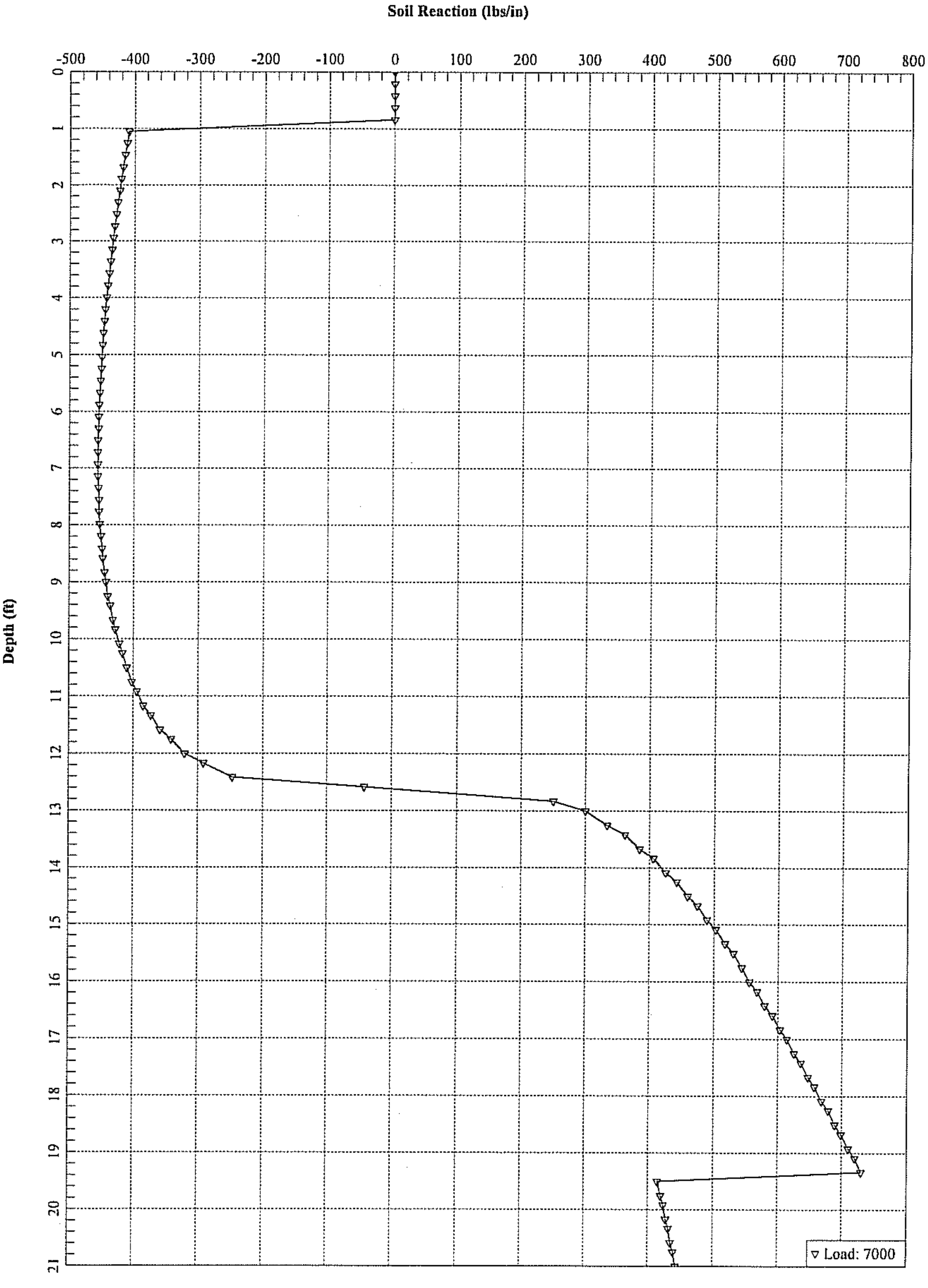
```
OUTPUT CODES
    KOUTPT =  0
    KPYOP  =  0
    INC    =  1


                     O U T P U T   I N F O R M A T I O N
                     ***********************************


             **************************************************
             * COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
             * CURVES FOR LATERAL LOADING                     *
             **************************************************



    LOADING NUMBER   1

    BOUNDARY CONDITION CODE                  =          1
    LATERAL LOAD AT THE PILE HEAD            =   .700E+04 LBS
    MOMENT AT THE PILE HEAD                  =   .600E+07 IN-LBS
    AXIAL LOAD AT THE PILE HEAD              =   .500E+04 LBS


OUTPUT VERIFICATION

    THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT  =    .196E-03 IN-LBS
    THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT =  -.401E-04 LBS


                       S U M M A R Y   T A B L E
                       *************************


 BOUNDARY     BOUNDARY      AXIAL      PILE   HEAD      MAX.        MAX.
 CONDITION    CONDITION     LOAD       DEFLECTION      MOMENT       SHEAR
   BC1          BC2          LBS          IN           IN-LBS        LBS
 .7000E+04    .6000E+07   .5000E+04    .8159E+00    .6140E+07   -.5187E+05

                        **** WARNING ****
THE DEFLECTION AT THE PILE HEAD    .100E+03 IS LARGER THAN THE ALLOWABLE
DEFLECTION    .100E+03

                        **** WARNING ****
THE DEFLECTION AT THE PILE HEAD    .103E+03 IS LARGER THAN THE ALLOWABLE
DEFLECTION    .100E+03


                       DEFLECTION VS PILE LENGTH
                       *************************


 BOUNDARY     BOUNDARY      PILE       PILE   HEAD      MAX.        MAX.
 CONDITION    CONDITION     LENGTH     DEFLECTION      MOMENT       SHEAR
   BC1          BC2          IN           IN           IN-LBS        LBS
 .7000E+04    .6000E+07   .2520E+03    .8159E+00    .6140E+07   -.5187E+05
```

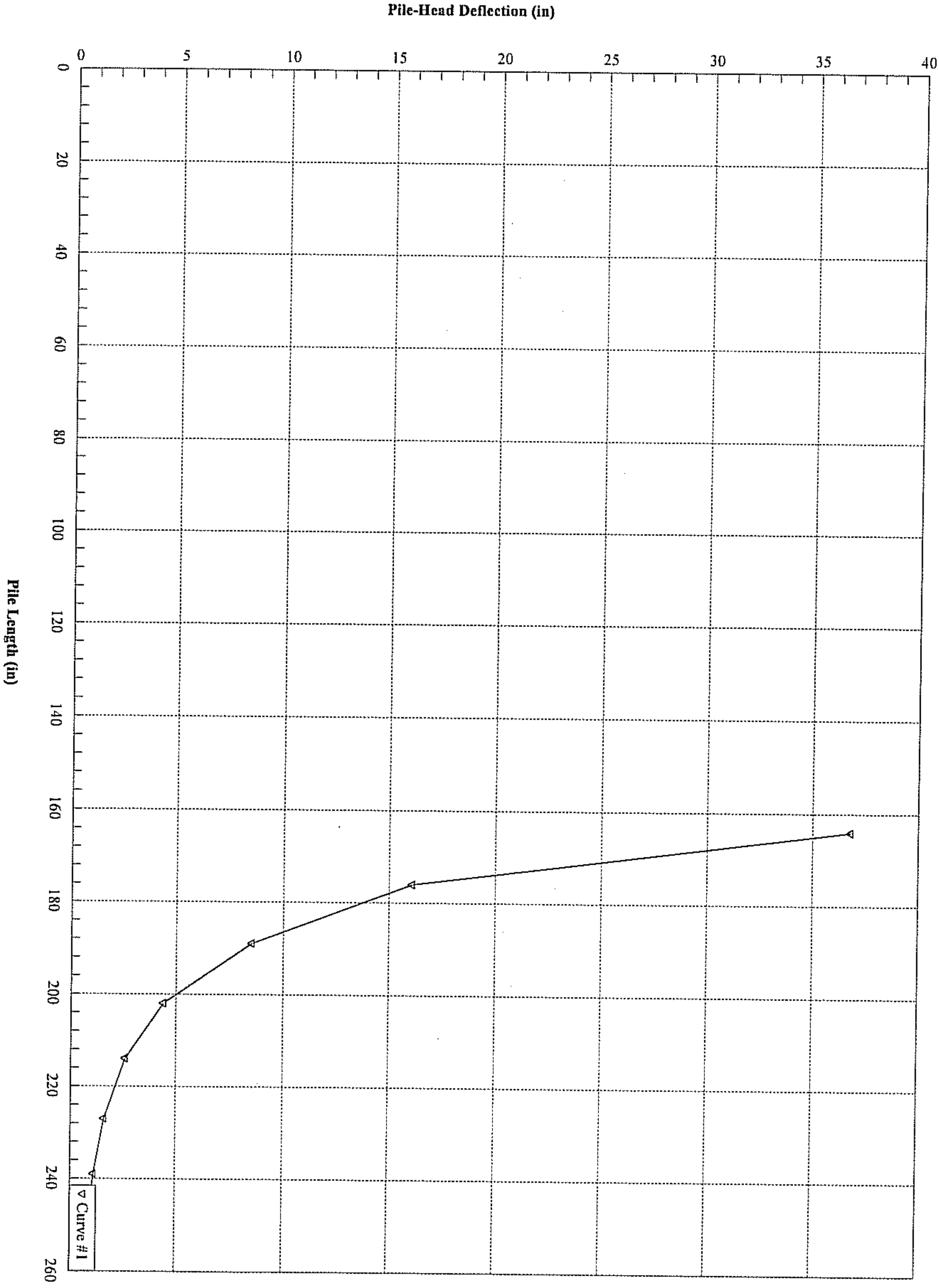
```
 .7000E+04     .6000E+07     .2394E+03     .1122E+01     .6148E+07   -.5400E+05
 .7000E+04     .6000E+07     .2268E+03     .1606E+01     .6139E+07   -.5618E+05
 .7000E+04     .6000E+07     .2142E+03     .2610E+01     .6129E+07   -.5916E+05
 .7000E+04     .6000E+07     .2016E+03     .4408E+01     .6121E+07   -.6259E+05
 .7000E+04     .6000E+07     .1890E+03     .8537E+01     .6128E+07   -.6742E+05
 .7000E+04     .6000E+07     .1764E+03     .1608E+02     .6124E+07   -.7243E+05
 .7000E+04     .6000E+07     .1638E+03     .3681E+02     .6146E+07   -.8041E+05
```

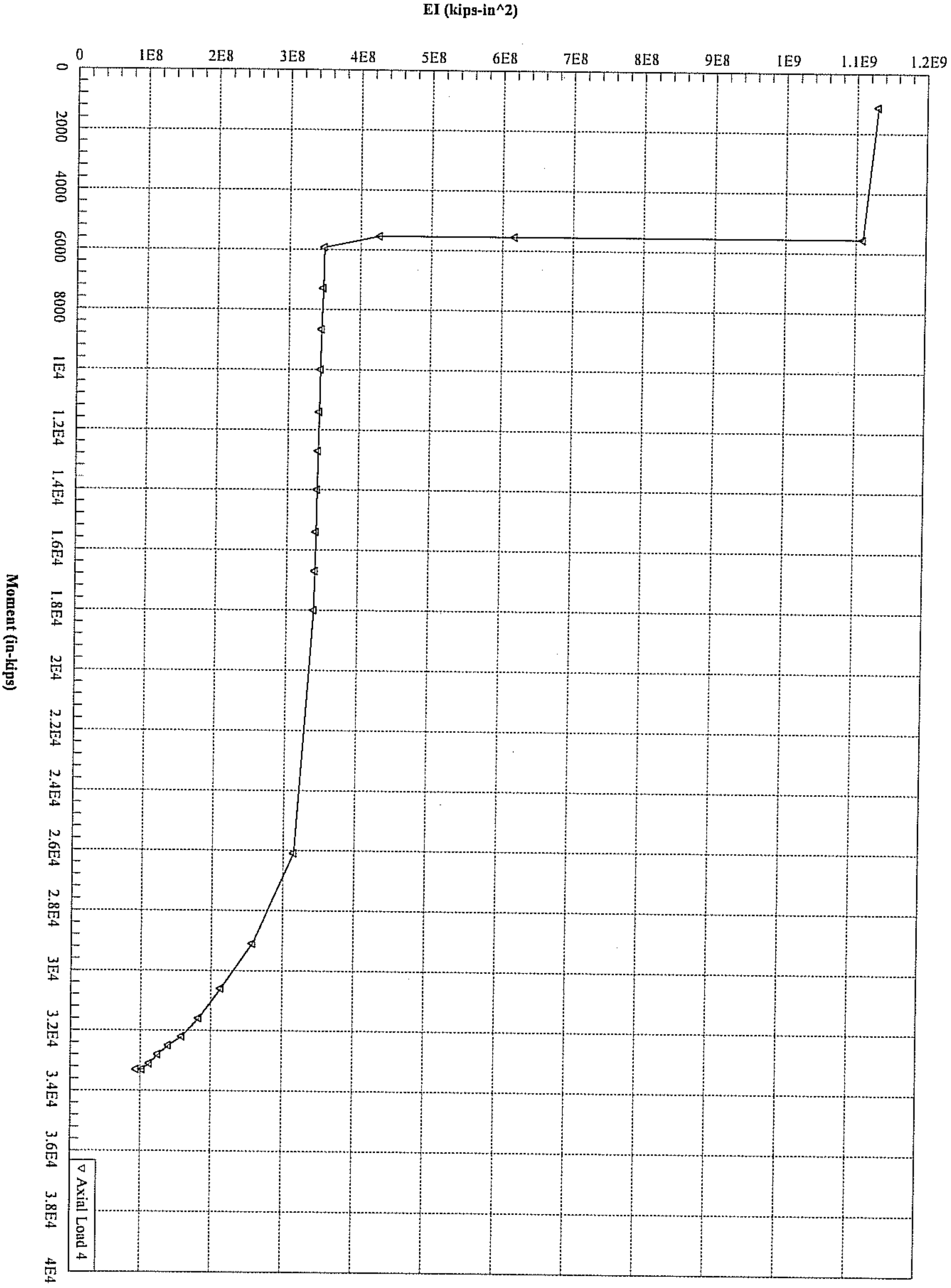

Deflection (in)
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
▽ Load: 7000


Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
▽ Load: 7000


Shear (kips)
-60
-55
-50
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
5
10
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
▽ Load: 7000


Soil Reaction (lbs/in)
-500
-400
-300
-200
-100
0
100
200
300
400
500
600
700
800
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
▽ Load: 7000


Pile-Head Deflection (in)
0
5
10
15
20
25
30
35
40
Pile Length (in)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
Curve #1


EI (kips-in^2)
0
1E8
2E8
3E8
4E8
5E8
6E8
7E8
8E8
9E8
1E9
1.1E9
1.2E9
Moment (in-kips)
0
2000
4000
6000
8000
1E4
1.2E4
1.4E4
1.6E4
1.8E4
2E4
2.2E4
2.4E4
2.6E4
2.8E4
3E4
3.2E4
3.4E4
3.6E4
3.8E4
4E4
▿ Axial Load 4

High Mast Light
Station 1589+00 Line "A"
450 ft Left

27 ft long

```
Licensed to: Tom Struewing

          ATC Associates Inc.


 LATERALLY LOADED PILE ANALYSIS PROGRAM LPILE plus
  PC VERSION 3.0 (C) COPYRIGHT ENSOFT,INC. 1997
 THE PROGRAM WAS COMPILED USING MICROSOFT FORTRAN COMPILER,
(C) COPYRIGHT MICROSOFT CORPORATION



 I-69 Light TL-21


        **************************************************************
        ULTIMATE BENDING RESISTANCE AND FLEXURAL RIGIDITY
        **************************************************************

        DIAMETER =  48.00 IN ✓

        CONCRETE COMPRESSIVE STRENGTH =  4.000000     KIP/IN**2 ✓

        REBAR YIELD STRENGTH =  60.000000     KIP/IN**2 ✓

        MODULUS OF ELASTICITY OF STEEL =  29000.000000     KIP/IN**2 ✓

        NUMBER OF REINFORCING BARS =  20 ✓

        AREA OF ONE REBAR =  .156E+01 IN**2        No. 11

        NUMBER OF ROWS OF REINFORCING BARS = 11

        COVER THICKNESS = 4.000 IN


        SQUASH LOAD CAPACITY =      7918.42 KIP

                 ROW          AREA OF        DISTANCE TO
                NUMBER     REINFORCEMENT   CENTROIDAL AXIS
                              IN**2              IN

                   1         1.560000          20.0000
                   2         3.120000          19.0211
                   3         3.120000          16.1804
                   4         3.120000          11.7557
                   5         3.120000           6.1804
                   6         3.120000            .0000
                   7         3.120000          -6.1804
                   8         3.120000         -11.7557
                   9         3.120000         -16.1804
                  10         3.120000         -19.0211
                  11         1.560000         -20.0000

          OUTPUT RESULTS FOR AN AXIAL LOAD =        4.00 KIP
         *****************************************************

           MOMENT         EI           PHI      MAX STR    N AXIS
           IN-KIP     KIP-IN**2        1/IN      IN/IN       IN

         .113E+04   .11269E+10     .000001     .00002    24.623
         .555E+04   .11103E+10     .000005     .00012    24.185
```

```
    .555E+04     .61684E+09    .000009     .00013    14.327
    .555E+04     .42704E+09    .000013     .00019    14.303
    .593E+04     .34899E+09    .000017     .00024    14.307
    .730E+04     .34767E+09    .000021     .00030    14.323
    .866E+04     .34649E+09    .000025     .00036    14.346
    .100E+05     .34537E+09    .000029     .00042    14.372
    .114E+05     .34427E+09    .000033     .00048    14.400
    .127E+05     .34328E+09    .000037     .00053    14.410
    .140E+05     .34225E+09    .000041     .00059    14.441
    .154E+05     .34122E+09    .000045     .00065    14.474
    .167E+05     .34019E+09    .000049     .00071    14.508
    .180E+05     .33917E+09    .000053     .00077    14.543
    .261E+05     .31500E+09    .000083     .00121    14.559
    .291E+05     .25770E+09    .000113     .00157    13.877
    .306E+05     .21431E+09    .000143     .00190    13.272
    .316E+05     .18278E+09    .000173     .00222    12.806
    .322E+05     .15854E+09    .000203     .00252    12.424
    .325E+05     .13956E+09    .000233     .00281    12.079
    .328E+05     .12489E+09    .000263     .00312    11.867
    .331E+05     .11293E+09    .000293     .00343    11.695
    .333E+05     .10304E+09    .000323     .00375    11.596
    .333E+05     .94371E+08    .000353     .00406    11.500

      THE ULTIMATE BENDING MOMENT AT A CONCRETE STRAIN OF 0.003
      IS :    .327E+05 IN-KIP
```

32,700 in-kips

```
  PROGRAM LPILE plus Version 3.0
  (C) COPYRIGHT 1997 ENSOFT, INC.
  ALL RIGHTS RESERVED


  I-69 Light TL-21


  UNITS--ENGLISH UNITS



                        I N P U T   I N F O R M A T I O N
                        *********************************


  THE LOADING IS CYCLIC
  NO. OF CYCLES =     .10E+05
  --------------------------


  PILE GEOMETRY AND PROPERTIES
  ----------------------------

     PILE LENGTH                          =     324.00 IN
      2 POINTS

          X           DIAMETER      MOMENT OF          AREA       MODULUS OF
                                     INERTIA                      ELASTICITY
         IN              IN          IN**4             IN**2       LBS/IN**2
        .00           48.000       .261E+06          .181E+04     .310E+07
     324.00           48.000       .261E+06          .181E+04     .310E+07


  SOILS INFORMATION
  -----------------
```

```
X AT THE GROUND SURFACE              =      12.00 IN

SLOPE ANGLE AT THE GROUND SURFACE         =          .00 DEG.

4 LAYER(S) OF SOIL

LAYER  1
THE SOIL IS A STIFF CLAY WITH NO FREE WATER
X AT THE TOP OF THE LAYER            =      12.00 IN
X AT THE BOTTOM OF THE LAYER         =     144.00 IN
MODULUS OF SUBGRADE REACTION         =   .100E+03 LBS/IN**3       k= 100 #/in^3

LAYER  2
THE SOIL IS A SOFT CLAY
X AT THE TOP OF THE LAYER            =     144.00 IN
X AT THE BOTTOM OF THE LAYER         =     240.00 IN
MODULUS OF SUBGRADE REACTION         =   .300E+02 LBS/IN**3       k= 30 #/in^3

LAYER  3
THE SOIL IS A STIFF CLAY WITH NO FREE WATER
X AT THE TOP OF THE LAYER            =     240.00 IN
X AT THE BOTTOM OF THE LAYER         =     264.00 IN
MODULUS OF SUBGRADE REACTION         =   .100E+03 LBS/IN**3      k= 100 #/in^3

LAYER  4
THE SOIL IS A SOFT CLAY
X AT THE TOP OF THE LAYER            =     264.00 IN
X AT THE BOTTOM OF THE LAYER         =     440.00 IN
MODULUS OF SUBGRADE REACTION         =   .300E+02 LBS/IN**3      k= 30 #/in^3


DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
                   2 POINTS
        X,IN        WEIGHT,LBS/IN**3
       12.00           .40E-01
      440.00           .40E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
                   8 POINTS
        X,IN        C,LBS/IN**2          PHI,DEGREES      E50
       12.00        .950E+01  1,400 #/ft^2 .000          .100E-01
      144.00        .950E+01  250 #/ft^2   .000          .100E-01
      144.00        .180E+01               .000          .200E-01
      240.00        .180E+01               .000          .200E-01
      240.00        .850E+01  1,250 #/ft^2 .000          .100E-01
      264.00        .850E+01               .000          .100E-01
      264.00        .180E+01               .000          .200E-01
      440.00        .180E+01  250 #/ft^2   .000          .200E-01


BOUNDARY AND LOADING CONDITIONS
------------------------------


    LOADING NUMBER   1

    BOUNDARY-CONDITION CODE                 =          1
    LATERAL LOAD AT THE PILE HEAD           =    .700E+04 LBS
    MOMENT AT THE PILE HEAD                 =    .600E+07 IN-LBS
    AXIAL LOAD AT THE PILE HEAD             =    .500E+04 LBS

FINITE-DIFFERENCE PARAMETERS
    NUMBER OF PILE INCREMENTS                                 =        100
```

```
     DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE       =    .100E-04 IN
     MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS =       100
     MAXIMUM ALLOWABLE DEFLECTION                           =     .10E+03 IN


 OUTPUT CODES
     KOUTPT =  0
     KPYOP  =  0
     INC    =  1



                 O U T P U T   I N F O R M A T I O N
                 ***********************************


           **************************************************
           * COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
           * CURVES FOR LATERAL LOADING                    *
           **************************************************



     LOADING NUMBER   1

     BOUNDARY CONDITION CODE                  =        1
     LATERAL LOAD AT THE PILE HEAD            =    .700E+04 LBS
     MOMENT AT THE PILE HEAD                  =    .600E+07 IN-LBS
     AXIAL LOAD AT THE PILE HEAD              =    .500E+04 LBS


 OUTPUT VERIFICATION

     THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT  =  -.541E-04 IN-LBS
     THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT =   .900E-05 LBS


                   S U M M A R Y   T A B L E
                   *************************


  BOUNDARY     BOUNDARY      AXIAL      PILE   HEAD      MAX.        MAX.
 CONDITION    CONDITION      LOAD      DEFLECTION      MOMENT       SHEAR
    BC1          BC2          LBS          IN          IN-LBS        LBS
 .7000E+04    .6000E+07    .5000E+04    .3561E+00    .6147E+07   -.3766E+05


                   DEFLECTION VS PILE LENGTH
                   *************************


  BOUNDARY     BOUNDARY      PILE       PILE   HEAD      MAX.        MAX.
 CONDITION    CONDITION     LENGTH     DEFLECTION      MOMENT       SHEAR
    BC1          BC2          IN           IN          IN-LBS        LBS
 .7000E+04    .6000E+07    .3240E+03    .3561E+00    .6147E+07   -.3766E+05
 .7000E+04    .6000E+07    .3078E+03    .4284E+00    .6140E+07   -.3923E+05
 .7000E+04    .6000E+07    .2916E+03    .5914E+00    .6152E+07   -.4151E+05
 .7000E+04    .6000E+07    .2754E+03    .7832E+00    .6143E+07   -.4363E+05
 .7000E+04    .6000E+07    .2592E+03    .1132E+01    .6134E+07   -.4631E+05
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.7000E+04    .6000E+07    .2430E+03    .2862E+01    .6120E+07  -.5417E+05
.7000E+04    .6000E+07    .2268E+03    .5586E+01    .6127E+07  -.6042E+05
.7000E+04    .6000E+07    .2106E+03    .8989E+01    .6120E+07  -.6564E+05
.7000E+04    .6000E+07    .1944E+03    .2004E+02    .6134E+07  -.7426E+05
.7000E+04    .6000E+07    .1782E+03    .4055E+02    .6142E+07  -.8293E+05
```
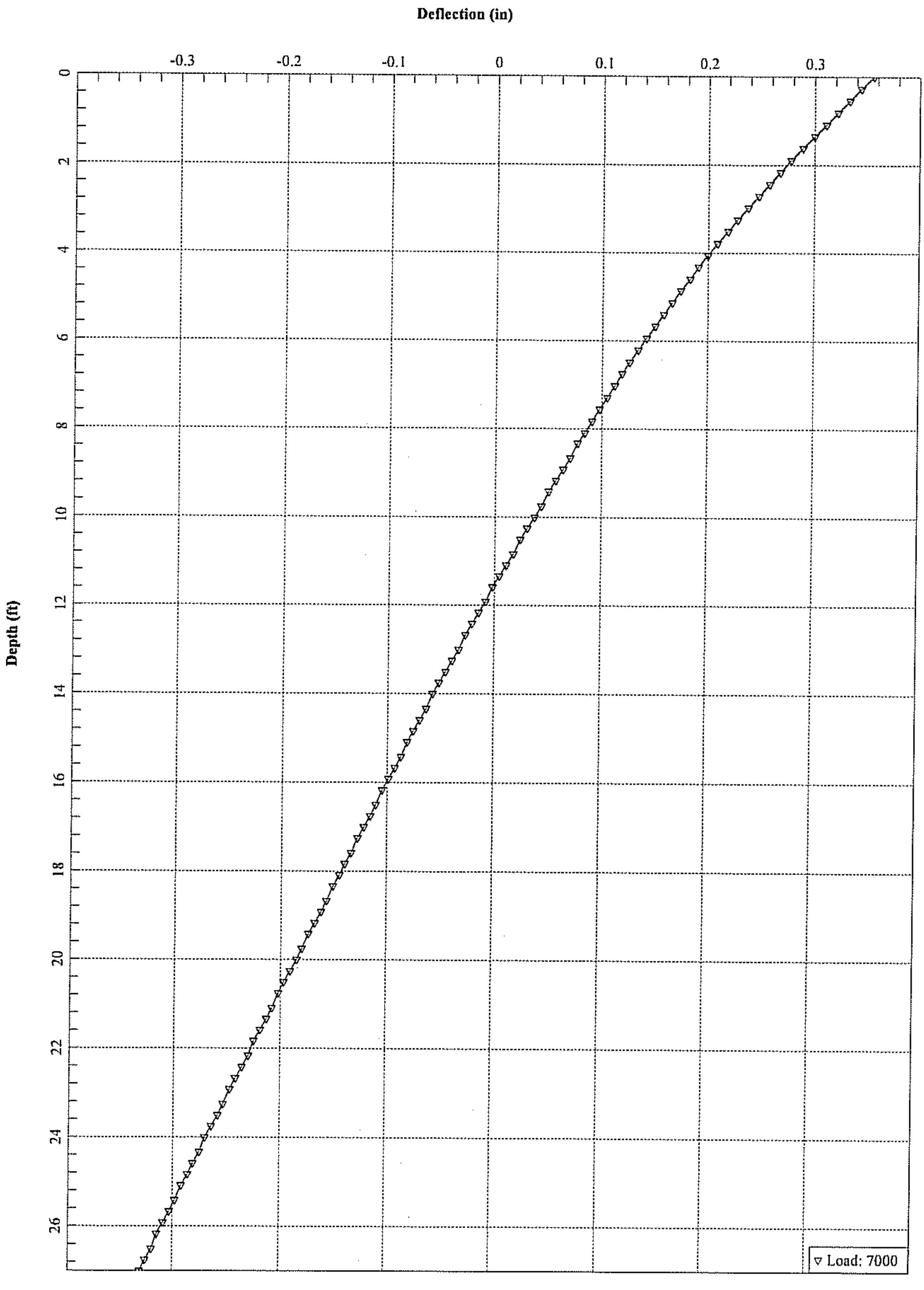
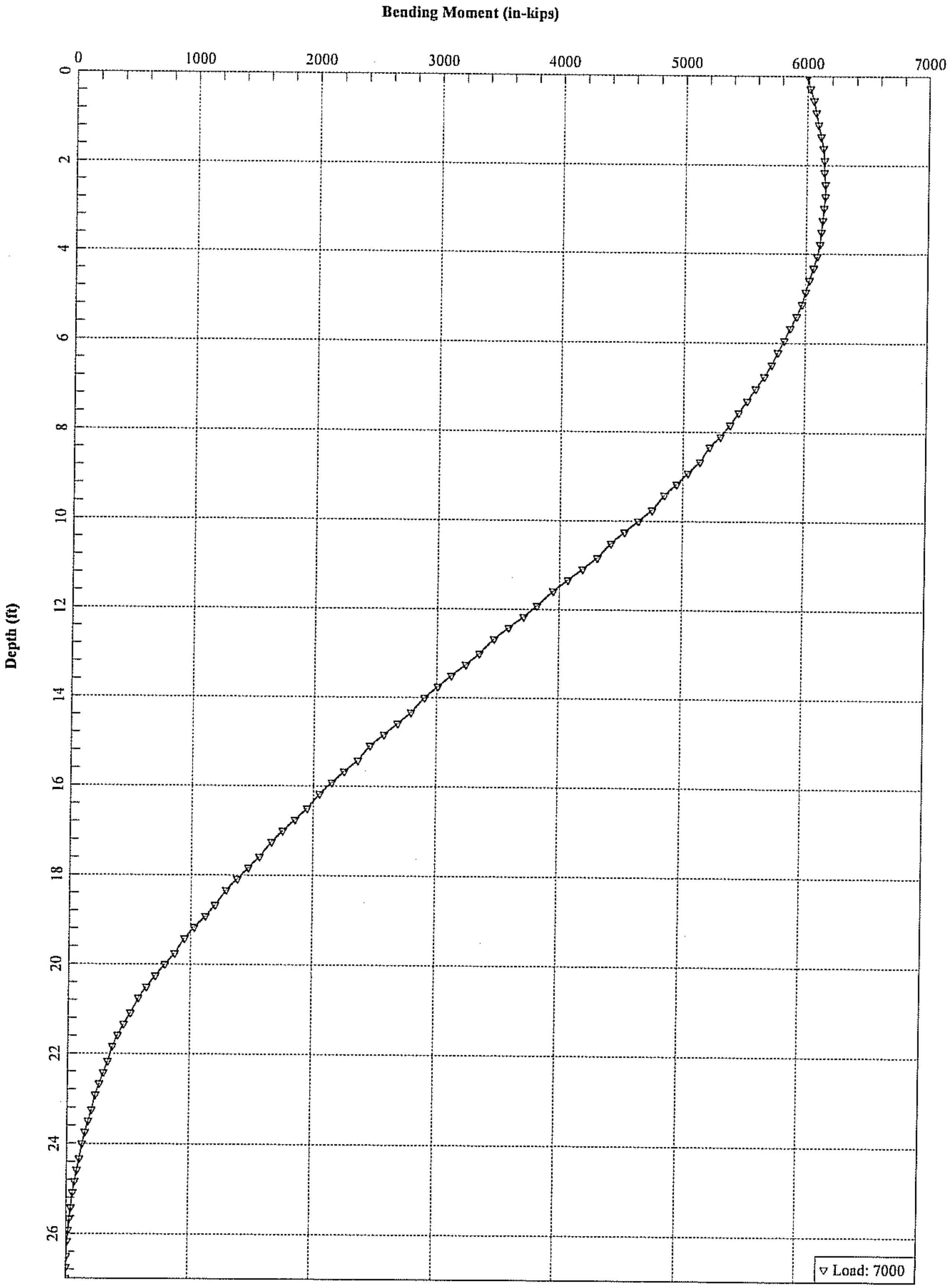
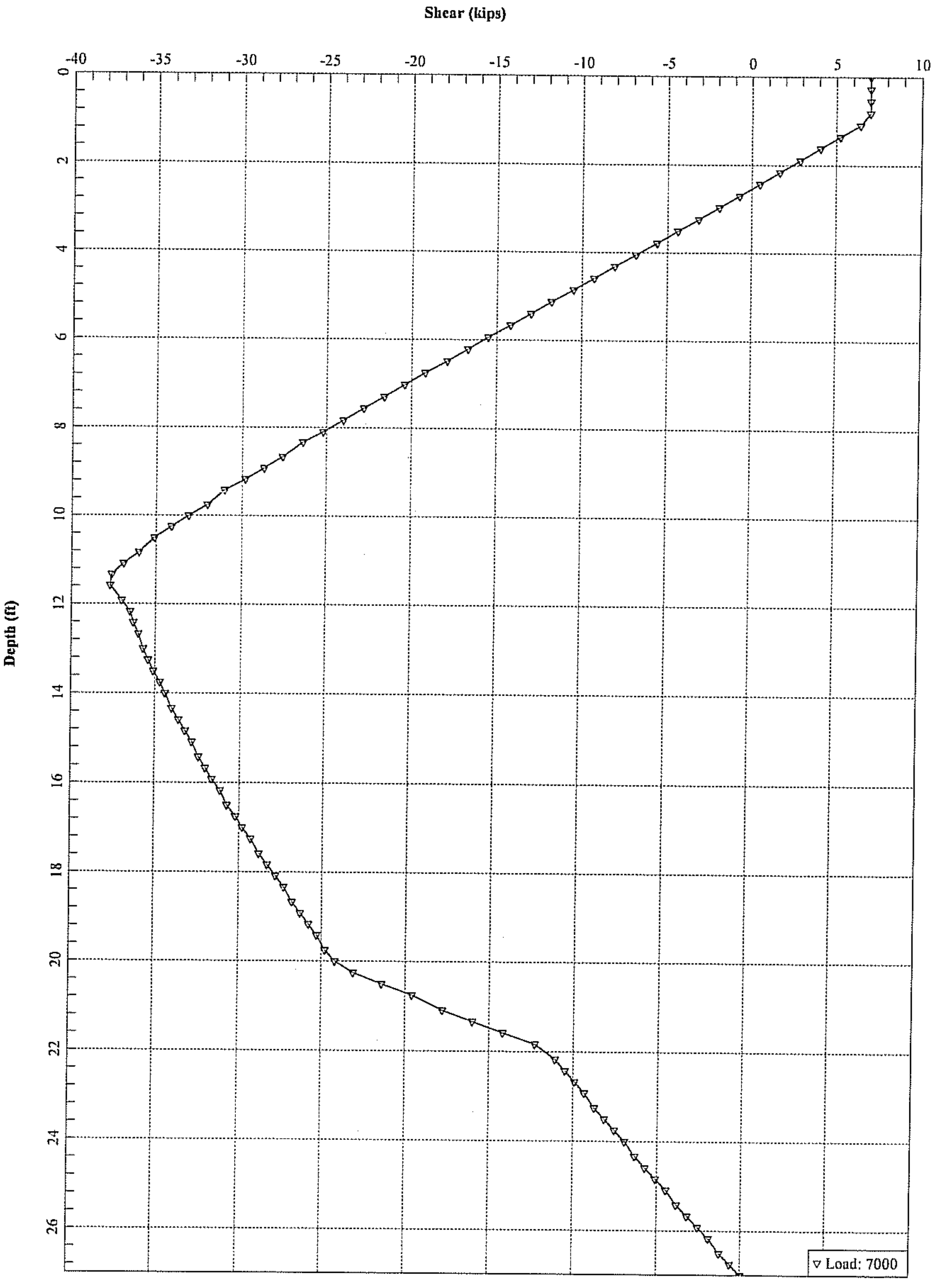
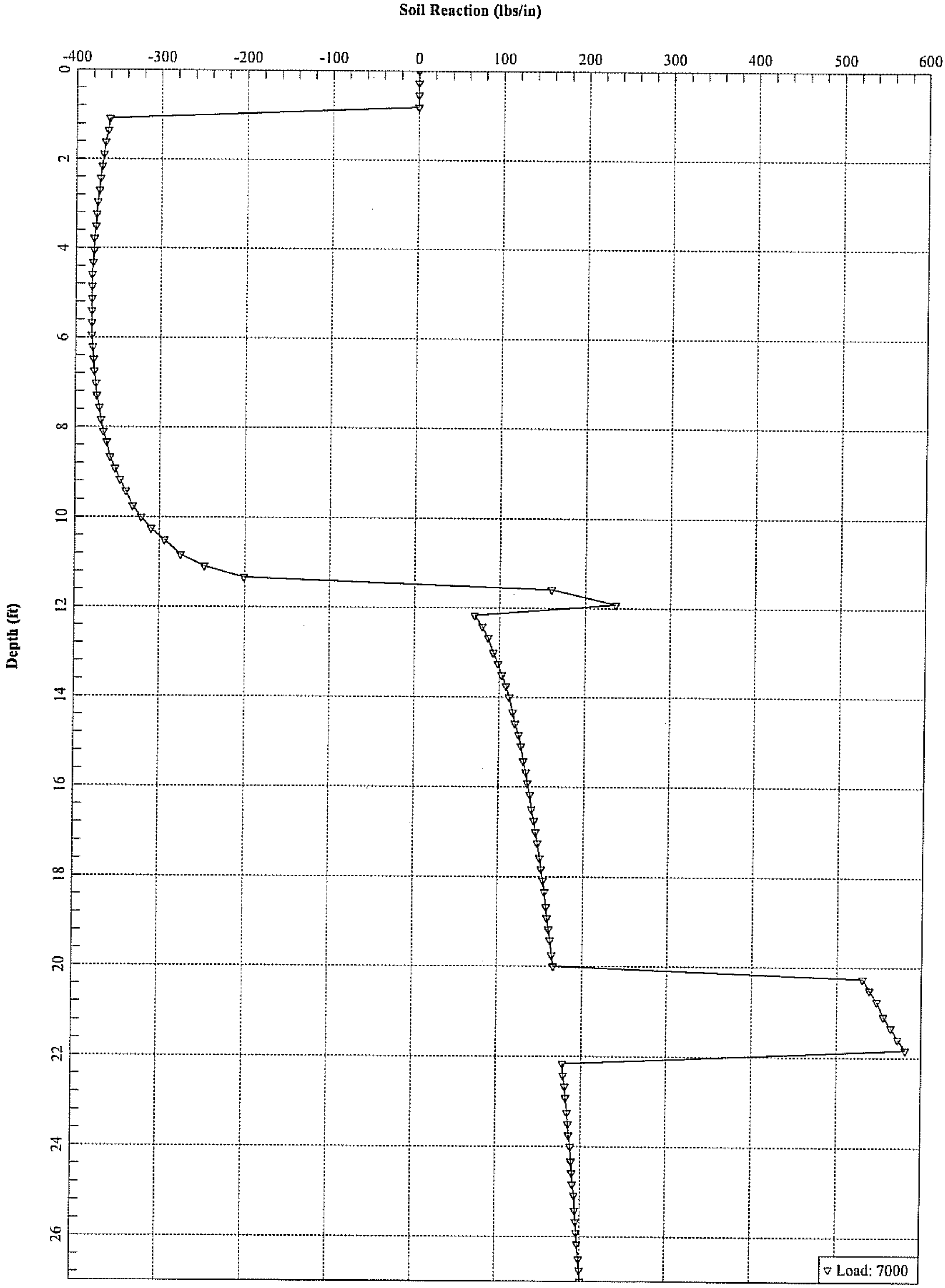
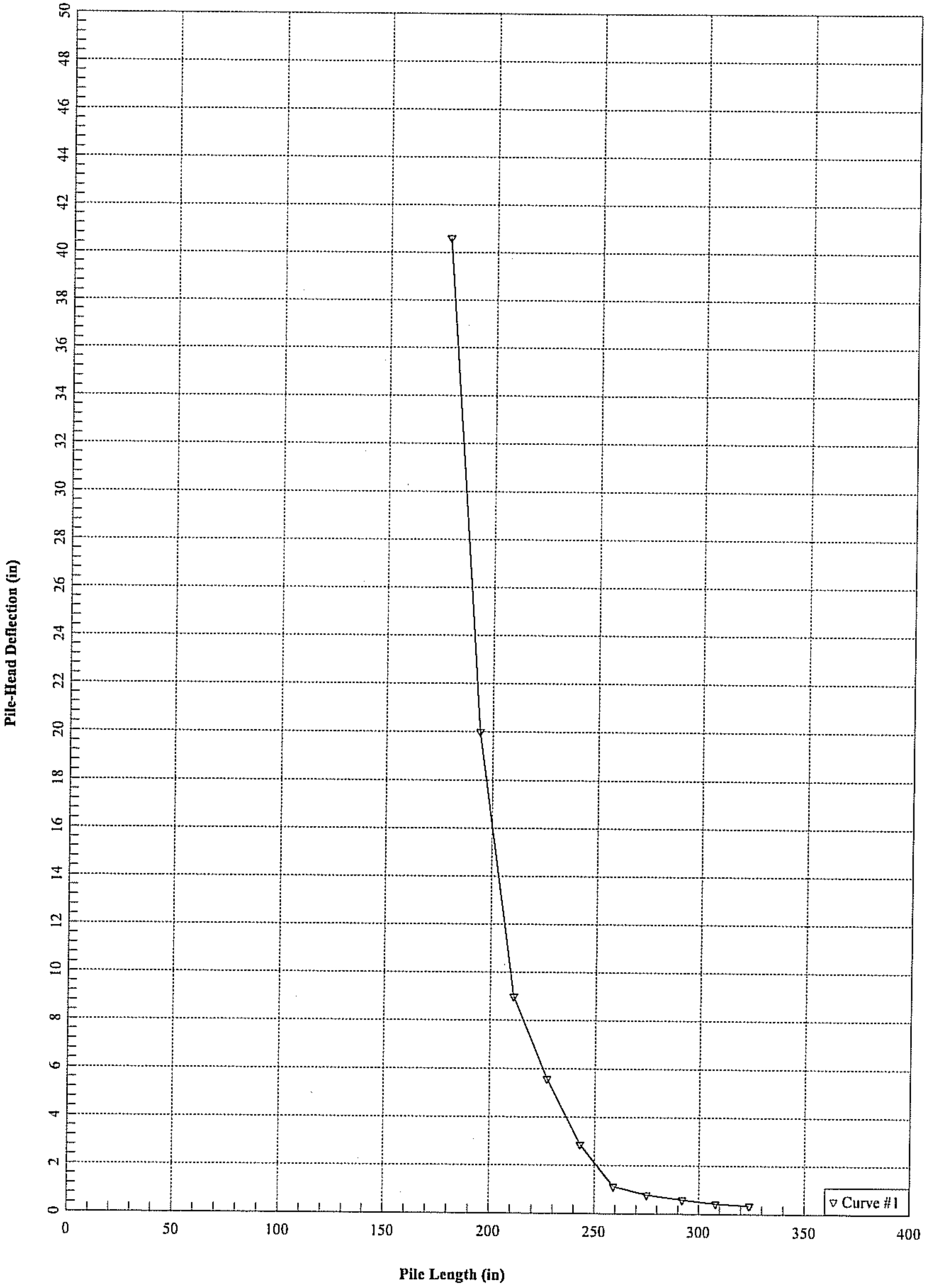


Deflection (in)
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load: 7000


Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load: 7000


Shear (kips)
-40
-35
-30
-25
-20
-15
-10
-5
0
5
10
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load: 7000


Soil Reaction (lbs/in)
-400
-300
-200
-100
0
100
200
300
400
500
600
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load: 7000


Pile-Head Deflection (in)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
0
50
100
150
200
250
300
350
400
Pile Length (in)
▿ Curve #1

APPENDIX J

SPECIAL PROVISIONS

THE INDIANA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

FOR

WICK DRAINS

Description:

This work shall consist of furnishing all necessary labor, equipment, and materials and performing all operations required for installation of prefabricated wick drains in accordance with the details shown on the plans and with the requirements of these specifications.

Material Requirements:

Prefabricated wick drains shall consist of a band-shaped plastic core which permits continuous vertical drainage, wrapped in a filter material and installed in the subsoils by displacement methods. Prefabricated wick drains acceptable for installation shall be the products known as Alidrain, Geodrain with polyester/cellulose filter, Mebradrain or Amerdrain or approved equal.

At least two weeks prior to construction, the Contractor shall submit documentation indicating the source of the drain materials. Prior to delivery of he materials to the site, the Contractor shall present the Engineer with a vendor’s purchase certificate for verification and a type “C” Certification.

Equipment:

Prefabricated drains shall be installed with approved modern equipment of a type which will cause a minimum of disturbance of the soil during the installation operation.

Each prefabricated drain shall be installed using a mandrel (or sleeve) which shall be advanced through the sand blanket and underlying soil.

The mandrel shall protect the drain from tears, cuts and abrasions during installation, and shall be retracted after each drain is installed. The mandrel shall be provided with an “anchor” rod or plate at the bottom to prevent the soils from entering the bottom of the mandrel during installation of the drain and to anchor the bottom of the drain at the required depth at the time of mandrel removal. The mandrel shall have a maximum cross sectional area of ten square inches. To minimize disturbance to the soil, the mandrel shall not be intruded into the soil using vibratory or impact methods.

At least two weeks prior to construction, the Contractor shall submit in writing to the Engineer for his review and approval, details of the sequence and method of installation. Approval by the Engineer will not relieve the Contractor of his responsibility to install the prefabricated drains in accordance with these specifications and manufacturer's recommendations.

Construction Methods:

Prior to installation of prefabricated drains within the areas designated on the plans, the Contractor shall demonstrate that his equipment, method, and materials produce a satisfactory drain installation in accordance with these specifications. For this purpose, the Contractor will be required to install up to ten trial drains in each test location as designated by the Engineer. The Contractor will be compensated for each trial drain if the installation satisfies the requirements of this specification. No compensation will be allowed for installing unsatisfactory trial drains.

Approval by the Engineer of the method and equipment used to install the trial drains shall not constitute, necessarily, acceptance of the method if the method of installation does not produce a drain which satisfies the project requirements. The Contractor shall alter his method and/or equipment as necessary to comply with these specifications.

The drains which do not require predrilling shall be installed following placement of the sand blanket as shown on the plans. The drains shall be installed to a depth corresponding to the bottom of the compressible layer shown on the drawings, or to such a depth where the soil resists further penetration under maximum effort of the installation equipment. The Engineer may vary the depths, spacing or the number of drains to be installed, and may revise the plan limits for this work as necessary.

The contractor shall be permitted to use augering or other methods to predrill or to loosen stiff upper soils prior to placement of the sand blanket. Placement of this sand blanket in areas where predrilling is required will follow placement of the wick drains.

The installation equipment shall be carefully checked for plumbness prior to advancing each drain. The plumbness of the mandrel shall not deviate more that one-eight ($^1/_8$) inch per foot from the vertical.

Drains that vary from their proper location by more than three inches or drains that are damaged during installation or subsequent construction, or drains that are improperly completed shall be rejected by the Engineer, and no compensation will be allowed for any materials furnished or for any work performed on such drains.

During installation, the Contractor shall provide the Engineer with suitable means of measuring the vertical length of prefabricated drain installed at a given location and deriving a tip elevation for each drain.

After installation, the Contractor shall cut each drain such that approximately six inches of drain material extends above the top of the sand blanket. The drain material shall be cut neatly at its upper end.

Prefabricated drains will be located, numbered, and staked out by the Contractor. The Contractor shall take all reasonable precautions to preserve the stakes. The locations of the drains shall not vary by more than three inches from the locations indicated on the drawing or as directed by the Engineer. Two weeks prior to construction, the Contractor shall submit shop drawings to the Engineer for his approval showing the method of field location, drain layout and numbering plan.

Where obstructions are encountered below the working surface which cannot be penetrated by the drain installation equipment, the Contractor shall complete the drain from the elevation of the obstruction to the working surface and notify the Engineer. At the direction of the Engineer, the Contractor shall attempt to install a new drain within an eighteen inch radius from the obstructed drain. A maximum of two additional attempts shall be made as directed by the Engineer. The Contractor will be compensated for each obstructed drain unless the drain is otherwise improperly installed, in which case no compensation will be allowed.

Documentation:

The Engineer shall keep a daily log which lists for each drain the date of installation, the top elevation, tip elevation, and pay length. A copy of each daily log shall be provided to the Contractor for his records.

Method of Measurement:

The quantity to be paid for under this item shall be the number of linear feet or linear meter of drain installed and accepted, computed from the top of the sand blanket to the tip elevation of the drains. In case of obstructions, the Contractor will be paid at the contract price for the number of linear feet or linear meter of drain measured from the top of the drainage blanket to the elevation at which the obstruction was encountered.

Basis of Payment:

The unit bid price per linear foot or linear meter for the item, “Wick Drain”, shall include the cost of furnishing all tools, materials, labor and equipment necessary to complete the work in accordance with the Plans and Specifications. No payment shall be made for unacceptable drains, unacceptable trial drains, or delays or expenses incurred by the Contractor, through changes necessitated by improper or unacceptable material or equipment.