FAYETTE County
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Purchasing Department
140 Stonewall Avenue West, Ste 204
Fayetteville, GA 30214
Phone: 770-305-5420
www.fayettecountyga.gov

October 5, 2023

Subject: ITB #2314-B: FCWS – Trilith Studios Elevated Water Storage Tank Addendum #1

Gentlemen/Ladies:

Below, please find responses to questions, clarification, or additional information for the above referenced Invitation to Bid. You will need to consider this information when preparing your bid.

Specifications:

Item S1. **Add** Exhibits section of specifications included in Attachment 1 of Addendum 1.

Questions:

1. **Will there be any 3rd party inspection on construction or painting? If so, who will it be and on what portion of work? Who will bear the cost?**
   Response: Yes 3rd party inspection on construction or painting will be included in the contract. Refer to 01 45 29, Testing Laboratory Services for who will be doing 3rd party inspections and who will pay for the services.

2. **Has an Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) been filed with the FAA? If one has been filed and completed, are the results available? If there has not been one completed, please notify the Owner that one must be completed by the Owner for the permanent structure prior to the Contractor mobilizing on site.**
   Response: Filing with the OE/AA is not required for the permanent tank structure. The notice criteria tool results are provided in Attachment 2 of Addendum 1. The contractor will need to file with the OE/AAA for any crane used during construction that is taller than 200-ft.

3. **Is instrumentation included at this time?**
   Response: No

4. **Please confirm tank drain is 8" diameter.**
   Response: Tank drain is 8" diameter.

Received by (Name): _____ Company_____

Note: If this addendum is not returned to the Fayette County Purchasing Department or if it is returned not signed, responding individuals, companies or other organizations will still be responsible for the requirements of this addendum and the specifications or changes herein.

The opening date for this ITB has not changed. **The opening time and date are 3:00 p.m., Thursday, October 12, 2023.** Bids must be received by the Purchasing Department at the address above, Suite 204, at or before the opening date and time.

The deadline for inquiries has passed, so the Purchasing Department will not be able to accept any additional questions after this time.

If you have questions, please contact Natasha Duggan, Contract Administrator at (770) 305-5150, fax (770) 719-5534 or email at nduggan@fayettecountyga.gov.

Sincerely,

Ted L. Burgess
Director of Purchasing

EXHIBITS

OASIS
CONSULTING
SERVICES

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

TRILITH STUDIOS ABOVE GROUND STORAGE TANK
461 SANDY CREEK ROAD
FAYETTEVILLE, GEORGIA

Oasis Project No. 224927

Prepared For:
Arcadis
2839 Paces Ferry Road SE
Suite 900
Atlanta, Georgia 30339

Prepared By:
Oasis Consulting Services
45 Woodstock Street
Roswell, Georgia 30075

October 4, 2022

OASIS
CONSULTING
SERVICES

October 4, 2022

Arcadis
2839 Paces Ferry Road SE
Suite 900
Atlanta, Georgia 30339

Attention: Mr. Travis Thomas

Subject: **Report of Subsurface Exploration and Geotechnical Engineering Evaluation**
Trilith Studios Above Ground Storage Tank
461 Sandy Creek Road
Fayetteville, Georgia
Oasis Project No. 224927

Dear Travis:

Oasis Consulting Services (Oasis) is pleased to provide this report of our subsurface exploration and geotechnical engineering evaluation for the above referenced project. The field study and this report were accomplished in general accordance with Oasis Proposal No. P22082 dated May 25, 2022.

The following report presents a brief summary of our pertinent findings and recommendations followed by our understanding of the proposed construction, methods of exploration employed, site and subsurface conditions encountered, and conclusions and recommendations regarding the geotechnical aspects of the project. We request that we be provided with a copy of the approved plans for review to verify that the design recommendations are incorporated into the design. We will also be able to make supplemental recommendations to address conditions that were not known at the time this report was prepared.

Should you have any questions regarding items discussed in this report, please do not hesitate to contact the undersigned.

Sincerely,
Oasis Consulting Services

Andrew W. Graff, E.I.T.
Project Engineer
GA Registration #: EIT027799

Darren J. Bray, P.E.
Technical Director
GA Registration #: PE038504

GEORGIA REGISTERED No. PE038504 PROFESSIONAL ENGINEER DARREN J. BRAY

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1.0 SUMMARY

A brief summary of pertinent findings, conclusions and recommendations are presented below. This information should not be utilized in design without first referring to the more detailed expansion of these ideas presented in the text of this report.

1.1. For the purpose of this report, we anticipate the construction of a 0.25-to-0.5-million-gallon elevated water storage tank for Fayette County. The water storage tank will be located on a 0.6-acre site within the Trilith Studios development in Fayetteville, Georgia. No other details of the proposed construction were available at the time this report was prepared.

1.2. General subsurface conditions encountered by the borings consist of topsoil, aggregates, residual soils, partially weathered rock (PWR), and groundwater. Boring B-3 encountered approximately 3 inches of surficial topsoil and associated root zone. Borings B-1 and B-2 encountered about 7 to 18 inches of surficial gravel or gravel/soil mix. Residual soils were encountered in all soil test borings below the surficial topsoil or gravel layer. The residuum extended to partially weathered rock or to the planned boring termination depths of up to 100 feet below existing grade. Partially weathered rock was encountered in boring B-2 and at a depth 82 feet below existing grade and extended to the boring termination depth of 100 feet below existing grade. A PWR-like material was reported by the drill operator at a depth of approximately 90 feet below existing grade in boring B-3; however, SPT sampling was not performed due to excessive water pressure. Groundwater was encountered at the time of drilling in all soil test borings at depths ranging from 38 to 43 feet below existing grade. After varying delay periods, the groundwater levels were remeasured and found to range from 29 feet to 37 feet below existing grades.

1.3. **Based on the anticipated foundation loads and the subsurface conditions encountered, shallow foundation support of the structure is not a suitable option. We anticipate supporting the proposed elevated water storage tank on a conventional deep foundation system such as auger cast in place piles (ACIPs) or driven piles. Once final loads are established, we can provide further information regarding foundation types, capacities, and expected settlements.**

1.4. Another concern is related to the presence of elastic silts (MH) encountered in the upper 5 feet of boring B-2. Elastic soils may be reused as structural fill but should not be placed immediately beneath footings, slabs, and/or paved areas due to their moisture sensitivity and potential volume change. We recommend maintaining a minimum of 24-inch-thick layer of separation between the bottom of slabs-on-grade and a 12-inch-thick layer of separation between pavements and shallow footings and the top of the elastic silt layer. After mass grading, where elastic material exists near footings, slabs, or pavement elevations, it should be undercut and replaced with approved

structural fill (PI less than 30) or compacted graded aggregate base stone. Moisture conditioning will be a critical factor in achieving minimum density criteria, as such, we recommend grading take place during warmer times of the year

1.5. For slab-on-grade design, we recommend a modulus of subgrade reaction of 125 pci. An Oasis geotechnical engineer should carefully evaluate all subgrade conditions prior to fill placement or at-grade construction. In the event that soft soils or materials containing deleterious materials are encountered in other areas at the time of construction, typical recommendations would include undercutting and replacing with structural fill or stabilizing in place.

1.6. The on-site residual soils visually appear suitable for reuse as structural fill. Based on the local geology, the on-site soils are typically moisture sensitive and may be more problematic to work with should earthwork operations take place during periods of wet weather. Moisture control may be necessary, primarily depending on the weather conditions at the time of construction. In addition, a significant amount of the residual soils encountered at depths greater than about 18 feet below the existing ground surface were noted as wet. If wet soils are excavated for reuse as structural fill, drying of these soils will likely be required prior to reuse.

1.7. An Oasis geotechnical engineer should carefully evaluate all subgrade conditions prior to fill placement or construction. If soft soils or materials containing deleterious materials are encountered in other areas at the time of construction, typical recommendations would include undercutting and replacing with structural fill or stabilizing in place. New fill should be compacted to 95 percent of the standard Proctor (ASTM D 698) maximum dry density. Compaction of the subgrade immediately beneath grade slabs and pavements should be increased to 98 percent.

1.8. The site class is based on the Site Class Definitions in Section 1613.2.2, Design Spectral Response Acceleration Parameters in Section 1613.2.4, and Determination of Seismic Design Category in Section 1613.2.5 of the 2018 International Building Code. Based on the standard penetration resistance data from the borings, we recommend that **Site Class "D"** be used for the seismic design considerations.

1.9. Additional recommendations relative to earth pressures, slopes, site preparation, and foundation construction are discussed in the report.

2.0 PROPOSED CONSTRUCTION

Based on our correspondence with you, we understand that you are planning to provide design services for a 0.25-to-0.5-million-gallon elevated water storage tank for Fayette County. The water storage tank will be located on a 0.6-acre site within the Trilith Studios development in Fayetteville, Georgia. No other details of the proposed construction were available at the time this report was prepared.

3.0 METHODS OF EXPLORATION

To evaluate the subsurface conditions, the property was explored by a combination of a visual site reconnaissance and drilling a total of three (3) soil test borings to depths of 100 feet below the existing grade. The borings were located in the field using handheld GPS and by measuring distances and estimating directions from identifiable site features. Therefore, their locations as shown on the Boring Location Plan in the Appendix should be considered approximate.

The borings were advanced using a power rotary drill and twisting continuous hollow stem auger flights into the ground. At selected intervals, Standard Penetration Tests (SPT) were performed in general accordance with ASTM standard D-1586 by driving a standard 1-$^3/_8$" I.D. (2" O.D.) split spoon sampler with an automatic 140-pound hammer falling 30 inches. The number of hammer blows needed to drive the sampler 18 inches, in 6-inch increments, was recorded. The Standard Penetration Test value or "N" value is the summation of the last two 6-inch increments and is shown on the boring logs adjacent to their corresponding depths. In very dense soils or partially weathered rock, the sampler is driven a few inches instead of the 6-inch increment and the number of blows needed versus the penetration depth is recorded. The results of the penetration tests, when properly evaluated, provide an indication of the relative consistency of the soil being sampled, the potential for difficult excavation, and the soil's ability to support loads.

Soil samples recovered during the drilling process were returned to Oasis' lab where they were visually classified in general accordance with the Unified Soil Classification System (USCS). Detailed descriptions of the materials encountered at each boring location, along with a graphical representation of the Standard Penetration Test results, are shown on the Boring Logs in the Appendix.

Elevations on the Boring Logs were interpolated from available Fayette County GIS maps and should be considered approximate. If encountered, groundwater depth was measured at the time of drilling, at completion of drilling, and, if possible, after a 24-to-96-hour delay.

4.0 SITE DESCRIPTION, GEOLOGY AND SUBSURFACE CONDITIONS

4.1 SITE DESCRIPTION

The site is located within the Trilith Studios development east of the intersection of Veterans Parkway and Iver Place in Fayetteville, Georgia. At the time of our field work, the site was cleared with a mix of grass and scrub vegetation. The site is primarily flat with steep slopes along the south and east peripheries.

4.2 GEOLOGY

The site is located in the Piedmont Physiographic Province of Georgia, an area underlain by ancient igneous and metamorphic rocks. The residual soils in the Piedmont are the result of the chemical and physical weathering of the underlying parent rock. The weathering profile usually results in fine-grained clayey silts and silty clays near the surface, where weathering is more advanced. With depth, sandy silts and silty sands are found, often containing mica. Below the residual soils, partially weathered rock is often found as a transition above relatively unweathered rock. In local practice, partially weathered rock is arbitrarily defined as residual soils with Standard Penetration Resistances in excess of 100 blows per foot (50 blows per 6 inches), and which can be penetrated by a power auger. The upper surface of bedrock is generally very erratic and the depth at which bedrock is encountered can vary greatly. Typically, bedrock is encountered at shallow to moderate depths. This typical profile can be altered by the process of erosion and deposition and recent development.

4.3 SUBSURFACE CONDITIONS

The subsurface conditions encountered during this study are generally typical of those described in the previous geology section of this report. Topsoil, gravel, residual soils, partially weathered rock (PWR), and groundwater were encountered in the soil test borings. The following briefly describes the subsurface conditions encountered.

4.3.1 TOPSOIL

Topsoil is a dark-colored surficial material with a high organic content and is generally unsuitable for structural support. Boring B-3 encountered approximately 3 inches of surficial topsoil and associated root zone. Measurable amounts of surficial topsoil were not encountered at the remaining boring locations, likely due to previous grading activities. Some variation in topsoil thickness should be anticipated during site stripping operations.

4.3.2 AGGREGATES

Borings B-1 and B-2 encountered about 7 to 18 inches of surficial gravel or gravel/soil mix.

4.3.3 RESIDUUM

Residuum is a term used to define soils formed in-place by the chemical and physical weathering process of the underlying rocks. Residual soils were encountered in all soil test borings below the surficial topsoil or gravel layer. The residuum extended to partially weathered rock or to the planned boring termination depths of up to 100 feet below existing grade. The residuum was typically classified as silty sand (SM), sandy silt (ML), and/or clayey sand (SC) with varying amounts of mica. Most of the residual soils below depths of about 22 feet were noted as wet.

Standard Penetration Test results ranged from 0 to 40 bpf with typical values ranging between 10 and 18 bpf. Based on SPT results, the consistency of the residuum would be considered low to moderately low consistency.

4.3.4 PARTIALLY WEATHERED ROCK

Partially weathered rock (PWR) is defined as residual material exhibiting standard penetration resistances of 50 blows per 6 inches or less penetration that can be penetrated by a power auger. Partially weathered rock is generally a transition zone between residual soils and bedrock. Partially weathered rock was encountered in boring B-2 and at a depth 82 feet below existing grade and extended to the boring termination depth of 100 feet below existing grade. The PWR was generally sampled as very dense silty sand (SM). A PWR-like material was reported by the drill operator at a depth of approximately 90 feet below existing grade in boring B-3; however, SPT sampling could not be performed due to excessive water pressure.

4.3.5 GROUNDWATER

Groundwater was encountered at the time of drilling in all soil test borings at depths ranging from 38 to 43 feet below existing grade. After varying delay periods, the groundwater levels were remeasured and found to range from 29 feet to 37 feet below existing grades. All three boreholes were found to have caved at depths ranging from 41 feet to 53 feet below existing grade. The caved depths are generally an indication of the elevation of stabilized groundwater. Fluctuations in measured groundwater elevations of 5 feet or more are common in this geology due to seasonal fluctuations and could be encountered at higher elevations in the future.

Table 1: Soil Test Boring Summary

Boring ID	Existing Elev. (ft)	Boring Depth (ft)	PWR Depth (ft)	Refusal Depth (ft)	Groundwater Depth - initial (ft)	Groundwater Depth - final (ft)
B-1	872	100	-	-	38	36
B-2	874	100	82	-	43	37
B-3	875	100	90	-	40	32

- Not Encountered

4.4 LABORATORY TEST RESULTS

The laboratory test results indicate that most of the soils encountered at this site are classified as silty sands (SM) or sandy silts (ML/MH). The percentage of fines (% passing #200 sieve) ranged from 38.2 to 67.7 percent. The results of the Atterberg Limit testing indicate that four (4) of the five (5) samples were non-plastic soils. The remaining Atterberg Limit test indicated a Liquid

Limit (LL) of 65 and a Plasticity Index (PI) 18. As a result, the soils range from non-plastic to highly plastic.

A copy of the laboratory testing procedures is provided in Appendix B. A summary of the Laboratory test results and test reports are included in Appendix D of this report.

The conditions described in the preceding paragraphs, and those shown in the Appendix, have been based on interpolation of the results of the previously described data using generally accepted principles and practices of geotechnical engineering. However, conditions in this geology may vary intermediate of the tested locations and even more so on previously filled property.

Although individual soil test borings are representative of the subsurface conditions at the precise boring and test pit locations on the day(s) performed, they are not necessarily indicative of the subsurface conditions at other locations or other times. The nature and extent of variation between the borings and test pits may not become evident until the course of construction. If such variations are then noted, it will be necessary to reevaluate the recommendations of this report after on-site observation of the conditions.

5.0 CONCLUSIONS AND RECOMMMENDATIONS

The following conclusions and recommendations are based on the data gathered during this exploration, our understanding of the proposed construction, our experience with similar site and subsurface conditions and generally accepted principles and practices of geotechnical engineering. Should the proposed construction change significantly from that described in this report, we request that we be advised so that we may amend these recommendations accordingly. This report, and the conclusions and recommendations provided herein, are provided exclusively for the use of Arcadis and their design team and is intended solely for design of the referenced project.

5.1 GENERAL

Although structural loads have not been provided to Oasis, based on the nature of the project we expect foundation loads will be significant. As such, we anticipate the use of deep foundation elements to support the planned elevated storage tank. Based on the boring data, we do not anticipate end-bearing support of the deep foundation elements above 100 feet below existing grade.

Another concern is related to the presence of elastic silts (MH) encountered in the upper 5 feet of boring B-2. Elastic soils may be reused as structural fill but should not be placed immediately beneath footings, slabs, and/or paved areas due to their moisture sensitivity and potential volume

change. We recommend maintaining a minimum of 24-inch-thick layer of separation between the bottom of slabs-on-grade and a 12-inch-thick layer of separation between pavements and shallow footings and the top of the elastic silt layer. After mass grading, where elastic material exists near footings, slabs, or pavement elevations, it should be undercut and replaced with approved structural fill (PI less than 30) or compacted graded aggregate base stone. Moisture conditioning will be a critical factor in achieving minimum density criteria, as such, we recommend grading take place during warmer times of the year.

The on-site residual soils visually appear suitable for reuse as structural fill. Based on the local geology, the on-site soils are typically moisture sensitive and may be more problematic to work with should earthwork operations take place during periods of wet weather. Moisture control may be necessary, primarily depending on the weather conditions at the time of construction. In addition, a significant amount of the residual soils encountered at depths greater than about 18 feet below the existing ground surface were noted as wet. If wet soils are excavated for reuse as structural fill, drying of these soils will likely be required prior to reuse.

5.2 SITE PREPARATION

As an initial step in site preparation, all trees and unwanted vegetation should be removed, stumps grubbed, and organic topsoil stripped in all areas of at-grade construction or areas to receive fill. Existing utilities should be rerouted around the proposed building location or removed so as not to negatively impact the new development. Any excavations created to demolish existing utilities should be properly backfilled according to the earthwork recommendations contained in this report.

Subgrades should be evaluated by an Oasis geotechnical engineer prior to at-grade construction or fill placement. The evaluation process should include proofrolling the subgrade with a fully loaded tandem axle dump truck (20 tons) during a period of dry weather and under the observation of the geotechnical engineer. Any areas which "pump" or "rut" excessively under the weight of the proofrolling vehicle should be further evaluated. After evaluation by Oasis, remedial options could include recompaction, undercutting and replacing with soil and/or rock, partial over-excavation with geogrid placement, or drying and recompaction. Proofrolling can occasionally detect pits where stumps or other debris may have been buried, or other areas where weak surface conditions exist. If encountered, weak soils should be evaluated by Oasis and remedial options could include replacing with structural fill or compacted crushed stone. As needed, backhoe test pits or hand augers with Dynamic Cone Penetrometer (DCP) testing can be used to delineate any unsuitable material found during proofrolling.

5.3 EARTHWORK

The residual soils on the property appear suitable for reuse as structural fill based on visual examination. Any topsoil or otherwise organic-laden soils may be reused in non-structural areas of the site such as landscape areas or slopes. Most of the residual soils encountered contain varying amounts of mica. These soils are typically more moisture sensitive and can often be problematic to work with especially during periods of wet weather. In addition, we anticipate that a significant amount of the residual soils encountered below a depth of approximately 18 feet may contain excessive moisture contents and will likely require adequate drying prior to reuse as structural fill.

Where fill is placed against slopes steeper than 5H:1V, it will be necessary to "bench" the new fill into the existing soils to insure an adequate bonding of the fill with the existing material. Inadequate benching may create a predefined plane of weakness and adversely affect slope stability.

All structural fill should be compacted to at least 95 percent of the soil's standard Proctor maximum dry density, as determined by ASTM standard D-698. The upper one foot of fill which will support structures, pavements or slabs-on-grade should be compacted to at least 98 percent of the soil's standard Proctor maximum dry density for improved support. Further, the fill material should have a maximum dry density of 90 pcf or above. In areas which are at or above the finished grade, and which will support pavements or slabs, the upper 8 inches immediately below these systems should be scarified and recompacted to the 98 percent criteria. Structural fill should be free of topsoil, organic materials, or highly plastic silts and clays, have a liquid limit (LL) less than 40 and a plasticity index (PI) less than 20 and contain rock sizes no larger than 4 inches. Unacceptable materials removed during grading operations should be either stockpiled for later use in landscaped areas or placed in approved disposal areas either on site or off site.

Fill operations should be observed on a full-time basis by an Oasis soils technician and density testing should be performed to determine the degree of compaction and to verify compliance with the project specifications. Fill materials should be placed in loose lifts not exceeding 8 inches and moisture conditioned to within 3 percent of the optimum moisture content to facilitate proper compaction. For underfloor areas, at least one field density test should be made per 2,500 square feet of fill area for each two-foot lift. Testing frequency should be increased in confined areas. Areas which do not meet the compaction specifications should be recompacted to achieve compliance. In confined areas, such as utility trenches, the use of portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve compaction.

5.4 GROUNDWATER CONTROL

Groundwater was encountered at depths ranging from approximately 29 feet to 43 feet below the existing ground surface and may be encountered at higher elevations in the future due to seasonal fluctuations.

If encountered, temporary groundwater control may be required in the lower elevations during excavations for underground utilities, foundations, and slabs. Groundwater should be properly controlled such that it is maintained 2 feet to 3 feet below the bottom of proposed excavations. Pumping from sumps in the excavations may suffice for limited depths of dewatering; however, deeper excavations may require systems such as deep wells or well points.

5.5 FOUNDATIONS

Based on the anticipated foundation loads and the subsurface conditions encountered, shallow foundation support of the structure is **not** a suitable option. **We anticipate supporting the proposed elevated water storage tank on a conventional deep foundation system such as auger cast in place piles (ACIPs) or driven piles. Once final loads are established, we can provide further information regarding foundation types, capacities, and expected settlements.**

An Oasis geotechnical engineer should observe deep foundation construction operations to verify that the foundation system is installed in accordance with the plans and specifications. Engineering inspection is considered critical to the success of the foundation system installation and performance.

We recommend the installation criteria for the piles be verified by an Oasis engineer by performing a load test in general accordance with ASTM D1143. The load test location should be selected after installing two probe piles throughout the water storage tank footprint. The probe piles would assist the pile contractor and geotechnical engineer in evaluating the equipment and pile response to the specific site conditions and in determining tentative installation criteria for the test pile. All production piles should be placed using the same procedures and equipment used for installation of the test pile. If ultimate uplift loads are to be in excess of 1/8th of the vertical capacity, a modified load test must be performed on a separate pile to verify tensile or uplift capacity.

It is recommended that the installation of the probe piles, test pile(s) and all production piles be monitored by a representative of Oasis. The installation of auger-cast piles should be sequenced such that adjacent piles within the same cap should not be constructed within the same 24-hour period. This is required to provide adequate time for curing. Minimum center-to-center spacing between driven piles should be three (3) times the maximum pile diameter.

5.6 SOIL SUPPORTED SLABS

After successful completion of the site preparation measures slabs-on-grade may be soil supported. We recommend a modulus of subgrade reaction of 125 pci for use in the slab design. Due to the underlying low-consistency residual soils, we recommend a minimum of 6 inches of crushed stone beneath the slab to address slab performance issues. The crushed stone should be compacted to a minimum of 98% Modified Proctor Test (ASTM D698). Prior to at-grade construction, the subgrade soils should be evaluated by an Oasis representative. Unstable material should either be removed and replaced or scarified and recompacted. The extent of undercutting can be determined at the time of construction. We also recommend that a vapor barrier be placed beneath the slab to prevent the infiltration of soil moisture into finished areas.

5.7 TEMPORARY AND PERMANENT SLOPES

Temporary and permanent slopes may be used to accommodate grade changes. If temporary slopes are used, they should be constructed no steeper than 1.5H:1V for slopes less than 15 feet high. Permanent slopes should be constructed no steeper than 2H:1V for slopes less than 20 feet high. These recommendations are based on our experience with similar conditions and no detailed slope stability analyses have been performed. Further, these recommendations assume that no groundwater or seepage is present in the proposed slope location. If groundwater or seepage is present, then a detailed slope stability analyses will need to be performed. Likewise, if the maximum slope heights indicated in this section are exceeded then a detailed slope stability analysis will need to be performed. Buildings should be set back at least 10 feet from the top of slopes; a minimum 5-foot setback is considered sufficient for pavement areas. All finished slopes should be suitably protected from erosion.

5.8 LATERAL EARTH PRESSURES

Lateral earth pressures imposed on a retaining wall are a function of the soil properties, the inclination of the backfill behind the retaining wall, any surcharge loads applied behind the wall, and the amount of deflection the wall system can undergo. Lateral earth pressures developed from the "active" condition are applicable for design of temporary or permanent free-standing retaining walls, if adequate wall movement can occur to fully mobilize the shear strength of the retained soil. Permanent laterally restrained walls, such as basement walls, should be designed for pressures using the full "at-rest" case. The following equivalent fluid pressures are based on our experience and correlations with our field testing. Site specific laboratory soil strength testing was not performed for this project. However, based on the conditions found, the following equivalent fluid pressures are recommended using a horizontal backfill configuration with no surcharge loads

and providing "typical" Piedmont soils (silty sand and sandy silt) are used for backfill. We assume the soils have a moist unit weight of 120 pounds per cubic foot (pcf), an angle of internal friction (ϕ) of 28 degrees and a sliding coefficient of friction of .45 x N where N is the vertical force component of the foundation system per linear foot. For concrete on soil, a sliding coefficient of friction of 0.53 may be used in the *ultimate design value* of the retaining wall.

Earth Pressure Condition	Earth Pressure Value	Recommended Equivalent Fluid Pressure (psf/f) Above Groundwater	Recommended Equivalent Fluid Pressure (psf/f) Below Groundwater
Active (K_A)	0.36	45	85
At-Rest (K_O)	0.53	60	90
Passive (Kp)	2.77	160*	160*

*safety factor of at least 2 for material properties and service criterion

Heavy compaction equipment should not be used to compact backfill immediately behind any retaining wall, unless the wall is designed for the increased pressure. Retaining wall backfill should be compacted to at least 95% of the soil's standard Proctor maximum dry density; therefore hand operated compaction equipment will be necessary in these areas. Areas exposed to groundwater or surface infiltration of water should include a properly filtered footing and wall drain. The drain should include a perforated schedule 40 PVC pipe, placed in clean crushed stone, encapsulated in a 4-ounce needle-punched nonwoven filter fabric.

For structures supported on shallow foundations, lateral loads can be resisted by passive pressures against the face of the foundation or sliding resistance on the base of the footing. Because significant wall movements are required to develop the passive pressure, the recommended passive equivalent fluid pressure (160 psf/f) is one-half of the total calculated passive pressure, a safety factor of at least 2. Additional resistance to movement can be gained by developing sliding friction on the base of the footing and an allowable friction factor of 0.35 may be used. This includes a factor of safety of about 1.5. If the structural engineer is designing according to the International Building Code (IBC) 2018, the structural engineer can increase the values for passive pressure and sliding friction factor to 250 psf and 0.4, respectively. These values have a factor of safety for material properties but no service criterion factor of safety since the service criterion factor of safety is accounted for in the structural calculations per the IBC code.

5.9 SEISMIC SITE CLASSIFICATION

We have been asked to provide the Site Class as defined by the *International Building Code 2018* as adopted by the State of Georgia. The following recommendations are based on the Site Class Definitions in Section 1613.2.2, Design Spectral Response Acceleration Parameters in Section

1613.2.4, and Determination of Seismic Design Category in Section 1613.2.5 of the *2018 International Building Code and Section 11.4.7 of ASCE 7.* Based on the boring data, the site does not correspond to any of the categories for Site Class "F". Since there is not a total thickness of soft clay greater than 10 feet, the site does not meet the requirements for Site Class "E". Therefore, based on the standard penetration resistance data from the borings, we recommend that **Site Class "D"** be used for seismic design considerations.

5.10 LIQUEFACTION POTENTIAL AT THE SITE

Under cyclic loading (i.e., during an earthquake) loose non-cohesive materials (gravels, sands, silty-sands) tend to decrease in volume. This tendency to decrease in volume is much greater in loose than dense soils. When loose non-cohesive soils are saturated and rapid loading occurs under undrained conditions, the soil densification causes excess pore water pressure to increase. The increase in pore water pressure results in a loss of soil strength due to a decrease in effective stress and eventually liquefaction occurs, once the effective stress drops to zero. Liquefaction of loose sands can lead to large displacements of foundations, flow failures of slopes, ground surface settlement, sand boils, and post-earthquake stability failures.
It is our opinion that the potential for liquefaction of the native soils at the site due to earthquake activity is relatively low based on the information obtained from the soil test borings.

6.0 QUALIFICATIONS OF RECOMMENDATIONS

This evaluation of the geotechnical aspects of the proposed design and construction has been based on our understanding of the project and the data obtained during this study. The general subsurface conditions used in our evaluation were based on interpolation of the subsurface data between the borings. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions will differ between boring locations, that conditions are not as anticipated by the designers, or that the construction process has modified the soil conditions. Therefore, experienced Oasis soil engineers and technicians should evaluate earthwork and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications or recommendations.

The recommendations contained in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria change, we should be permitted to determine if the recommendations should be modified. The findings of such a review will be presented in a supplemental report. Even after completion of a subsurface study, the nature and extent of variation between borings may not become evident until the course of

construction. If such variations then become evident, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

These professional services have been performed, the findings derived, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all warranties either expressed or implied. This company is not responsible for the conclusions, opinions or recommendation of others based on these data.

APPENDIX A

SITE VICINITY MAP AND BORING LOCATION PLAN

Figure No.:	SITE VICINITY MAP		
1	Source: Google Earth	FCWS Elevated Storage Tank – Trilith Studios 461 Sandy Creek Road Fayetteville, Georgia	
	Oasis Project No.: 224927	Scale: Map Scale	**Oasis Consulting Services** **45 Woodstock Street** **Roswell, Georgia 30075**
	Date drawn: 08/2022	Drawn By: AG	

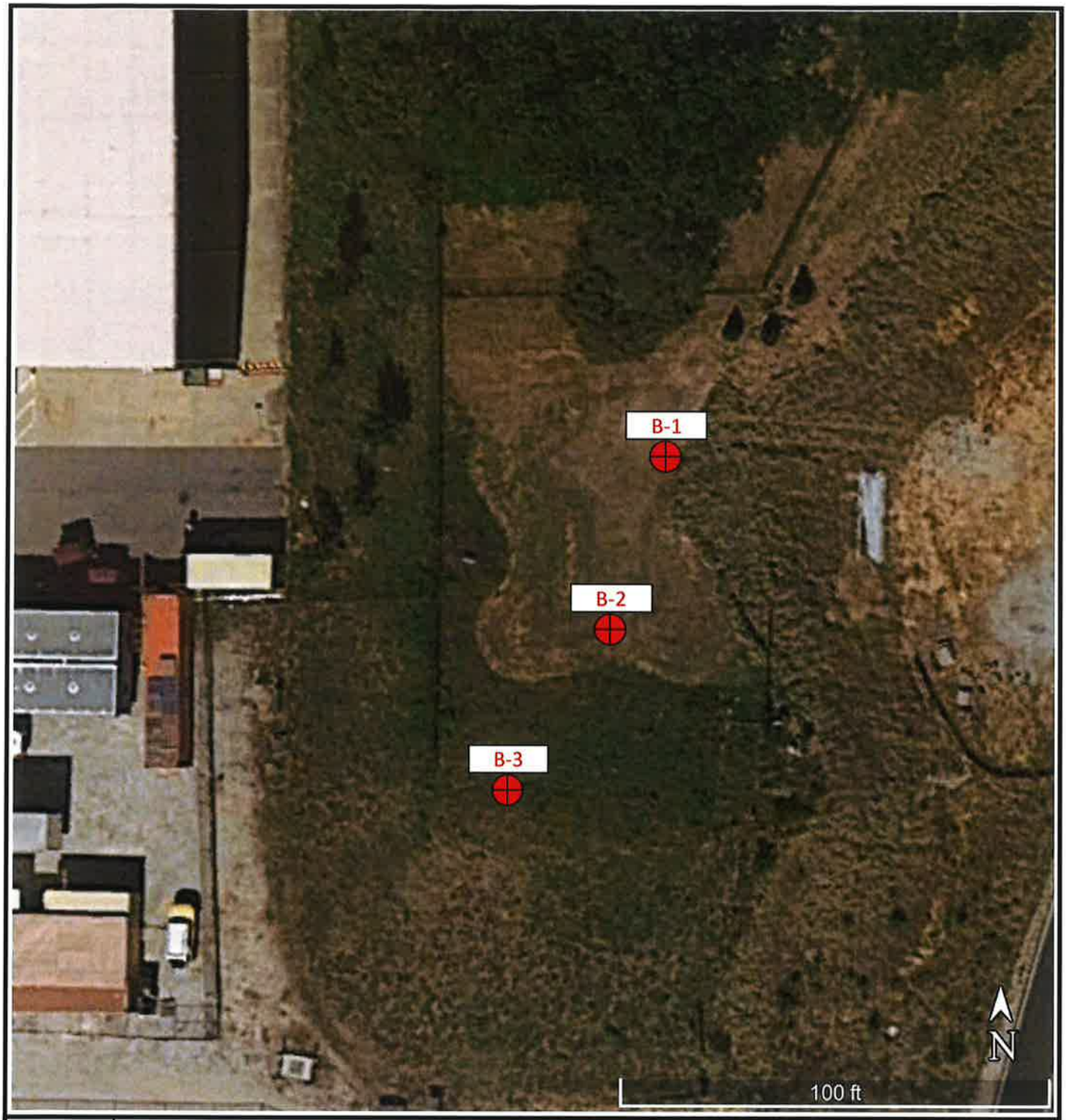

Figure No.:	BORING LOCATION PLAN		
2	Source: Google Earth = Boring Location	FCWS Elevated Storage Tank – Trilith Studios 461 Sandy Creek Road Fayetteville, Georgia	OASIS CONSULTING SERVICES
	Oasis Project No.: 224927	Scale: Map Scale	**Oasis Consulting Services** **45 Woodstock Street** **Roswell, Georgia 30075**
	Date drawn: 08/2022	Drawn By: AG	

APPENDIX B

FIELD TEST PROCEDURES AND LABORATORY TEST PROCEDURES

TEST PROCEDURES

The general field procedures employed by Oasis Consulting Services (OCS) are summarized in the American Society for Testing and Materials (ASTM) Standard D 420 - Investigating and Sampling Soil and Rock. This practice lists recognized methods for determining soil, rock and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

Standard Drilling Techniques

To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits and water or drilling mud.
c) Hand augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

Typical drilling methods used are presented in the following paragraphs.

Hollow Stem Augering: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Sampling and Testing in Boreholes

Several techniques are used to obtain samples and data in soils in the field; however the most common methods in this area are:

a) Standard Penetrating Testing
b) Undisturbed Sampling
c) Dynamic Cone Penetrometer Testing
d) Water Level Readings

The procedures utilized for this project are presented below.

Standard Penetration Testing: At regular intervals, soil samples are obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings and then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values

of standard penetration tests are shown on the Boring Logs. Split tube samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Logs. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater table which may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Logs.

Boring Logs

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the driller or an OCS representative. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the field representative's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed, a geotechnical engineer or geologist classifies the soil samples and prepares the final Boring Logs, which are the basis for our evaluations and recommendations.

Soil Classification

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer or geologist. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

The Key to Symbols and Classifications presents criteria that are typically used in the classification and description of soil and rock samples for preparation of Boring Logs.

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LABORATORY TEST PROCEDURES

Soil Compaction

Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the standard Proctor test and the modified Proctor test. They are performed in accordance with ASTM Standards D698 and D1557, respectively. Generally, the standard compaction test is run on samples from building areas and areas where small compaction equipment is anticipated. The modified compaction test is generally used for analyses of highways and other areas where large compaction equipment is expected. In both tests, dry portions of each soil are mixed with varying quantities of water and representative portions are placed in a mold and compacted with a compaction hammer. Each portion is compacted with exactly the same compactive effort. Both tests have four alternate methods.

In the standard Proctor test, compaction is achieved by twenty-five blows of a 5.5 pound hammer falling 12 inches on each of three equal layers in a 4 inch diameter, 1/30 cubic foot cylinder. The moisture content and unit weight (dry density) of each compacted sample is determined and a graph of the results is plotted with the optimum moisture content occurring at the maximum dry density.

California Bearing Ratio

The results of the previously described compaction tests were used in preparing samples for California Bearing Ratio (CBR) tests. CBR tests are performed in accordance with ASTM D1883. The CBR is a punching shear test that provides data that is a semi-empirical index of the strength and deflection characteristics of a soil correlated with pavement performance to establish design curves for pavement thickness. The test is performed on a 6-inch diameter, 5-inch thick sample of compacted soil confined in a steel cylinder. Before testing, the sample is soaked in water under a confining pressure roughly equivalent to the weight of the future pavement to determine the potential swelling and to simulate subgrade saturation in the field. A 1.95-inch diameter piston is then forced into the soil at a standard rate to determine the resistance to penetration. The CBR is the ratio, expressed as a percentage, of the load required to produce a 0.1-inch deflection of the test soil to that required to produce the same deflection in a standard crushed stone.

Moisture Content

The moisture content of soil is defined as the weight of water in a given soil mass divided by the weight of dry soil solids in the same mass. Natural moisture contents are determined in accordance with ASTM Standard D2216.

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Soil Plasticity

Representative samples of the soils were selected for Atterberg limits testing to determine the soil plasticity characteristics. The soil's Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The LL is the moisture content at which the soil will flow as a heavy viscous fluid, and is determined in accordance with ASTM D423. The PL is the moisture content at which the soil begins to lose its plasticity and is determined in accordance with ASTM D424.

Certain soils swell and shrink with increases and decreases in soil moisture. The PI is related to this potential volume change ability. When such volume changes occur in soils confined beneath foundations, structural deformations can be produced. Past experience has shown that soils having a PI of less than 30 are only slightly susceptible to volume changes. Soils having a PI greater than 50 are generally very susceptible to these volume changes. Soils with a PI between these limits have moderate volume change potential.

Grain Size/Gradation

Grain size tests are performed to determine the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D421 (dry preparation) or ASTM D2217 (wet preparation). The grain size distribution of soils coarser than a number 200 sieve (0.074 mm opening) is determined by passing the samples through a standard set of nested sieves. A sample of known weight is passed through the sequence of sieves with decreasing size of openings and the portions retained on each sieve weighed. Materials passing the number 200 sieve are suspended in water and the grain size distributing calculated from the measured settlement rate (hydrometer analysis). Hydrometer analysis determines the density of a suspension of soil at various times after agitation. Using Stokes's law, the particle size remaining suspended at each particular time is calculated and the corresponding density is a measure of the quantity of soil smaller than the computed size. Test results are presented in the form of percent finer versus grain size curves.

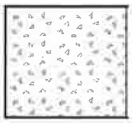
APPENDIX C

KEYS TO SYMBOLS AND CLASSIFICATIONS AND BORING LOGS

KEY TO SYMBOLS AND CLASSIFICATIONS

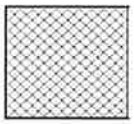
SYMBOL	TYPE OF SAMPLE
	Split Tube Sample (SPT)
	Shelby Tube Sample
	Bulk Sample
	Core Run

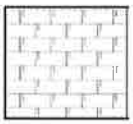

Asphalt


Partially Weathered Rock


Topsoil


Bedrock


Fill


Concrete

PARTICLE SIZE DEFINITIONS	
COMPONENT	SIZE RANGE
Boulders	Larger than 12 inches
Cobbles	3 to 12 inches
Gravel	3 inches to 4.5 mm (Sieve No.4)
Coarse Gravel	3 inches to 3/4 of an inch
Fine Gravel	3/4 of an inch 4.5
Sand	4.5 mm to 0.074 mm (Sieves No.4 to No.200)
Coarse Sand	4.5 mm to 2.0 mm (Sieves No.4 to No.10)
Medium Sand	2.0 mm to 0.42 mm (Sieves No.10 to No.40)
Fine Sand	0.42 mm to 0.074 mm (Sieves No.40 to No.200)
Silt and Clay	Smaller than 0.074 mm (passing sieve No. 200)

MOISTURE CONTENT	
Dry	Absence of moisture, dusty, dry to the touch
Damp	Some perceptible moisture, below optimum
Moist	No visible water, near optimum moisture content
Wet	Visible free water, usually soil is below water table

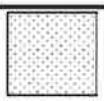
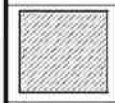
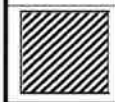
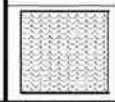
RELATIVE HARDNESS OF ROCK	
Very Soft	Desintegrates or easily compresses to touch
Soft	May be broken with fingers
Moderately Soft	May be scratched with nail, edges may be broken with fingers
Moderately Hard	Light blow of hammer required to break sample
Hard	Hard blow of hammer required to break sample

ROCK CONTINUITY	
DESCRIPTION	RQD*
Incompetent	Less than 40%
Competent	40% to 70%
Fairly Continuous	71% to 90%
Continuous	91% to 100%

*RQD=Rock Quality Designation

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE					
COHESIONLESS SOIL			COHESIVE SOILS		
Density	N (blows/ foot)	Approximate Relative Density (%)	Consistency	N (blows/foot)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 to 15	Very Soft	0 to 1	Less than 250
Loose	5 to 10	15 to 35	Soft	2 to 4	250 to 500
Medium Dense	11 to 30	35 to 65	Firm	5 to 8	500 to 1000
Dense	31 to 50	65 to 85	Stiff	9 to 15	1000 to2000
Very Dense	over 50	85 to 100	Very Stiff	16 to 30	2000 to 4000
			Hard	31 to 50	Greater than 4000
			Very Hard	over 50	

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	Clean Gravels (Little or no fines)		GW	Well graded gravels, gravel-sand mixtures, little or no fines
				GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with fines (Appreciable amount of fines)		GM	Silty gravels, gravel-sand-silt mixtures
				GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS AND SANDY SOILS MORE THAN 50% OF COARSE FRACTIONPASSING NO.4 SIEVE	Clean sands (Little or no fines)		SW	Well graded sands, gravelly sands, little or no fines
				SP	Poorly graded sands, gravelly sands, little or no fines
		Sands with fines (Appreciable amount of fines)		SM	Silty sands, sand-silt mixtures
				SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	Liquid Limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
				OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS	Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium high plasticity, organic silts
HIGHLY ORGANIC SOILS				PT	Peat, humus, swamp soils with high organic contents

Note: Dual symbols are used to indicate borderline soil classifications

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Telephone: (678) 739-2400

BORING NUMBER B-1

CLIENT Arcadis
PROJECT NAME FCWS Elevated Storage Tank - Trilith Studios
PROJECT NUMBER 224927
PROJECT LOCATION 461 Sandy Creek Road, Fayetteville, GA
DATE STARTED 8/5/22 **COMPLETED** 8/5/22
GROUND ELEVATION 872 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Nicholson Exploration
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING 38.00 ft / Elev 834.00 ft
LOGGED BY NE **CHECKED BY** BT
AT END OF DRILLING 33.00 ft / Elev 839.00 ft
NOTES Borehole caved at 41'
96hrs AFTER DRILLING 36.00 ft / Elev 836.00 ft

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0	AGGREGATE: Approximately 7 inches of gravel			
	(SC) RESIDUUM: Medium dense red brown clayey medium to fine SAND	SS 1	870	8-10-15 (25)
5		SS 2		4-8-10 (18)
	(SM) Medium dense red orange clayey silty medium to fine SAND, slightly micaceous	SS 3	865	11-5-7 (12)
	(SM) Loose orange tan silty fine SAND, slightly micaceous	SS 4		4-3-7 (10)
10			860	
	(ML) Stiff red tan fine sandy SILT, micaceous	SS 5		4-3-6 (9)
15			855	
		SS 6		4-5-9 (14)
20			850	
	(ML) Stiff tan orange fine sandy SILT, slightly micaceous, wet	SS 7		6-5-6 (11)
25			845	
		SS 8		4-4-7 (11)
30			840	
	(ML) Firm to stiff brown orange black fine sandy SILT, micaceous, very wet	SS 9		3-3-4 (7)
35				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-1

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
35		(ML) Firm to stiff brown orange black fine sandy SILT, micaceous, very wet *(continued)*			
				835	
40			SS 10		4-4-7 (11)
		(SM) Medium dense brown tan silty medium to fine SAND, micaceous, very wet		830	
45			SS 11		5-5-6 (11)
				825	
50			SS 12		4-5-6 (11)
				820	
55			SS 13		6-7-10 (17)
				815	
60			SS 14		3-6-8 (14)
				810	
65			SS 15		6-8-12 (20)
				805	
70			SS 16		10-14-16 (30)
		Auger only		800	
75					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-1

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
75		Auger only *(continued)*		795		
80				790		
85				785		
90				780		
95				775		
100		Borehole terminated at 100.0 feet.				

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BORING NUMBER B-2

CLIENT Arcadis
PROJECT NAME FCWS Elevated Storage Tank - Trilith Studios
PROJECT NUMBER 224927
PROJECT LOCATION 461 Sandy Creek Road, Fayetteville, GA
DATE STARTED 8/9/22 **COMPLETED** 8/9/22
GROUND ELEVATION 874 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Nicholson Exploration
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING 43.00 ft / Elev 831.00 ft
LOGGED BY NE **CHECKED BY** BT
AT END OF DRILLING 29.00 ft / Elev 845.00 ft
NOTES Borehole caved at 47'
24hrs AFTER DRILLING 37.00 ft / Elev 837.00 ft

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0	AGGREGATE: Approximatelt 18" of gravel/soil mix			
	(MH) RESIDUUM: Very stiff red brown clayey medium to fine sandy SILT	SS 1		8-8-9 (17)
		SS 2	870	9-7-10 (17)
5	(SM) Medium dense red orange clayey silty medium to fine SAND	SS 3		7-7-6 (13)
	(SM) Medium dense orange tan silty fine SAND, slightly micaceous	SS 4	865	5-3-8 (11)
10	(SM) Medium dense to loose tan orange silty fine SAND, slightly micaceous			
		SS 5	860	6-3-8 (11)
15				
		SS 6	855	4-2-6 (8)
20	(ML) Stiff purple tan file sandy SILT, slightly micaceous, wet			
		SS 7	850	3-3-7 (10)
25	(ML) Loose to medium dense purple tan silty fine SAND, slightly micaceous, very wet			
		SS 8	845	2-3-9 (12)
30				
		SS 9	840	3-6-9 (15)
35				

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-2

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
35		(ML) Loose to medium dense purple tan silty fine SAND, slightly micaceous, very wet *(continued)*			
40			SS 10	835	3-5-10 (15)
45		(SM) Loose to medium dense tan brown silty medium to fine SAND, slightly micaceous, very wet	SS 11	830	4-3-6 (9)
50			SS 12	825	3-4-4 (8)
55			SS 13	820	4-4-8 (12)
60			SS 14	815	3-5-7 (12)
65			SS 15	810	6-6-11 (17)
70			SS 16	805	6-9-13 (22)
75		(SM) Dense to medium dense tan brown silty medium to fine SAND, slightly micaceous, very wet	SS 17	800	13-19-21 (40)

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-2

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
75						
		(SM) Dense to medium dense tan brown silty medium to fine SAND, slightly micaceous, very wet *(continued)*				
			SS 18	795	6-9-13 (22)	
80						
		(SM) PARTIALLY WEATHERED ROCK: Sampled as very dense tan brown silty medium to fine SAND, slightly micaceous, wet				
			SS 19	790	6-12-50/5"	>>
85						
			SS 20	785	47-50/5"	>>
90						
			SS 21	780	50/2"	>>
95						
		No sample recovered				
			SS 22	775	50/1"	>>
100						

Borehole terminated at 100.0 feet.

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Roswell, Georgia 30075
Telephone: (678) 739-2400

BORING NUMBER B-3

CLIENT Arcadis
PROJECT NAME FCWS Elevated Storage Tank - Trilith Studios
PROJECT NUMBER 224927
PROJECT LOCATION 461 Sandy Creek Road, Fayetteville, GA
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION 875 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Nicholson Exploration
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING 40.00 ft / Elev 835.00 ft
LOGGED BY NE **CHECKED BY** BT
AT END OF DRILLING 32.00 ft / Elev 843.00 ft
NOTES Borehole caved at 53'
AFTER DRILLING —

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0	TOPSOIL: Approximately 3" of topsoil and associated root zone		875	
	(SC) RESIDUUM: Medium dense red brown clayey medium to fine SAND	SS 1		8-9-11 (20)
5		SS 2	870	5-9-11 (20)
	(SM) Medium dense red orange clayey silty medium to fine SAND, slightly micaceous	SS 3		4-5-8 (13)
	(SM) Loose red tan silty fine SAND, slightly micaceous	SS 4	865	4-4-6 (10)
10				
	(SM) Loose purple tan silty fine SAND, slightly micaceous	SS 5	860	3-4-5 (9)
15				
		SS 6	855	3-3-5 (8)
20				
	(SM) Medium dense purple tan silty fine SAND, slightly mciaceous, wet	SS 7	850	4-6-8 (14)
25				
		SS 8	845	5-8-10 (18)
30				
	(SM) Loose to medium dense purple tan silty fine SAND, slightly micaceous, very wet	SS 9	840	3-4-5 (9)
35				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Oasis Consulting Services
45 Woodstock Street
Roswell, Georgia 30075
Telephone: (678) 739-2400

BORING NUMBER B-3

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
35				840	
		(SM) Loose to medium dense purple tan silty fine SAND, slightly micaceous, very wet *(continued)*			
40		▽	SS 10	835	5-5-8 (13)
45			SS 11	830	4-6-6 (12)
		(SM) Very loose tan black silty medium to fine SAND, slightly micaceous, very wet			
50			SS 12	825	0-0-0 (0)
55			SS 13	820	0-0-0 (0)
		(SM) Medium dense tan white silty coarse to fine SAND, slightly micaceous, wet			
60			SS 14	815	2-4-7 (11)
65			SS 15	810	12-7-8 (15)
70			SS 16	805	8-4-7 (11)
75			SS 17	800	7-10-13 (23)

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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Roswell, Georgia 30075
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BORING NUMBER B-3

CLIENT Arcadis **PROJECT NAME** FCWS Elevated Storage Tank - Trilith Studios

PROJECT NUMBER 224927 **PROJECT LOCATION** 461 Sandy Creek Road, Fayetteville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
75				800		
		Auger only. Driller described PWR-like material at 90 feet.				
80				795		
85				790		
90				785		
95				780		
100				775		
		Borehole terminated at 100.0 feet.				

APPENDIX D

LABORATORY TEST RESULTS

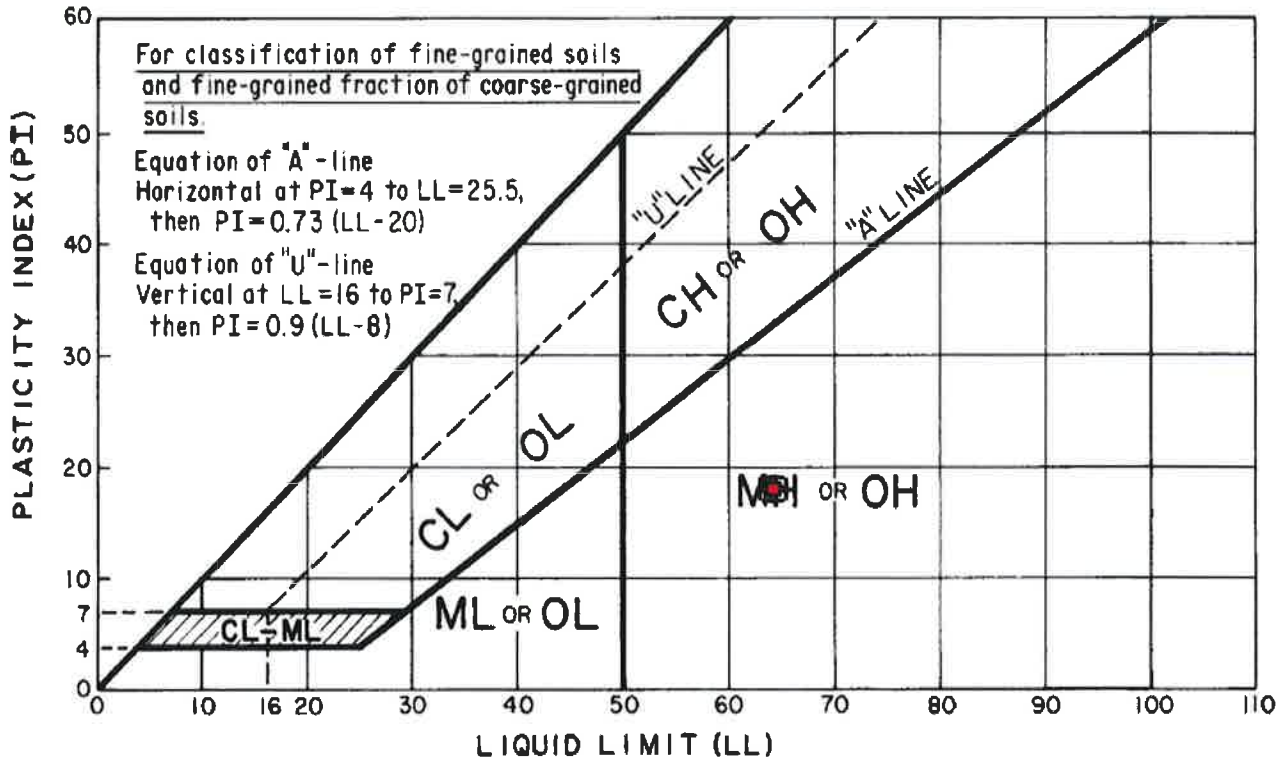
OASIS CONSULTING SERVICES

REPORT OF ATTERBERG LIMITS TEST RESULTS (ASTM D4318)

Project Name:	Trilith Studios Above Ground Storage Tank		Lab#: 5068	Project Number:	224927
Location	B-2 3.5'-5'	Technician	JS	Test Date:	8/26/2022
Type of Test:	Atterberg Limits	Checked by	DW	USCS Classification:	MH
Sample Description:	Red sandy SILT (MH)			Boring B-2	Depth 3.5'-5'

*USCS Classification is based on the Atterberg Limit test and the Grain Size Analysis results.

Liquid Limit	**65**
Plastic Limit	**47**
Plasticity Index	**18**



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45 Woodstock Street
Roswell, Georgia 30075
678-739-2400

Report of Grain Size Analysis of Material Larger Than #200 Sieve

(ASTM D422), (ASTM D1140)

Client	Arcadis			
Project Name	Trilith Studios Above Ground Storage Tank			
Project Number	224927			
Date	8/26/2022	**Technician**	JS	
Sample #	B-2 3.5'-5'	**Lab #**	5068	
Classification	Red sandy SILT (MH)			

Sieve Analysis		
Sieve #	Diameter mm	Passing %
2	50.8	100.0
1.5	38.09	100.0
1	25.4	100.0
3/4	19.04	100.0
1/2	12.7	100.0
3/8	9.5	100.0
#4	4.75	100.0
#10	2	99.9
#20	0.85	94.7
#40	0.425	85.2
#60	0.25	78.9
#100	0.15	73.3
#200	0.075	67.7

Natural Moisture Content
%
19.6

Wash #200 Soak Time
(At least 120 min to the nearest 10 min)
960

Test Method		
A		B
		x

Jun-19

Checked By: _____

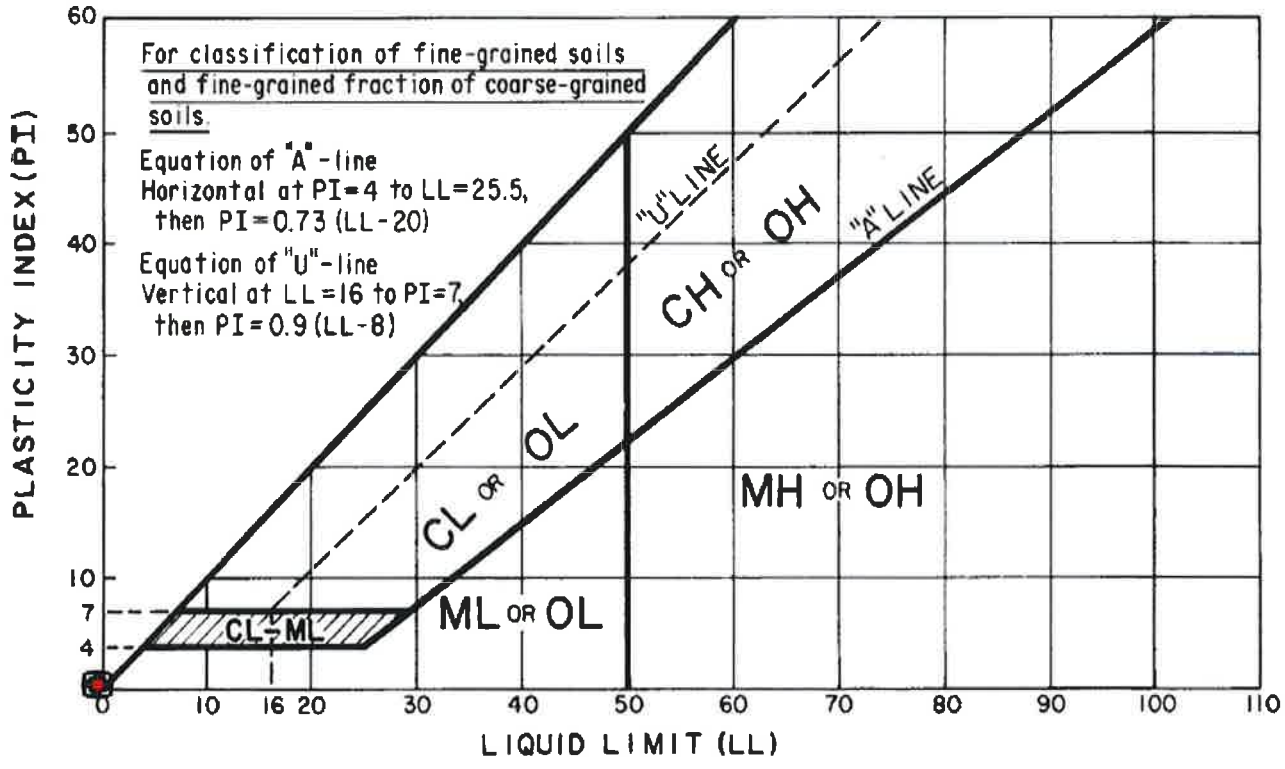
OASIS CONSULTING SERVICES

REPORT OF ATTERBERG LIMITS TEST RESULTS (ASTM D4318)

Project Name:	Trilith Studios Above Ground Storage Tank		Lab#: 5068	Project Number:	224927
Location	B-2, 18.5'-20'	Technician	JS	Test Date:	8/26/2022
Type of Test:	Atterberg Limits	Checked by	DW	USCS Classification:	SM
Sample Description:	Reddish brown silty SAND (SM)			Boring B-2	Depth 18.5'-20'

*USCS Classification is based on the Atterberg Limit test and the Grain Size Analysis results.

Liquid Limit	**N/A**
Plastic Limit	**N/A**
Plasticity Index	**NP**



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Roswell, Georgia 30075
678-739-2400

Report of Grain Size Analysis of Material Larger Than #200 Sieve

(ASTM D422), (ASTM D1140)

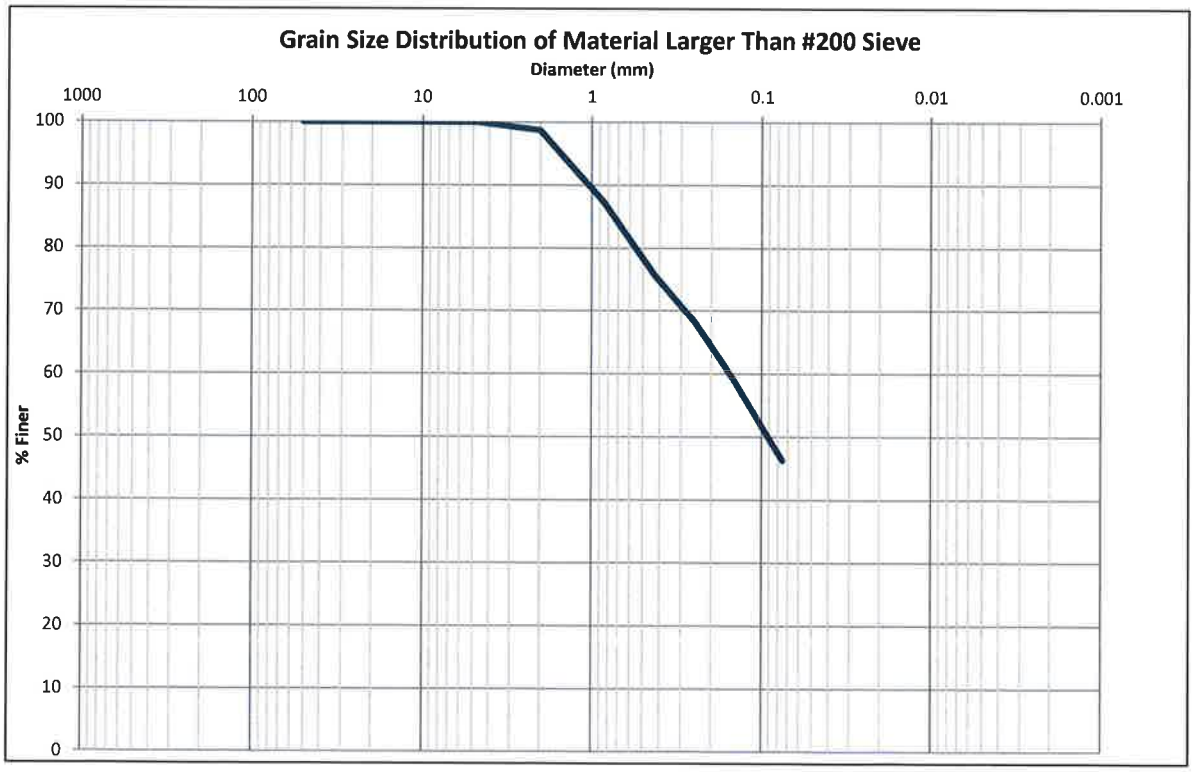
Client	Arcadis			
Project Name	Trilith Studios Above Ground Storage Tank			
Project Number	224927			
Date	8/26/2022	**Technician**	JS	
Sample #	B-2, 18.5'-20'	**Lab #**	5068	
Classification	Reddish brown silty SAND (SM)			

Sieve Analysis		
Sieve #	Diameter mm	Passing %
2	50.8	100.0
1.5	38.09	100.0
1	25.4	100.0
3/4	19.04	100.0
1/2	12.7	100.0
3/8	9.5	100.0
#4	4.75	100.0
#10	2	98.7
#20	0.85	87.3
#40	0.425	75.6
#60	0.25	68.3
#100	0.15	59.4
#200	0.075	46.3

Natural Moisture Content %
27.8

Wash #200 Soak Time (At least 120 min to the nearest 10 min)
960

Test Method		
A		B
		x



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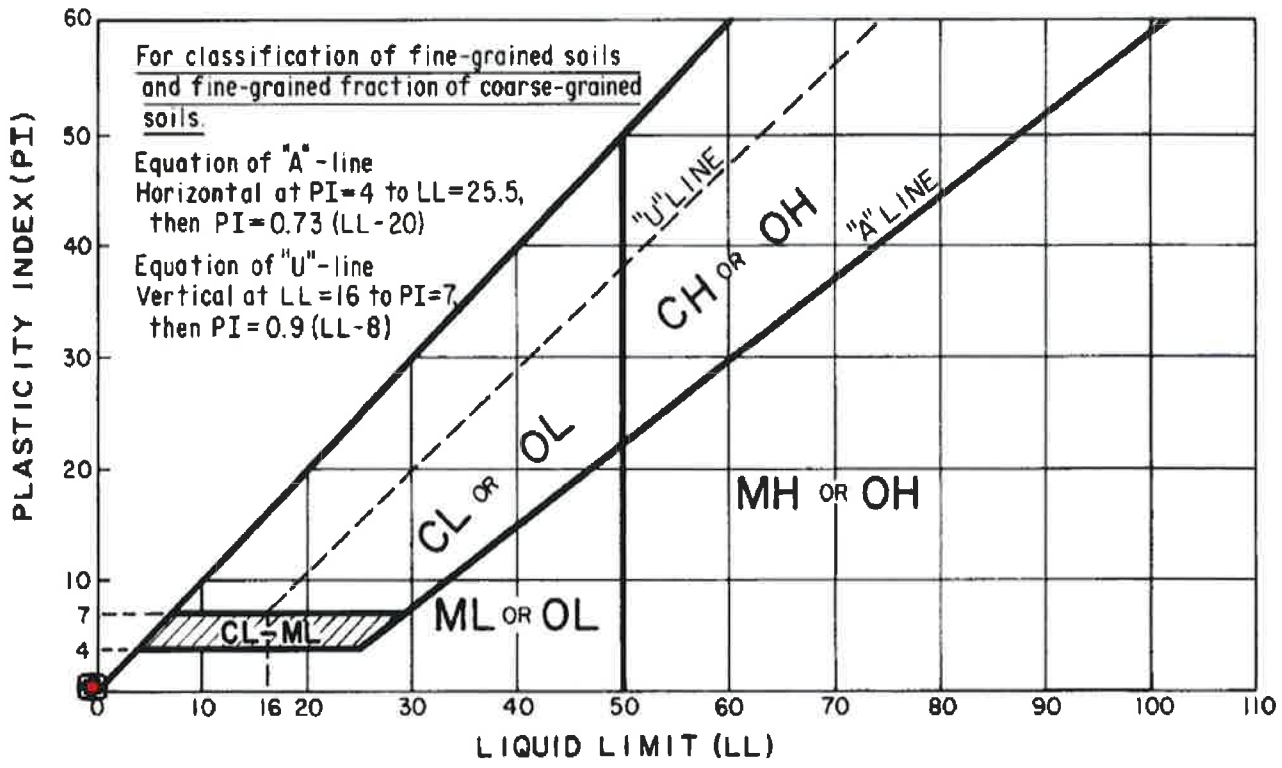
OASIS CONSULTING SERVICES

REPORT OF ATTERBERG LIMITS TEST RESULTS (ASTM D4318)

Project Name:	Trilith Studios Above Ground Storage Tank		Lab#: 5068	Project Number:	224927
Location	B-2 38.5'-40'	Technician	JS	Test Date:	8/26/2022
Type of Test:	Atterberg Limits	Checked by	DW	USCS Classification:	SM
Sample Description:	Light red silty SAND (SM)			Boring B-2	Depth 38.5'-40'

*USCS Classification is based on the Atterberg Limit test and the Grain Size Analysis results.

Liquid Limit	**N/A**
Plastic Limit	**N/A**
Plasticity Index	**NP**



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678-739-2400

Report of Grain Size Analysis of Material Larger Than #200 Sieve

(ASTM D422), (ASTM D1140)

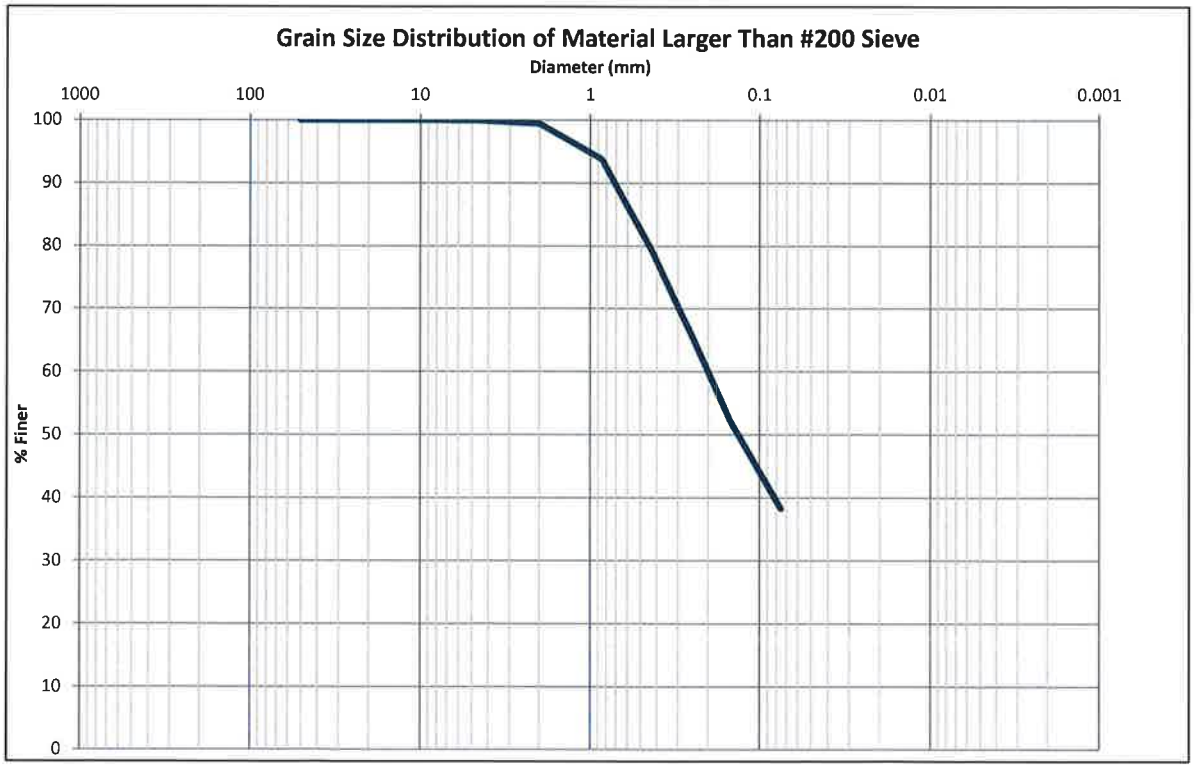
Client	Arcadis			
Project Name	Trilith Studios Above Ground Storage Tank			
Project Number	224927			
Date	8/26/2022	**Technician**	JS	
Sample #	B-2, 38.5'-40'	**Lab #**	5068	
Classification	Light red silty SAND (SM)			

Sieve Analysis		
Sieve #	Diameter mm	Passing %
2	50.8	100.0
1.5	38.09	100.0
1	25.4	100.0
3/4	19.04	100.0
1/2	12.7	100.0
3/8	9.5	100.0
#4	4.75	100.0
#10	2	99.4
#20	0.85	93.8
#40	0.425	79.0
#60	0.25	65.8
#100	0.15	52.4
#200	0.075	38.2

Natural Moisture Content %
36.9

Wash #200 Soak Time (At least 120 min to the nearest 10 min)
960

Test Method		
A		B
		x



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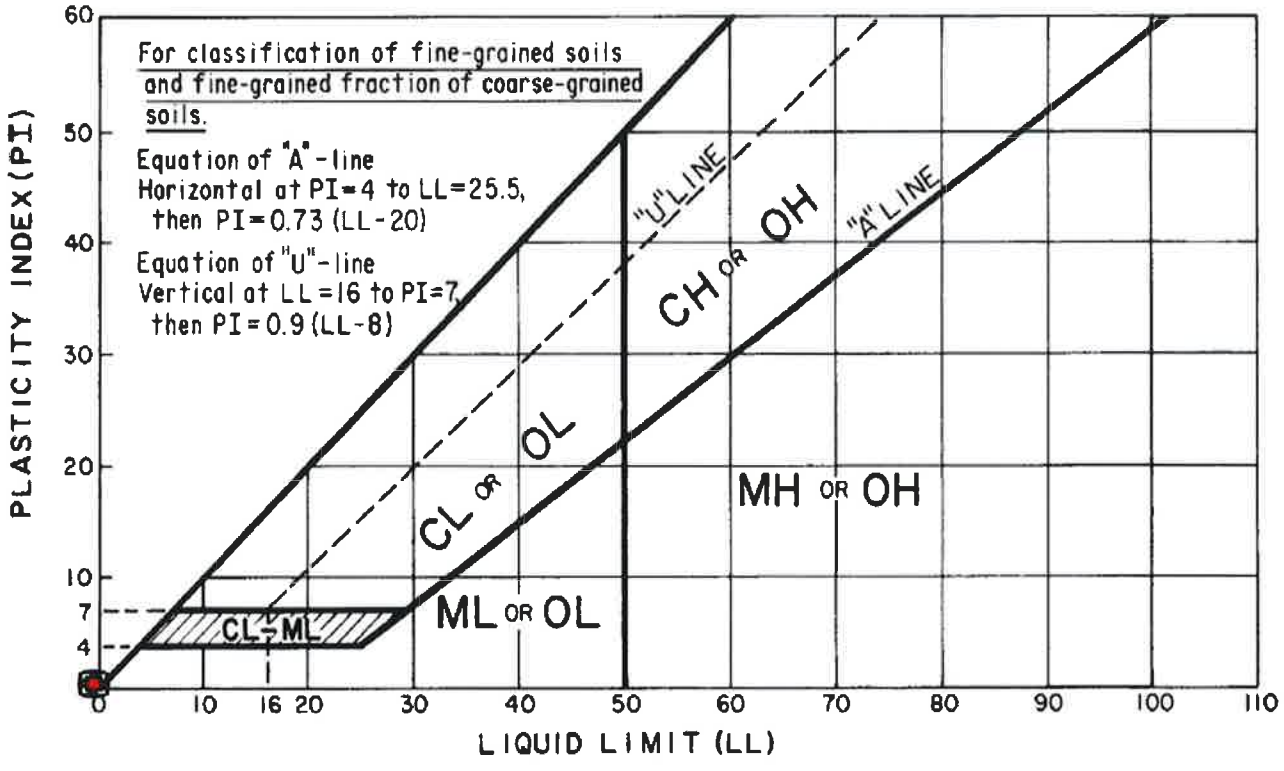
REPORT OF ATTERBERG LIMITS TEST RESULTS (ASTM D4318)

Project Name:	Trilith Studios Above Ground Storage Tank		Lab#: 5068	Project Number:	224927
Location	B-2, 68.5'-70'	Technician	JS	Test Date:	8/26/2022
Type of Test:	Atterberg Limits	Checked by	DW	USCS Classification:	SM
Sample Description:	Gray silty SAND (SM)			Boring B-2	Depth 68.5'-70'

*USCS Classification is based on the Atterberg Limit test and the Grain Size Analysis results.

Liquid Limit	**N/A**
Plastic Limit	**N/A**
Plasticity Index	**NP**



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Report of Grain Size Analysis of Material Larger Than #200 Sieve

(ASTM D422), (ASTM D1140)

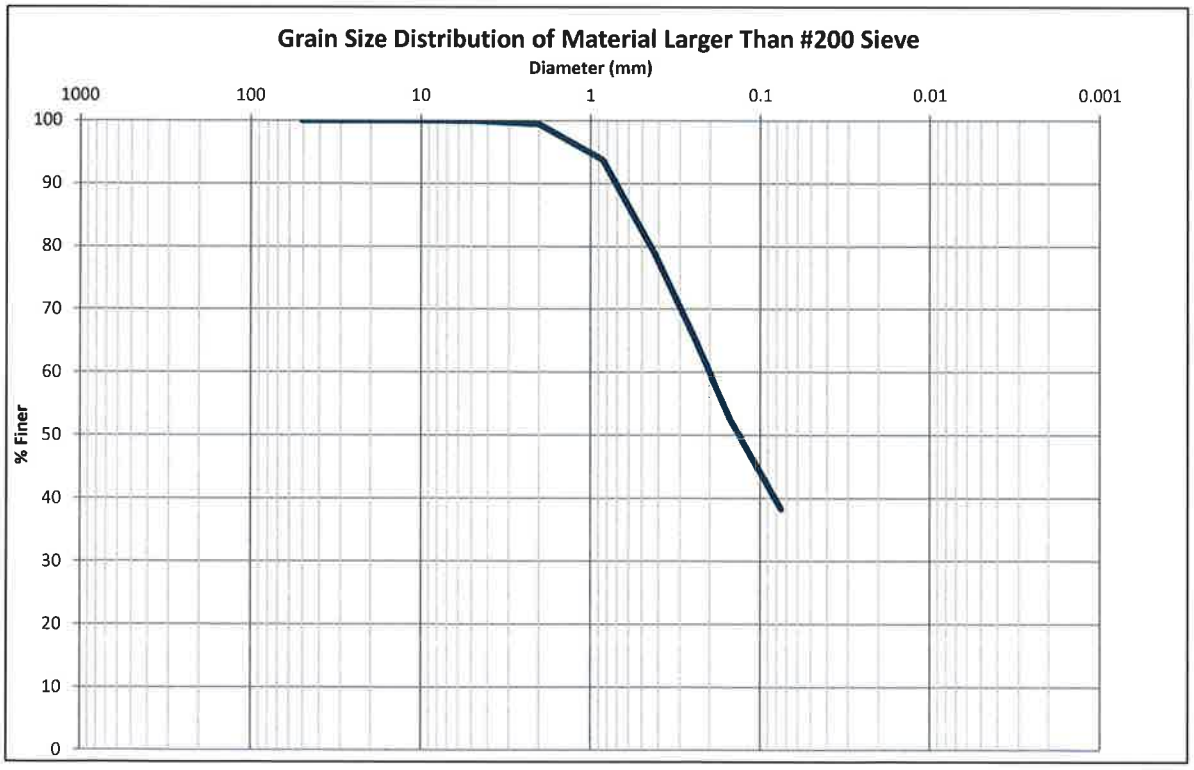
Client	Arcadis			
Project Name	Trilith Studios Above Ground Storage Tank			
Project Number	224927			
Date	8/26/2022	**Technician**	JS	
Sample #	B-2, 68.5'-70.0'	**Lab #**	5068	
Classification	Gray silty SAND (SM)			

Sieve Analysis		
Sieve #	Diameter mm	Passing %
2	50.8	100.0
1.5	38.09	100.0
1	25.4	100.0
3/4	19.04	100.0
1/2	12.7	100.0
3/8	9.5	100.0
#4	4.75	100.0
#10	2	99.4
#20	0.85	93.8
#40	0.425	79.0
#60	0.25	65.8
#100	0.15	52.4
#200	0.075	38.2

Natural Moisture Content
%
28.1

Wash #200 Soak Time
(At least 120 min to the nearest 10 min)
960

Test Method		
A		B
		x



Jun-19

Checked By: _____

OASIS
CONSULTING
SERVICES

November 22, 2022

Arcadis
2839 Paces Ferry Road SE, Suite 900
Atlanta. Georgia 30339

Attention: Mr. Travis Thomas

Subject: **Addendum to Report of Subsurface Exploration and Geotechnical Engineering Evaluation**
FCWS Elevated Storage Tank
461 Sandy Creek Road
Fayetteville, Georgia
Oasis Project No. 224927

Dear Travis:

As you are aware, Oasis Consulting Services (Oasis) previously submitted a Report of Subsurface Exploration and Geotechnical Engineering Evaluation dated October 4, 2022 (fka - Trilith Studios Above Ground Storage Tank, Oasis Project No 224927). In that report we provided the recommendation of deep foundations for foundation support of the Above Ground Storage Tank. Recently, you inquired as to what type of deep foundations would be appropriate for the anticipated loads of the structure and asked that we review the foundation support options in light of the newly provided anticipated loads.

This addendum report should be used in conjunction with our previous report and not as a separate report. The recommendations contained in our original report remain in effect unless otherwise modified in this addendum report.

PROJECT INFORMATION

We understand the project consists of the construction of a 400,000-gallon elevated storage tank in an area of the Trilith Development. Based on our review of the provided load calculations, we understand the elevated storage tank will have maximum outside column loads of 593.5 kips and a maximum center riser load 1134.9 kips.

FOUNDATION OPTIONS

As noted above, we were asked to review the foundation support options in light of the anticipated loads and provide an axial pile and lateral pile analysis along with pile uplift resistance recommendations. For our analysis, we used a combination of soil conditions from borings B-2 and B-3 as a conservative approach. Boring B-2 soil consistency from the depth of 47 feet to 57 feet below existing grade was interpolated from boring B-3.

Our analysis considered a deep foundation system as the most appropriate foundation solution for the design as they will provide the necessary axial and lateral support for the anticipated loads. We considered caissons and auger cast-in-place (ACIP) piles for this project. After review, caissons do not appear feasible due to the depth needed to support the provided loads. In our opinion, auger cast piles will be the most cost-effective and feasible deep foundation system at this site due to the availability to achieve the depth needed to support the provided loads and therefore, detailed recommendations are provided for this system only.

For this project we analyzed 16-inch and 18-inch diameter ACIP piles. Estimated allowable compressive capacity was calculated using the SPT N-values and American Association of State Highway Transportation Officials (AASHTO) methods. Axial pile analysis was performed using the computer program RSPile by Rocscience with a deflection of 0.5-inches. Lateral pile analysis was performed using the computer program LPile. Results are attached.

Based on the boring data, ACIP piles will develop their capacity from a combination of skin friction and end bearing but mainly skin friction for this site. ACIP piles consisting of 16 or 18 inches in diameter, depending on the anticipated loads, appear to be a feasible foundation option. Auger refusal depths in the borings varied significantly in the parking deck area, and we estimate pile lengths on the order of 85 to 95 feet based on the existing grade elevation. If desired, we recommend additional air track borings be performed at each column location to better quantify the depth to rock and estimated ACIP pile depths, which should help to provide a more accurate pile construction costs estimate. If partially weathered rock is encountered (PWR) refusal should be defined as a penetration rate of one foot or less per minute using a drive box with a minimum dead weight of 5,000 pounds and a torque of at least 20,000 foot-pounds. It is recommended that a center-to-center pile spacing of at least three (3) pile diameters be maintained to minimize settlement and pile capacity reductions caused by group effects. Where piles are spaced no closer than three pile diameters, a group reduction factor will not be required.

The allowable load design capacity generated is based on pile skin resistance since end bearing support varied significantly. The allowable axial compression design capacities include a factor of safety of 2.0 for skin friction in soil and 3.0 for the end bearing resistance in weak rock. The

28-day compressive strength of the grout should be at least 4,000 psi. To provide tension reinforcement, a full-length steel-reinforcing cage should be installed into the center of each pile immediately following grouting. The cage should be designed by the structural engineer based on design allowable capacities. Spacing devices (Centralizers) should be attached to the cage at one-third points but not in the cage area. Piles subject to uplift forces must be provided with adequate reinforcement steel through the entire length.

We recommend the design loads and pile lengths for the piles be verified by performing at least one (1) static load test and monitored in general accordance with ASTM D1143. We recommend that the pile(s) be tested to a minimum of two (2) times their allowable compression design capacity. After completing the pile load test and failure does not occur first, we recommend loading the test pile to three (3) times the design load. The primary purpose of the testing program would be to evaluate the axial/compression capacity of the proposed piles at the recommended minimum depth. The load tests are used to provide evidence that the contractor can produce an ACIP pile, which can safely support the design loads at the project site, and to satisfy project requirements. The load test location should be selected after installing 2 to 4 probe piles throughout the water tower foundations. The probe piles would assist the pile contractor and geotechnical engineer in evaluating the equipment and pile response to the specific site conditions and in determining tentative installation criteria for the test pile. All production piles should be placed using the same procedures and equipment used for installation of the test pile. If ultimate uplift loads are to be in excess of 1/8th of the vertical capacity, a modified load test must be performed on a separate pile to verify tensile or uplift capacity.

It is recommended that the installation of the probe piles, test pile(s) and all production piles be monitored by a representative of Oasis. The installation of auger-cast piles should be sequenced such that adjacent piles with a center-to-center pile spacing of at least three (3) pile diameters within the same cap should not be constructed within the same 24-hour period. This is required to provide adequate time for curing.

All piles must be installed with a grout ratio in excess of 1.15. The grout ratio is the actual volume of pumped grout divided by the theoretical volume of the pile. During the forming of the pile, the minimum required pump strokes per linear foot of pile, as determined by pump calibration, should be achieved. Should less than the required pump strokes occur in any one-foot increment, the auger should be immediately advanced three (3) feet below the point in question and forming of the pile resumed. Pressure of the grout during pumping should be maintained between 75 and 300 pounds per square inch (psi). If the pressure falls below 75 psi, the auger should be advanced to a point three (3) feet lower than the elevation at which the pressure loss occurred. If the auger jumps upward during withdrawal or if the grouting process is interrupted, the auger should be inserted at least three (3) feet below the point in question and the pumping process continued.

Qualified personnel should be present to cast grout compressive test specimens. At a minimum, at least two sets of specimens, six specimens per set, should be cast per day of pile installation, or at least one set per every 50 cubic yards of grout. A flow cone should be used to check the fluidity of the grout mix.

UPLIFT RESISTANCE

Uplift resistance will rely on side friction developed between the various soils in contact with the ACIP piles. Table 1 below presents our recommendations.

Table 1

Soil Type	Uplift-Allowable Side Friction (ksf)
Fill Soils	0.25
Residual Soils	0.5
PWR	1.5

The upper five (5) feet of ACIP piles should be neglected for uplift calculations due to disturbance and other factors. The recommended friction values include a factor of safety of at least 2 and assume the pile has full depth reinforcement. The actual uplift resistance will depend on the thicknesses of the different strata at each pile location.

CLOSURE

This addendum report of professional services has been performed, the findings derived, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the local area. This warranty is in lieu of all warranties either expressed or implied. Unless otherwise stated herein, our original recommendations remain unchanged.

This addendum report and the conclusions and recommendations provided herein, are provided exclusively for the use of Arcadis and their design team and is intended solely for design of the referenced project. Oasis is not responsible for the conclusions, opinions or recommendations of others based on these data.

We sincerely appreciate the opportunity to provide you with these geotechnical services for the project. We remain available to assist you with the project if additional information is needed. Should you have any questions concerning this report, please do not hesitate to contact us.

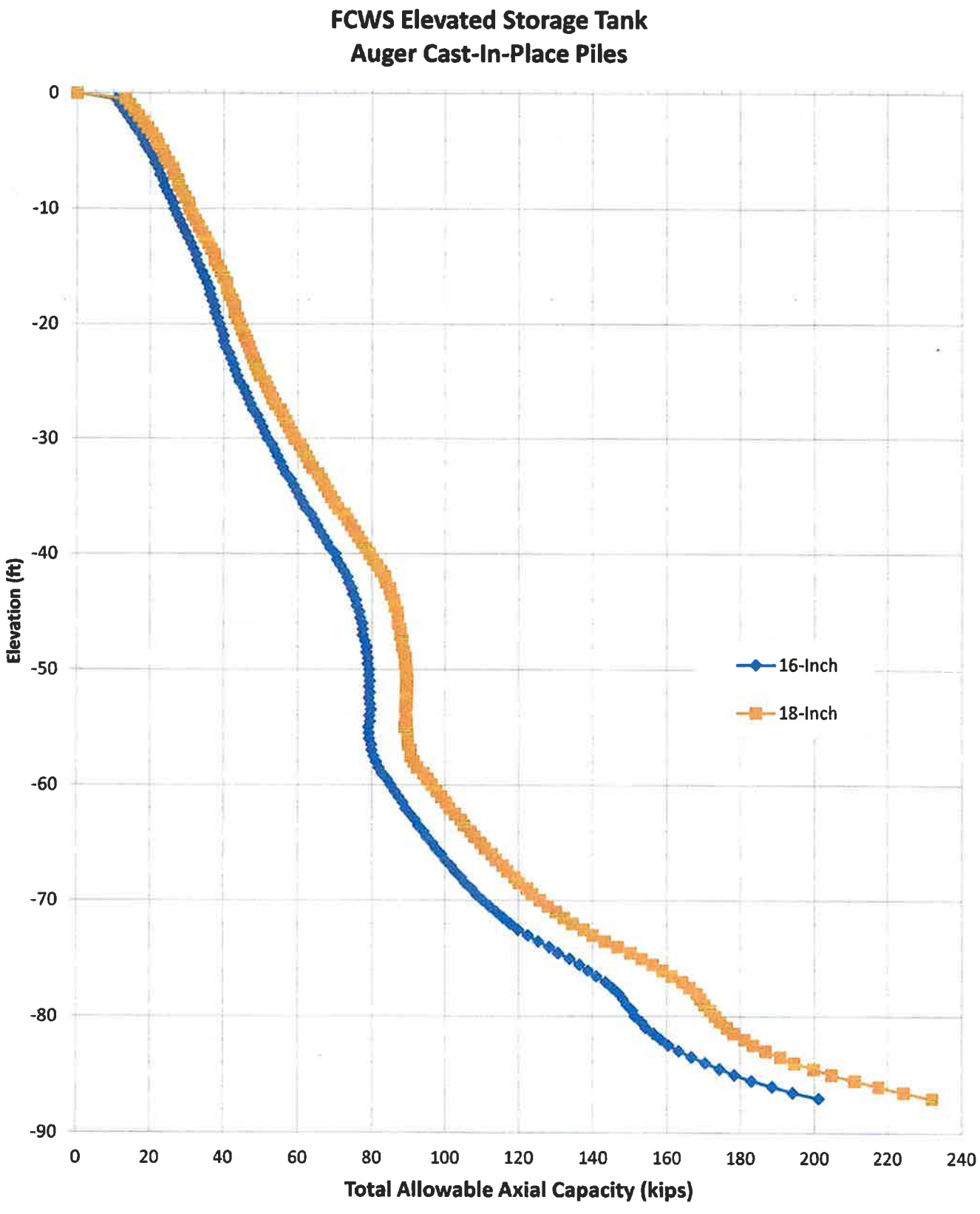
Sincerely,
Oasis Consulting Services

Benjamin D. Thomason, E.I.T.
Project Engineer
GA Registration #: EIT022461

Darren J. Bray, P.E.
Technical Director
GA Registration #: PE038504

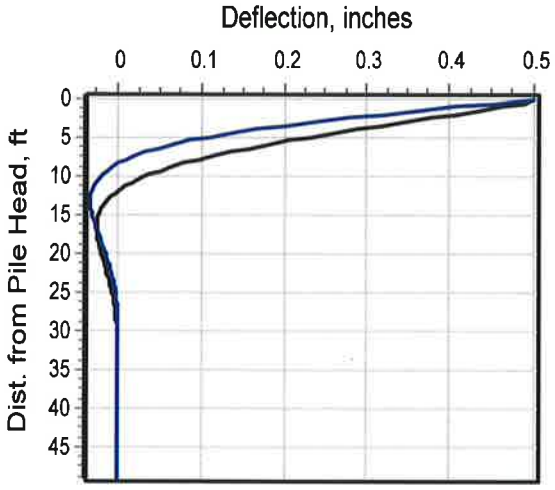
GEORGIA REGISTERED No. PE038504 PROFESSIONAL ENGINEER DARREN J. BRAY 11/22/22

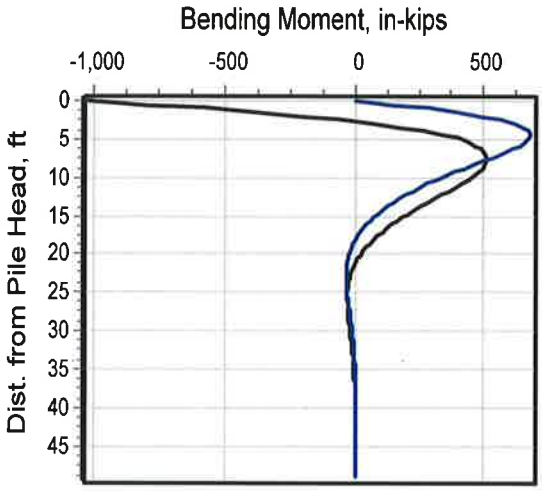
Attachments: Total Allowable Axial Pile Analysis
Lateral Pile Analysis, 16-Inch ACIP
Lateral Pile Analysis, 18-Inch ACIP

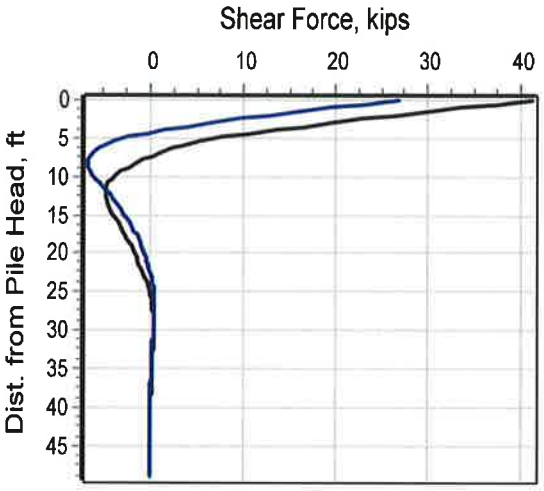

FCWS Elevated Storage Tank
Auger Cast-In-Place Piles
Elevation (ft)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
20
40
60
80
100
120
140
160
180
200
220
240
Total Allowable Axial Capacity (kips)
16-Inch
18-Inch

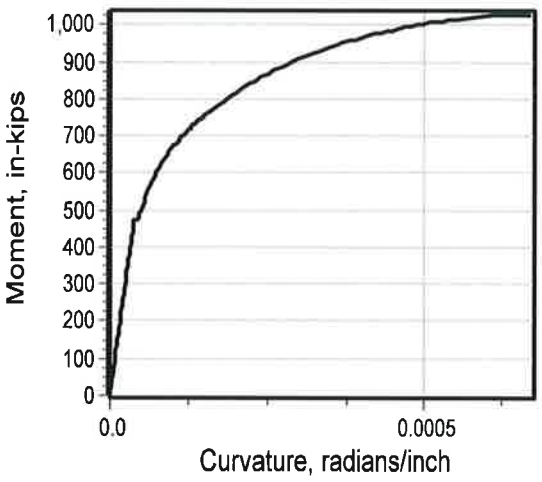
FCWS Elevated Storage Tank
Fayette County
Oasis Project No. 224927

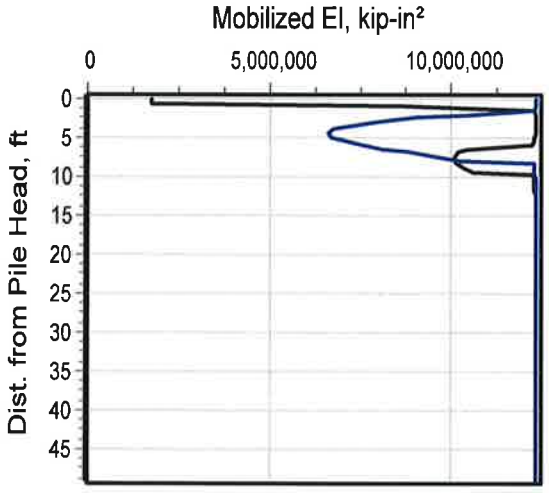
Lateral Pile Analysis
16-Inch ACIP

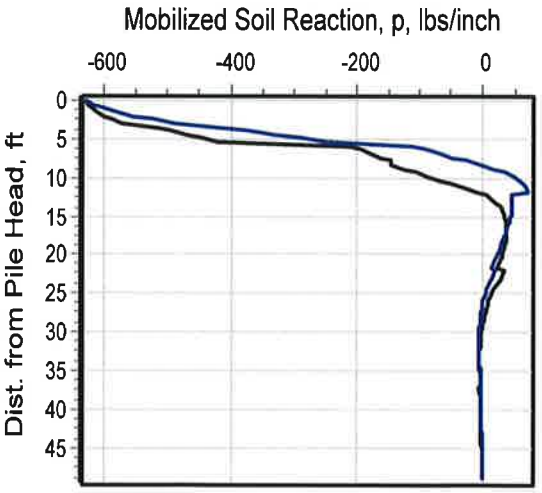








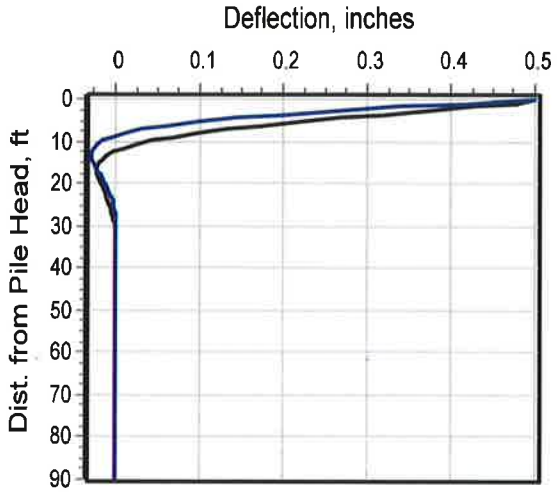


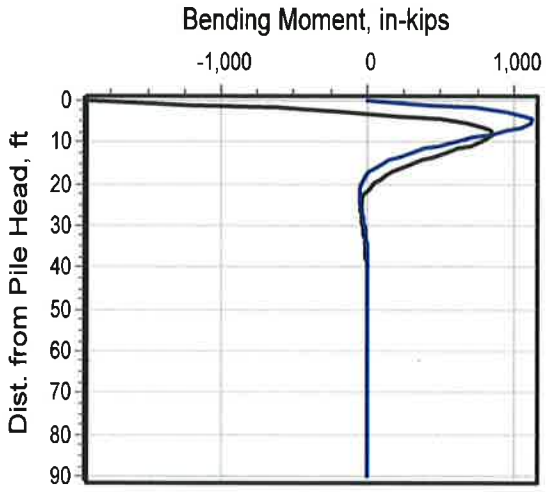


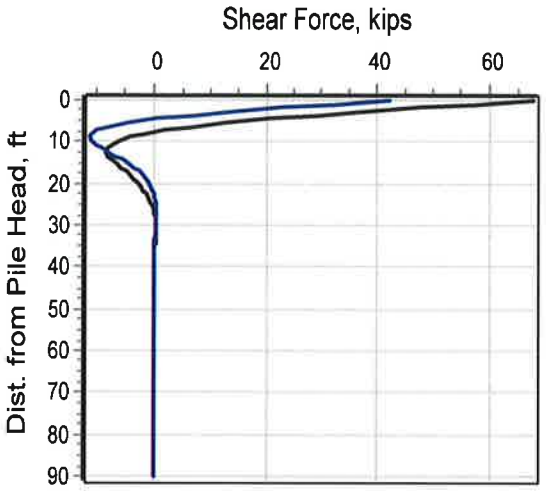
---- Fixed Head
---- Pinned Head

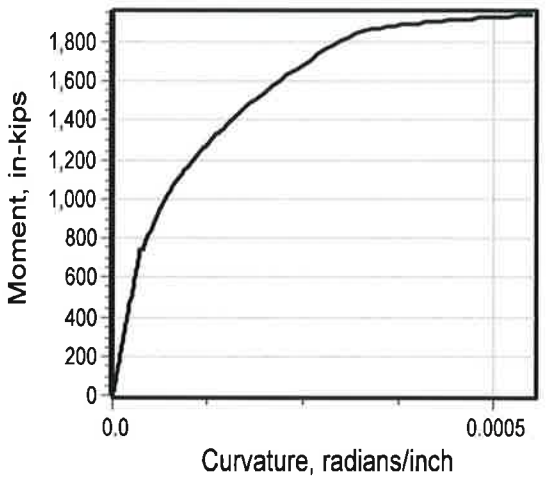
FCWS Elevated Storage Tank
Fayette County
Oasis Project No. 224927

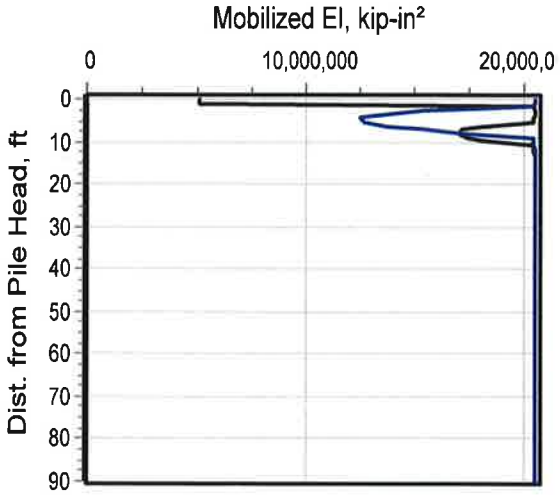
Lateral Pile Analysis
18-Inch ACIP

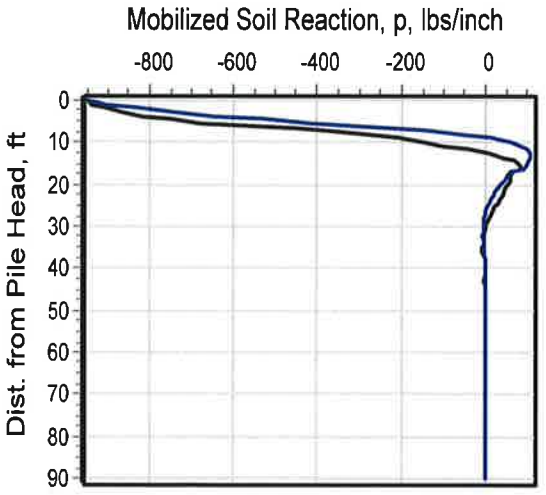












---- Fixed Head
---- Pinned Head

OASIS
CONSULTING
SERVICES

June 22, 2023

Arcadis
2839 Paces Ferry Road SE, Suite 900
Atlanta. Georgia 30339

Attention: Mr. Michael Diaz

Subject: **Addendum #2 to Report of Subsurface Exploration and Geotechnical Engineering Evaluation**
FCWS Elevated Storage Tank
461 Sandy Creek Road
Fayetteville, Georgia
Oasis Project No. 224927

Dear Michael:

As you are aware, Oasis Consulting Services (Oasis) previously submitted a Report of Subsurface Exploration and Geotechnical Engineering Evaluation dated October 4, 2022 (fka - Trilith Studios Above Ground Storage Tank, Oasis Project No 224927) and an Addendum to Report of Subsurface Exploration and Geotechnical Engineering Evaluation dated November 22, 2022. In those reports we provided the recommendation of deep foundations for support of the Above Ground Storage Tank. Recently, you provided Oasis newly anticipated foundation loads to be applied to the proposed deep foundations and asked that we review the foundation support options in light of the newly provided anticipated loads.

This Addendum #2 report should be used in conjunction with our previous reports referenced above and not as a separate report. The recommendations contained in our original reports remain in effect unless otherwise modified in this addendum report.

PROJECT INFORMATION

We understand the project consists of the construction of a 400,000-gallon (36' diameter) elevated storage tank in an area of the Trilith Development. Based on our review of the newly provided load calculations, we understand the elevated storage tank will have maximum outside column loads of 847.0 kips and a maximum center riser load 1068.0 kips with a horizontal reaction of 34.6 kips caused by the seismic load.

FOUNDATION OPTIONS

As noted above, we were asked to review the foundation support options in light of the anticipated loads and provide an axial pile and lateral pile analysis along with pile uplift resistance recommendations. For our analysis, we used a combination of soil conditions from borings B-2 and B-3 as a conservative approach. Boring B-2 soil consistency from the depth of 47 feet to 57 feet below existing grade was interpolated from boring B-3.

Our analysis considered a deep foundation system as the most appropriate foundation solution for the design as they will provide the necessary axial and lateral support for the anticipated loads. We considered caissons and auger cast-in-place (ACIP) piles for this project. After review, caissons did not appear feasible due to the depth needed to support the provided loads. In our opinion, auger cast piles would be the most cost-effective and feasible deep foundation system at this site due to the availability to achieve the depth needed to support the provided loads and therefore, detailed recommendations are provided for this system only.

For this project we analyzed 16-inch and 18-inch diameter ACIP piles. Estimated allowable compressive capacity was calculated using the SPT N-values and American Association of State Highway Transportation Officials (AASHTO) methods. Axial pile analysis was performed using the computer program RSPile by Rocscience with a deflection of 0.5-inches. Lateral pile analysis was performed using the computer program LPile. Results are attached.

Based on the boring data, ACIP piles will develop their capacity from a combination of skin friction and end bearing but mainly skin friction for this site. ACIP piles consisting of 16 or 18 inches in diameter, depending on the anticipated loads, appear to be a feasible foundation option for the axial loads. **However, 16-inch diameter ACIP piles do not appear to meet the newly provided horizontal reaction of 34.6 kips caused by the seismic load due to increased deflection beyond 0.5-inches (see attached L-Pile analysis).** Auger refusal depths in the borings varied significantly in the parking deck area, and we estimate pile lengths on the order of 85 to 95 feet based on the existing grade elevation. If desired, we recommend additional air track borings be performed at each column location to better quantify the depth to rock and estimated ACIP pile depths, which should help to provide a more accurate pile construction costs estimate. If partially weathered rock is encountered (PWR) refusal should be defined as a penetration rate of one foot or less per minute using a drive box with a minimum dead weight of 5,000 pounds and a torque of at least 25,000 foot-pounds. It is recommended that a center-to-center pile spacing of at least three (3) pile diameters be maintained to minimize settlement and pile capacity reductions caused by group effects. Where piles are spaced no closer than three pile diameters, a group reduction factor will not be required.

The allowable load design capacity generated is based on pile skin resistance since end bearing support varied significantly. The allowable axial compression design capacities include a factor of safety of 2.0 for skin friction in soil and 3.0 for the end bearing resistance in weak rock. The 28-day compressive strength of the grout should be at least 4,000 psi. To provide tension reinforcement, a full-length steel-reinforcing cage should be installed into the center of each pile immediately following grouting. The cage should be designed by the structural engineer based on design allowable capacities. Spacing devices (Centralizers) should be attached to the cage at one-third points but not in the cage area. Piles subject to uplift forces must be provided with adequate reinforcement steel through the entire length.

We recommend the design loads and pile lengths for the piles be verified by performing at least one (1) static load test and monitored in general accordance with ASTM D1143. We recommend that the pile(s) be tested to a minimum of two (2) times their allowable compression design capacity. After completing the pile load test and failure does not occur first, we recommend loading the test pile to three (3) times the design load. The primary purpose of the testing program would be to evaluate the axial/compression capacity of the proposed piles at the recommended minimum depth. The load tests are used to provide evidence that the contractor can produce an ACIP pile, which can safely support the design loads at the project site, and to satisfy project requirements. The load test location should be selected after installing 2 to 4 probe piles throughout the water tower foundations. The probe piles would assist the pile contractor and geotechnical engineer in evaluating the equipment and pile response to the specific site conditions and in determining tentative installation criteria for the test pile. All production piles should be placed using the same procedures and equipment used for installation of the test pile. If ultimate uplift loads are to be in excess of 1/8th of the vertical capacity, a modified load test must be performed on a separate pile to verify tensile or uplift capacity.

It is recommended that the installation of the probe piles, test pile(s) and all production piles be monitored by a representative of Oasis. The installation of auger-cast piles should be sequenced such that adjacent piles with a center-to-center pile spacing of at least six (6) pile diameters within the same cap should not be constructed within the same 12-hour period. Piles can be installed with a center-to-center pile spacing of at least four (4) pile diameters within the same cap after curing for at least 24 hours. These recommendations should provide adequate time for curing.

All piles must be installed with a grout ratio in excess of 1.15. The grout ratio is the actual volume of pumped grout divided by the theoretical volume of the pile. During the forming of the pile, the minimum required pump strokes per linear foot of pile, as determined by pump calibration, should be achieved. Should less than the required pump strokes occur in any one-foot increment, the auger should be immediately advanced three (3) feet below the point in question and forming of the pile resumed. Pressure of the grout during pumping should be maintained between 75 and 300 pounds

per square inch (psi). If the pressure falls below 75 psi, the auger should be advanced to a point three (3) feet lower than the elevation at which the pressure loss occurred. If the auger jumps upward during withdrawal or if the grouting process is interrupted, the auger should be inserted at least three (3) feet below the point in question and the pumping process continued.

Qualified personnel should be present to cast grout compressive test specimens. At a minimum, at least two sets of specimens, six specimens per set, should be cast per day of pile installation, or at least one set per every 50 cubic yards of grout. A flow cone should be used to check the fluidity of the grout mix.

UPLIFT RESISTANCE

Uplift resistance will rely on side friction developed between the various soils in contact with the ACIP piles. Table 1 below presents our recommendations.

Table 1

Soil Type	Uplift-Allowable Side Friction (ksf)
Fill Soils	0.25
Residual Soils	0.5
PWR	1.5

The upper five (5) feet of ACIP piles should be neglected for uplift calculations due to disturbance and other factors. The recommended friction values include a factor of safety of at least 2 and assume the pile has full depth reinforcement. The actual uplift resistance will depend on the thicknesses of the different strata at each pile location.

CLOSURE

This addendum report of professional services has been performed, the findings derived, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the local area. This warranty is in lieu of all warranties either expressed or implied. Unless otherwise stated herein, our original recommendations remain unchanged.

This addendum report and the conclusions and recommendations provided herein, are provided exclusively for the use of Arcadis and their design team and is intended solely for design of the referenced project. Oasis is not responsible for the conclusions, opinions or recommendations of others based on these data.

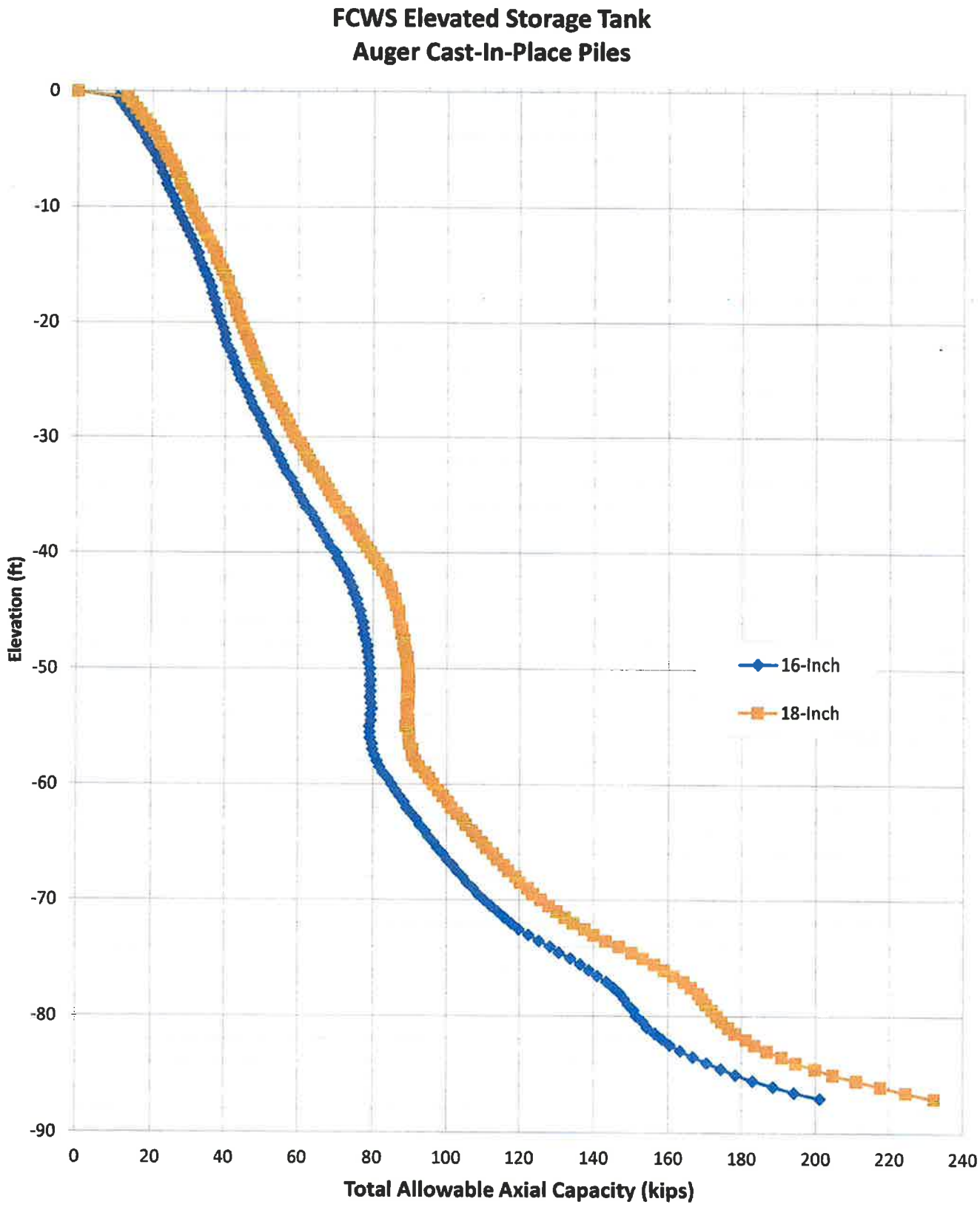
We sincerely appreciate the opportunity to provide you with these geotechnical services for the project. We remain available to assist you with the project if additional information is needed. Should you have any questions concerning this report, please do not hesitate to contact us.

Sincerely,
Oasis Consulting Services

Benjamin D. Thomason, E.I.T.
Project Engineer
GA Registration #: EIT022461

Darren J. Bray, P.E.
Technical Director
GA Registration #: PE038504

Attachments: Total Allowable Axial Pile Analysis
Lateral Pile Analysis, 16-Inch ACIP
Lateral Pile Analysis, 18-Inch ACIP


FCWS Elevated Storage Tank
Auger Cast-In-Place Piles
Elevation (ft)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
20
40
60
80
100
120
140
160
180
200
220
240
Total Allowable Axial Capacity (kips)
16-Inch
18-Inch

==========

LPile for Windows, Version 2022-12.005

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

==========

This copy of LPile is being used by:

Darren Bray
Oasis Consulting Services

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Files Used for Analysis

Path to file locations:
\D-OCS\PROJECTS\Arcadis.10004\224927.Trilith Studios Above Ground Storage Tank\01.Subsurface Exploration\07.Redesign of ACIPs\

Name of input data file:
LPile 16 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12d

Name of output report file:
LPile 16 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12o

Name of plot output file:
LPile 16 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12p

Name of runtime message file:
LPile 16 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12r

Date and Time of Analysis

Date: June 22, 2023 Time: 9:02:09

Problem Title

Project Name: FCWS Elevated Storage Tank

Job Number: 224927

Client: Arcadis

Engineer:

Description:

Program Options and Settings

Computational Options:
- Conventional Analysis

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:

- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis uses layering correction (Method of Georgiadis)
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 90.000 ft
Depth of ground surface below top of pile = 0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	16.0000
2	90.000	16.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section	=	90.000000 ft
Shaft Diameter	=	16.000000 in

Soil and Rock Layering Information

The soil profile is modelled using 16 layers

Layer 1 is Piedmont residual soil

Distance from top of pile to top of layer	=	0.0000 ft
Distance from top of pile to bottom of layer	=	3.000000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)		
SPT N60 at top of layer	=	17.000000 blows/ft
SPT N60 at bottom of layer	=	17.000000 blows/ft

Layer 2 is Piedmont residual soil

Distance from top of pile to top of layer	=	3.000000 ft
Distance from top of pile to bottom of layer	=	5.500000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)		
SPT N60 at top of layer	=	17.000000 blows/ft
SPT N60 at bottom of layer	=	17.000000 blows/ft

Layer 3 is Piedmont residual soil

Distance from top of pile to top of layer	=	5.500000 ft
Distance from top of pile to bottom of layer	=	8.000000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)		
SPT N60 at top of layer	=	13.000000 blows/ft
SPT N60 at bottom of layer	=	13.000000 blows/ft

Layer 4 is Piedmont residual soil

Distance from top of pile to top of layer	=	8.000000 ft
Distance from top of pile to bottom of layer	=	12.000000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf

```
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    11.000000 blows/ft
   SPT N60 at bottom of layer                       =    11.000000 blows/ft


Layer 5 is Piedmont residual soil

   Distance from top of pile to top of layer        =    12.000000 ft
   Distance from top of pile to bottom of layer     =    17.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    11.000000 blows/ft
   SPT N60 at bottom of layer                       =    11.000000 blows/ft


Layer 6 is Piedmont residual soil

   Distance from top of pile to top of layer        =    17.000000 ft
   Distance from top of pile to bottom of layer     =    22.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =     8.000000 blows/ft
   SPT N60 at bottom of layer                       =     8.000000 blows/ft


Layer 7 is Piedmont residual soil

   Distance from top of pile to top of layer        =    22.000000 ft
   Distance from top of pile to bottom of layer     =    27.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    10.000000 blows/ft
   SPT N60 at bottom of layer                       =    10.000000 blows/ft


Layer 8 is Piedmont residual soil

   Distance from top of pile to top of layer        =    27.000000 ft
   Distance from top of pile to bottom of layer     =    32.000000 ft
   Effective unit weight at top of layer            =    47.600000 pcf
   Effective unit weight at bottom of layer         =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    12.000000 blows/ft
   SPT N60 at bottom of layer                       =    12.000000 blows/ft


Layer 9 is Piedmont residual soil
```

```
   Distance from top of pile to top of layer           =    32.000000 ft
   Distance from top of pile to bottom of layer        =    37.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =    15.000000 blows/ft
   SPT N60 at bottom of layer                          =    15.000000 blows/ft


Layer 10 is Piedmont residual soil

   Distance from top of pile to top of layer           =    37.000000 ft
   Distance from top of pile to bottom of layer        =    42.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =    15.000000 blows/ft
   SPT N60 at bottom of layer                          =    15.000000 blows/ft


Layer 11 is Piedmont residual soil

   Distance from top of pile to top of layer           =    42.000000 ft
   Distance from top of pile to bottom of layer        =    47.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =     9.000000 blows/ft
   SPT N60 at bottom of layer                          =     9.000000 blows/ft


Layer 12 is Piedmont residual soil

   Distance from top of pile to top of layer           =    47.000000 ft
   Distance from top of pile to bottom of layer        =    57.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =     8.000000 blows/ft
   SPT N60 at bottom of layer                          =    12.000000 blows/ft


Layer 13 is Piedmont residual soil

   Distance from top of pile to top of layer           =    57.000000 ft
   Distance from top of pile to bottom of layer        =    62.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
```

```
   SPT N60 at top of layer                              =    12.000000 blows/ft
   SPT N60 at bottom of layer                           =    12.000000 blows/ft


Layer 14 is Piedmont residual soil

   Distance from top of pile to top of layer            =    62.000000 ft
   Distance from top of pile to bottom of layer         =    72.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    17.000000 blows/ft
   SPT N60 at bottom of layer                           =    22.000000 blows/ft


Layer 15 is Piedmont residual soil

   Distance from top of pile to top of layer            =    72.000000 ft
   Distance from top of pile to bottom of layer         =    82.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    40.000000 blows/ft
   SPT N60 at bottom of layer                           =    22.000000 blows/ft


Layer 16 is Piedmont residual soil

   Distance from top of pile to top of layer            =    82.000000 ft
   Distance from top of pile to bottom of layer         =    90.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    68.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    50.000000 blows/ft
   SPT N60 at bottom of layer                           =   100.000000 blows/ft


 (Depth of the lowest soil layer extends 0.000 ft below the pile tip)



-------------------------------------------------------------------------------
                        Summary of Input Soil Properties
-------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective     In-situ      In-situ
 Num.           Name             Depth       Unit Wt.      Test         Test
          (p-y Curve Type)        ft           pcf         Type       Property
-----   ------------------   ----------   ----------   ----------   ----------
  1          Piedmont               0.00     110.0000       SPT         17.0000
```

	Residual Soil	3.0000	110.0000	SPT	17.0000
2	Piedmont	3.0000	110.0000	SPT	17.0000
	Residual Soil	5.5000	110.0000	SPT	17.0000
3	Piedmont	5.5000	110.0000	SPT	13.0000
	Residual Soil	8.0000	110.0000	SPT	13.0000
4	Piedmont	8.0000	110.0000	SPT	11.0000
	Residual Soil	12.0000	110.0000	SPT	11.0000
5	Piedmont	12.0000	110.0000	SPT	11.0000
	Residual Soil	17.0000	110.0000	SPT	11.0000
6	Piedmont	17.0000	110.0000	SPT	8.0000
	Residual Soil	22.0000	110.0000	SPT	8.0000
7	Piedmont	22.0000	110.0000	SPT	10.0000
	Residual Soil	27.0000	110.0000	SPT	10.0000
8	Piedmont	27.0000	47.6000	SPT	12.0000
	Residual Soil	32.0000	47.6000	SPT	12.0000
9	Piedmont	32.0000	47.6000	SPT	15.0000
	Residual Soil	37.0000	47.6000	SPT	15.0000
10	Piedmont	37.0000	47.6000	SPT	15.0000
	Residual Soil	42.0000	47.6000	SPT	15.0000
11	Piedmont	42.0000	47.6000	SPT	9.0000
	Residual Soil	47.0000	47.6000	SPT	9.0000
12	Piedmont	47.0000	47.6000	SPT	8.0000
	Residual Soil	57.0000	47.6000	SPT	12.0000
13	Piedmont	57.0000	47.6000	SPT	12.0000
	Residual Soil	62.0000	47.6000	SPT	12.0000
14	Piedmont	62.0000	47.6000	SPT	17.0000
	Residual Soil	72.0000	47.6000	SPT	22.0000
15	Piedmont	72.0000	47.6000	SPT	40.0000
	Residual Soil	82.0000	47.6000	SPT	22.0000
16	Piedmont	82.0000	47.6000	SPT	50.0000
	Residual Soil	90.0000	68.6000	SPT	100.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Concentrated Loads Applied to All Load Cases

Concentrated loads along depth defined using 1 points

Point No.	Depth X ft	Shear Force lbs	Moment in-lbs

```
  1          0.00000        0.00000          0.00000
```

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y Run Analysis vs. Pile Length
1	5	y = 0.500000 in	S = 0.0000 in/in	200000.	N.A. Yes
2	4	y = 0.500000 in	M = 0.0000 in-lbs	200000.	N.A. Yes
3	2	V = 34600. lbs	S = 0.0000 in/in	200000.	No Yes
4	1	V = 34600. lbs	M = 0.0000 in-lbs	200000.	No Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	90.000000 ft
Shaft Diameter	=	16.000000 in
Concrete Cover Thickness (to edge of trans. reinf.)	=	3.000000 in
Number of Reinforcing Bars	=	6 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	201.061930 sq. in.
Total Area of Reinforcing Steel	=	2.640000 sq. in.
Area Ratio of Steel Reinforcement	=	1.31 percent
Edge-to-Edge Bar Spacing	=	3.500000 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	4.67
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Transverse Reinforcement
Type: Hoop

Number of Transverse Reinf. (per spacing)	=	45
Spacing of Transverse Reinf.	=	12.000000 in
Yield Stress of Transverse Reinf.	=	60000. psi
Diameter of Transverse Reinf.	=	0.375000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	833.035 kips
Tensile Load for Cracking of Concrete	=	-91.358 kips
Nominal Axial Tensile Capacity	=	-158.400 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	0.750000	0.440000	4.250000	0.00000
2	0.750000	0.440000	2.125000	3.680608
3	0.750000	0.440000	-2.12500	3.680608
4	0.750000	0.440000	-4.25000	0.00000
5	0.750000	0.440000	-2.12500	-3.68061
6	0.750000	0.440000	2.125000	-3.68061

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 3.500 inches
between bars 4 and 5.

Ratio of bar spacing to maximum aggregate size = 4.67

Concrete Properties:

Compressive Strength of Concrete	=	4000. psi
Modulus of Elasticity of Concrete	=	3604997. psi
Modulus of Rupture of Concrete	=	-474.34165 psi
Compression Strain at Peak Stress	=	0.001886
Tensile Strain at Fracture of Concrete	=	-0.0001154
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	200.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-14, Section 21.2.3.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 200.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi	Run Msg
0.00000125	15.7384570	12590766.	192.6305167	0.0002408	0.0002208	0.9556729	6.8407562	
0.00000250	31.4644388	12585776.	100.3234840	0.0002508	0.0002108	0.9922683	6.9892526	

```
0.00000375    47.1896818    12583915.    69.5581435    0.0002608    0.0002008
1.0286928     7.1381481
0.00000500    62.9138154    12582763.    54.1782262    0.0002709    0.0001909
1.0649453     7.2874428
0.00000625    78.6364688    12581835.    44.9524784    0.0002810    0.0001810
1.1010251     7.4371367
0.00000750    94.3572714    12580970.    38.8038155    0.0002910    0.0001710
1.1369311     7.5872299
0.00000875   110.0758522    12580097.    34.4134871    0.0003011    0.0001611
1.1726625     7.7377224
0.00001000   125.7918405    12579184.    31.1221178    0.0003112    0.0001512
1.2082183     7.8886142
0.00001125   141.5048653    12578210.    28.5633883    0.0003213    0.0001413
1.2435976     8.0399055
0.00001250   157.2145553    12577164.    26.5175067    0.0003315    0.0001315
1.2787995     8.1915962
0.00001375   172.9205395    12576039.    24.8446058    0.0003416    0.0001216
1.3138230     8.3436866
0.00001500   188.6224464    12574830.    23.4514404    0.0003518    0.0001118
1.3486673     8.4961766
0.00001625   204.3199046    12573533.    22.2734566    0.0003619    0.0001019
1.3833314     8.6490665
0.00001750   220.0125423    12572145.    21.2645441    0.0003721    0.00009213
1.4178144     8.8023562
0.00001875   235.6999876    12570666.    20.3908890    0.0003823    0.00008233
1.4521154     8.9560460
0.00002000   251.3818686    12569093.    19.6271307    0.0003925    0.00007254
1.4862334     9.1101359
0.00002125   267.0578129    12567426.    18.9538759    0.0004028    0.00006277
1.5201675     9.2646261
0.00002250   282.7274480    12565664.    18.3560409    0.0004130    0.00005301
1.5539168     9.4195168
0.00002375   298.3904013    12563806.    17.8217176    0.0004233    0.00004327
1.5874804     9.5748080
0.00002500   314.0462996    12561852.    17.3413793    0.0004335    0.00003353
1.6208574     9.7305001
0.00002625   329.6947697    12559801.    16.9073143    0.0004438    0.00002382
1.6540467     9.8865931
0.00002750   345.3354382    12557652.    16.5132127    0.0004541    0.00001411
1.6870475    10.0430872
0.00002875   360.9679311    12555406.    16.1538622    0.0004644    0.00000442
1.7198589    10.1999827
0.00003000   376.5918266    12553061.    15.8249188    0.0004747   -0.00000525
1.7524799    10.3572794
0.00003125   392.2053422    12550571.    15.5227266    0.0004851   -0.00001491
1.7849088    10.5149711
0.00003250   407.8044816    12547830.    15.2441806    0.0004954   -0.00002456
1.8171429    10.6730403
0.00003375   423.3846493    12544730.    14.9866316    0.0005058   -0.00003420
1.8491789    10.8314658
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0.00003500   438.9414408     12541184.    14.7478093     0.0005162   -0.00004383
1.8810138    10.9902266
0.00003625   454.4706542     12537121.    14.5257564     0.0005266   -0.00005344
1.9126445    11.1493015
0.00003750   469.9686082     12532496.    14.3187784     0.0005370   -0.00006305
1.9440683    11.3086717
0.00003875   485.4319266     12527276.    14.1254005     0.0005474   -0.00007264
1.9752826    11.4683190
0.00004000   500.8576206     12521441.    13.9443335     0.0005578   -0.00008223
2.0062851    11.6282270
0.00004125   516.2430752     12514984.    13.7744458     0.0005682   -0.00009180
2.0370735    11.7883809
0.00004250   531.5859714     12507905.    13.6147400     0.0005786     -0.000101
2.0676460    11.9487672
0.00004375   546.8842577     12500212.    13.4643338     0.0005891     -0.000111
2.0980008    12.1093736
0.00004500   546.8842577     12152984.    13.1815785     0.0005932     -0.000127
2.1096998    12.0863601 C
0.00004625   546.8842577     11824524.    13.0280246     0.0006025     -0.000137
2.1366451    12.2161381 C
0.00004750   548.9270361     11556359.    12.8811505     0.0006119     -0.000148
2.1632057    12.3439849 C
0.00004875   558.3361350     11453049.    12.7402922     0.0006211     -0.000159
2.1893647    12.4696883 C
0.00005125   576.3305762     11245475.    12.4755304     0.0006394     -0.000181
2.2405924    12.7156572 C
0.00005375   593.3754743     11039544.    12.2312945     0.0006574     -0.000203
2.2904737    12.9552304 C
0.00005625   609.4331368     10834367.    12.0043743     0.0006752     -0.000225
2.3389621    13.1876358 C
0.00005875   624.7616660     10634241.    11.7936782     0.0006929     -0.000247
2.3862643    13.4147794 C
0.00006125   639.4349258     10439754.    11.5974402     0.0007103     -0.000270
2.4324373    13.6370533 C
0.00006375   653.4524098     10250234.    11.4137840     0.0007276     -0.000292
2.4774715    13.8541315 C
0.00006625   666.9210682     10066733.    11.2417007     0.0007448     -0.000315
2.5214587    14.0668177 C
0.00006875   679.8575134      9888837.    11.0798946     0.0007617     -0.000338
2.5644101    14.2750394 C
0.00007125   692.3031849      9716536.    10.9273932     0.0007786     -0.000361
2.6063628    14.4790253 C
0.00007375   704.3033682      9549876.    10.7833962     0.0007953     -0.000385
2.6473596    14.6790874 C
0.00007625   715.8798755      9388589.    10.6470943     0.0008118     -0.000408
2.6874208    14.8752861 C
0.00007875   727.0223341      9232030.    10.5175936     0.0008283     -0.000432
2.7265307    15.0672535 C
0.00008125   737.8253380      9080927.    10.3947020     0.0008446     -0.000455
2.7647885    15.2560160 C
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0.00008375 748.3310916 8935297. 10.2780097 0.0008608 -0.000479
2.8022419 15.4420157 C
0.00008625 758.5564406 8794857. 10.1670321 0.0008769 -0.000503
2.8389117 15.6253890 C
0.00008875 768.4043886 8658078. 10.0606587 0.0008929 -0.000527
2.8746824 15.8045206 C
0.00009125 778.0531368 8526610. 9.9594575 0.0009088 -0.000551
2.9097607 15.9819148 C
0.00009375 787.4595239 8399568. 9.8627541 0.0009246 -0.000575
2.9440999 16.1568626 C
0.00009625 796.5819163 8276176. 9.7698901 0.0009404 -0.000600
2.9776453 16.3285061 C
0.00009875 805.5900843 8157874. 9.6815333 0.0009561 -0.000624
3.0106085 16.4995914 C
0.0001013 814.2579123 8042053. 9.5959972 0.0009716 -0.000648
3.0427076 16.6661469 C
0.0001038 822.8677637 7931256. 9.5146800 0.0009871 -0.000673
3.0742979 16.8329939 C
0.0001063 831.1694922 7822772. 9.4358024 0.0010026 -0.000697
3.1050624 16.9955663 C
0.0001088 839.4388279 7718978. 9.3607809 0.0010180 -0.000722
3.1353564 17.1588631 C
0.0001113 847.4018449 7617095. 9.2877177 0.0010333 -0.000747
3.1648240 17.3175994 C
0.0001138 855.3301948 7519386. 9.2180641 0.0010486 -0.000771
3.1938236 17.4769891 C
0.0001163 863.0366126 7423971. 9.1504627 0.0010637 -0.000796
3.2221057 17.6331975 C
0.0001188 870.6425910 7331727. 9.0854983 0.0010789 -0.000821
3.2498371 17.7886851 C
0.0001213 878.1515221 7242487. 9.0230042 0.0010940 -0.000846
3.2770196 17.9434390 C
0.0001238 885.4534292 7155179. 8.9621568 0.0011091 -0.000871
3.3035081 18.0950406 C
0.0001263 892.7247604 7071087. 8.9039068 0.0011241 -0.000896
3.3295434 18.2473290 C
0.0001288 899.8357879 6989016. 8.8472944 0.0011391 -0.000921
3.3549458 18.3972859 C
0.0001313 906.8217453 6909118. 8.7924347 0.0011540 -0.000946
3.3797692 18.5457050 C
0.0001338 913.7776070 6831982. 8.7398006 0.0011689 -0.000971
3.4041437 18.6948019 C
0.0001363 920.5761403 6756522. 8.6884653 0.0011838 -0.000996
3.4278914 18.8413991 C
0.0001388 927.2649349 6682991. 8.6386475 0.0011986 -0.001021
3.4510837 18.9866582 C
0.0001413 933.9241473 6611852. 8.5907566 0.0012134 -0.001047
3.4738317 19.1325872 C
0.0001438 940.4895111 6542536. 8.5442789 0.0012282 -0.001072
3.4960436 19.2774631 C

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 0.0001463   946.8995076      6474527.     8.4987449     0.0012429     -0.001097
3.5176375    19.4196022 C
 0.0001488   953.2804587      6408608.     8.4548952     0.0012577     -0.001122
3.5387916    19.5624046 C
 0.0001588   978.0519144      6160957.     8.2918249     0.0013163     -0.001224
3.6183564    20.1267875 C
 0.0001688        1002.       5936355.     8.1464495     0.0013747     -0.001325
3.6900686    20.6831879 C
 0.0001788        1025.       5731790.     8.0164640     0.0014329     -0.001427
3.7541599    21.2350459 C
 0.0001888        1047.       5544726.     7.9000474     0.0014911     -0.001529
3.8107999    -22.880015 C
 0.0001988        1068.       5372360.     7.7947893     0.0015492     -0.001631
3.8599464    -24.698883 C
 0.0002088        1088.       5213112.     7.6996595     0.0016073     -0.001733
3.9017217    -26.517487 C
 0.0002188        1108.       5065670.     7.6140463     0.0016656     -0.001834
3.9362134    -28.330897 C
 0.0002288        1127.       4927836.     7.5355300     0.0017238     -0.001936
3.9632433    -30.146878 C
 0.0002388        1146.       4799310.     7.4648567     0.0017822     -0.002038
3.9829539    -31.954098 C
 0.0002488        1164.       4678483.     7.4001462     0.0018408     -0.002139
3.9951938    -33.759295 C
 0.0002588        1181.       4564706.     7.3412758     0.0018996     -0.002240
3.9999382    -35.558201 C
 0.0002688        1198.       4457390.     7.2885146     0.0019588     -0.002341
3.9986242    -37.343639 C
 0.0002788        1214.       4355141.     7.2397967     0.0020181     -0.002442
3.9993374    -39.126993 C
 0.0002888        1229.       4257951.     7.1958748     0.0020778     -0.002542
3.9996990    -40.898442 C
 0.0002988        1244.       4165475.     7.1565559     0.0021380     -0.002642
3.9998602    -42.655488 C
 0.0003088        1259.       4077321.     7.1213728     0.0021987     -0.002741
3.9999159    -44.398316 C
 0.0003188        1273.       3992822.     7.0886192     0.0022595     -0.002841
3.9999033    -46.139075 C
 0.0003288        1286.       3912071.     7.0592563     0.0023207     -0.002939
3.9998204    -47.866514 C
 0.0003388        1299.       3834824.     7.0330018     0.0023824     -0.003038
3.9996051    -49.580457 C
 0.0003488        1312.       3760848.     7.0095513     0.0024446     -0.003135
3.9991442    -51.281255 C
 0.0003588        1324.       3689939.     6.9886310     0.0025072     -0.003233
3.9982725    -52.969331 C
 0.0003688        1336.       3621913.     6.9699936     0.0025702     -0.003330
3.9983025    -54.645130 C
 0.0003788        1347.       3556497.     6.9531605     0.0026335     -0.003426
3.9998816    -56.311926 C
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 0.0003888        1358.     3493550.    6.9378354    0.0026971    -0.003523
3.9990618   -57.971488 C
 0.0003988        1369.     3433039.    6.9242713    0.0027611    -0.003619
3.9971536   -59.619558 C
 0.0004088        1379.     3374294.    6.9119404    0.0028253    -0.003715
3.9999024   -60.000000 CY
 0.0004188        1388.     3315267.    6.8990560    0.0028890    -0.003811
3.9985599   -60.000000 CY
 0.0004288        1396.     3255233.    6.8845711    0.0029518    -0.003908
3.9993138   -60.000000 CY
 0.0004388        1401.     3194007.    6.8684007    0.0030135    -0.004006
3.9989154   -60.000000 CY
 0.0004488        1405.     3131303.    6.8496939    0.0030738    -0.004106
3.9991129   -60.000000 CY
 0.0004588        1408.     3068180.    6.8296183    0.0031331    -0.004207
3.9984036   -60.000000 CY
 0.0004688        1409.     3006784.    6.8099640    0.0031922    -0.004308
3.9999510   -60.000000 CY
 0.0004788        1411.     2947370.    6.7908467    0.0032511    -0.004409
3.9969305   -60.000000 CY
 0.0004888        1413.     2890145.    6.7722786    0.0033100    -0.004510
3.9994043   -60.000000 CY
 0.0004988        1414.     2835073.    6.7548442    0.0033690    -0.004611
3.9979910   -60.000000 CY
 0.0005088        1415.     2781977.    6.7385828    0.0034283    -0.004712
3.9976913   -60.000000 CY
 0.0005188        1417.     2730829.    6.7232471    0.0034877    -0.004812
3.9996718   -60.000000 CY
 0.0005288        1418.     2681479.    6.7088748    0.0035473    -0.004913
3.9964425   -60.000000 CY
 0.0005388        1419.     2633819.    6.6954331    0.0036072    -0.005013
3.9975998   -60.000000 CY
 0.0005488        1420.     2587813.    6.6827425    0.0036672    -0.005113
3.9995935   -60.000000 CY
 0.0006088        1420.     2332752.    6.6888981    0.0040719    -0.005668
3.9999608   -60.000000 CY


--------------------------------------------------------------------------------
   Summary of Results for Nominal Moment Capacity for Section 1
--------------------------------------------------------------------------------

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

 Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.      Max.
Tens.
  No.              kips                 in-kip               Strain
Strain
 ----         ---------------     ------------------     ------------
```

1	200.000	1400.126	0.00300000
-0.00398499			

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor	Nominal Ax. Thrust kips	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	200.000000	1400.	130.000000	910.081773	6872966.
1	0.75	200.000000	1400.	150.000000	1050.	5516033.
1	0.90	200.000000	1400.	180.000000	1260.	4069747.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	Yes	N.A.	N.A.
2	3.0000	3.0000	No	Yes	N.A.	N.A.
3	5.5000	5.5000	No	Yes	N.A.	N.A.

4	8.0000	8.0000	No	Yes	N.A.	N.A.
5	12.0000	12.0000	No	Yes	N.A.	N.A.
6	17.0000	17.0000	No	Yes	N.A.	N.A.
7	22.0000	22.0000	No	Yes	N.A.	N.A.
8	27.0000	27.0000	No	Yes	N.A.	N.A.
9	32.0000	32.0000	No	Yes	N.A.	N.A.
10	37.0000	37.0000	No	Yes	N.A.	N.A.
11	42.0000	42.0000	No	Yes	N.A.	N.A.
12	47.0000	47.0000	No	Yes	N.A.	N.A.
13	57.0000	57.0000	No	Yes	N.A.	N.A.
14	62.0000	62.0000	No	Yes	N.A.	N.A.
15	72.0000	72.0000	No	Yes	N.A.	N.A.
16	82.0000	82.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

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

Pile-head conditions are Displacement and Pile-head Rotation (Loading Type 5)
Displacement of pile head = 0.500000 inches
Rotation of pile head = 0.000E+00 radians
Axial load on pile head = 200000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.5000	-1384933.	52558.	0.00	0.00	3.34E+09	-764.975	8262.	0.00
0.9000	0.4758	-858542.	44196.	-0.00363	0.00	3.34E+09	-758.493	17217.	0.00
1.8000	0.4216	-414620.	36114.	-0.00520	0.00	1.25E+10	-738.063	18908.	0.00
2.7000	0.3635	-56015.	28316.	-0.00540	0.00	1.26E+10	-706.113	20979.	0.00
3.6000	0.3049	220333.	20930.	-0.00533	0.00	1.26E+10			

```
-661.655     23435.       0.00
    4.5000     0.2484    419097.     14091.   -0.00506       0.00   1.25E+10
-604.883     26301.       0.00
    5.4000     0.1957    546528.      7924.   -0.00463       0.00   1.23E+10
-537.006     29630.       0.00
    6.3000     0.1483    610283.      3125.   -0.00409       0.00   1.08E+10
-351.831     25626.       0.00
    7.2000     0.1074    631686.   -336.450   -0.00346       0.00   1.05E+10
-289.115     29072.       0.00
    8.1000    0.07352    617969.     -2928.   -0.00283       0.00   1.07E+10
-190.782     28027.       0.00
    9.0000    0.04635    580655.     -4704.   -0.00224       0.00   1.12E+10
-138.185     32198.       0.00
    9.9000    0.02524    526012.     -5926.   -0.00173       0.00   1.25E+10
-88.084     37695.       0.00
   10.8000    0.00903    460114.     -6591.   -0.00130       0.00   1.25E+10
-34.954     41818.       0.00
   11.7000   -0.00290    389283.     -6719.  -9.37E-04       0.00   1.26E+10
11.2307     41818.       0.00
   12.6000   -0.01121    319038.     -6424.  -6.32E-04       0.00   1.26E+10
43.4079     41818.       0.00
   13.5000   -0.01656    253264.     -5846.  -3.86E-04       0.00   1.26E+10
63.6400     41508.       0.00
   14.4000   -0.01956    194443.     -5111.  -1.94E-04       0.00   1.26E+10
72.4352     40003.       0.00
   15.3000   -0.02075    143710.     -4310.  -4.88E-05       0.00   1.26E+10
75.8270     39467.       0.00
   16.2000   -0.02061    101555.     -3493.   5.65E-05       0.00   1.26E+10
75.4350     39528.       0.00
   17.1000   -0.01953     68010.     -2802.   1.29E-04       0.00   1.26E+10
52.6261     29102.       0.00
   18.0000   -0.01782     40478.     -2253.   1.76E-04       0.00   1.26E+10
49.0105     29705.       0.00
   18.9000   -0.01573     18587.     -1749.   2.01E-04       0.00   1.26E+10
44.3044     30413.       0.00
   19.8000   -0.01347      1829.     -1305.   2.10E-04       0.00   1.26E+10
37.9449     30413.       0.00
   20.7000   -0.01120    -10506.   -929.709   2.06E-04       0.00   1.26E+10
31.5378     30413.       0.00
   21.6000   -0.00902    -19143.   -622.220   1.93E-04       0.00   1.26E+10
25.4047     30413.       0.00
   22.5000   -0.00702    -24782.   -351.580   1.75E-04       0.00   1.26E+10
24.7138     38016.       0.00
   23.4000   -0.00525    -27492.   -118.333   1.52E-04       0.00   1.26E+10
18.4801     38016.       0.00
   24.3000   -0.00373    -27995.    52.4330   1.28E-04       0.00   1.26E+10
13.1432     38016.       0.00
   25.2000   -0.00248    -26914.   170.4915   1.05E-04       0.00   1.26E+10
8.7195     38016.       0.00
   26.1000   -0.00147    -24765.   245.5149   8.26E-05       0.00   1.26E+10
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5.1737     38016.       0.00
   27.0000  -6.92E-04    -21968.   289.2365   6.26E-05       0.00   1.26E+10
2.9229     45619.       0.00
   27.9000  -1.18E-04    -18788.   307.7046   4.51E-05       0.00   1.26E+10
0.4971     45619.       0.00
   28.8000   2.83E-04    -15516.   303.9449   3.04E-05       0.00   1.26E+10
-1.193     45619.       0.00
   29.7000   5.39E-04    -12354.   285.2068   1.84E-05       0.00   1.26E+10
-2.277     45619.       0.00
   30.6000   6.81E-04     -9435.   257.3794   9.10E-06       0.00   1.26E+10
-2.877     45619.       0.00
   31.5000   7.36E-04     -6834.   225.0670   2.13E-06       0.00   1.26E+10
-3.107     45619.       0.00
   32.4000   7.27E-04     -4583.   187.5624  -2.77E-06       0.00   1.26E+10
-3.838     57024.       0.00
   33.3000   6.76E-04     -2771.   147.5698  -5.93E-06       0.00   1.26E+10
-3.568     57024.       0.00
   34.2000   5.99E-04     -1370.   111.2265  -7.70E-06       0.00   1.26E+10
-3.162     57024.       0.00
   35.1000   5.09E-04   -335.195    79.6262  -8.43E-06       0.00   1.26E+10
-2.690     57024.       0.00
   36.0000   4.17E-04   386.4348    53.2192  -8.41E-06       0.00   1.26E+10
-2.201     57024.       0.00
   36.9000   3.28E-04   850.6753    31.9921  -7.88E-06       0.00   1.26E+10
-1.730     57024.       0.00
   37.8000   2.47E-04      1112.    15.6180  -7.04E-06       0.00   1.26E+10
-1.302     57024.       0.00
   38.7000   1.76E-04      1218.     3.5787  -6.04E-06       0.00   1.26E+10
-0.928     57024.       0.00
   39.6000   1.16E-04      1215.     -4.741  -5.00E-06       0.00   1.26E+10
-0.613     57024.       0.00
   40.5000   6.78E-05      1138.     -9.984  -3.99E-06       0.00   1.26E+10
-0.358     57024.       0.00
   41.4000   3.00E-05      1016.    -12.772  -3.06E-06       0.00   1.26E+10
-0.158     57024.       0.00
   42.3000   1.63E-06   874.9512    -13.656  -2.25E-06       0.00   1.26E+10
-0.00515     34214.       0.00
   43.2000  -1.86E-05   731.2239    -13.365  -1.56E-06       0.00   1.26E+10
0.05905     34214.       0.00
   44.1000  -3.21E-05   593.0292    -12.496  -9.95E-07       0.00   1.26E+10
0.1018     34214.       0.00
   45.0000  -4.01E-05   465.6086    -11.260  -5.41E-07       0.00   1.26E+10
0.1271     34214.       0.00
   45.9000  -4.38E-05   352.1535     -9.824  -1.90E-07       0.00   1.26E+10
0.1388     34214.       0.00
   46.8000  -4.42E-05   254.2356     -8.318   6.99E-08       0.00   1.26E+10
0.1401     34214.       0.00
   47.7000  -4.23E-05   172.1922     -6.895   2.53E-07       0.00   1.26E+10
0.1233     31477.       0.00
   48.6000  -3.88E-05   104.2107     -5.592   3.71E-07       0.00   1.26E+10
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0.1179     32846.       0.00
   49.5000  -3.43E-05    49.7906     -4.369   4.37E-07       0.00   1.26E+10
0.1086     34214.       0.00
   50.4000  -2.93E-05     7.9454     -3.261   4.62E-07       0.00   1.26E+10
0.09662    35583.       0.00
   51.3000  -2.43E-05    -22.645     -2.290   4.56E-07       0.00   1.26E+10
0.08313    36952.       0.00
   52.2000  -1.95E-05    -43.497     -1.468   4.28E-07       0.00   1.26E+10
0.06911    38320.       0.00
   53.1000  -1.51E-05    -56.207     -0.796   3.85E-07       0.00   1.26E+10
0.05535    39689.       0.00
   54.0000  -1.12E-05    -62.356     -0.268   3.34E-07       0.00   1.26E+10
0.04245    41057.       0.00
   54.9000  -7.85E-06    -63.438     0.1278   2.80E-07       0.00   1.26E+10
0.03084    42426.       0.00
   55.8000  -5.12E-06    -60.805     0.4064   2.27E-07       0.00   1.26E+10
0.02076    43794.       0.00
   56.7000  -2.95E-06    -55.638     0.5853   1.77E-07       0.00   1.26E+10
0.01235    45163.       0.00
   57.6000  -1.30E-06    -48.927     0.6817   1.32E-07       0.00   1.26E+10
0.00550    45619.       0.00
   58.5000  -1.05E-07    -41.483     0.7138   9.31E-08       0.00   1.26E+10
4.45E-04    45619.       0.00
   59.4000   7.08E-07    -33.910     0.7001   6.08E-08       0.00   1.26E+10
-0.00299    45619.       0.00
   60.3000   1.21E-06    -26.623     0.6564   3.48E-08       0.00   1.26E+10
-0.00510    45619.       0.00
   61.2000   1.46E-06    -19.882     0.5956   1.49E-08       0.00   1.26E+10
-0.00617    45619.       0.00
   62.1000   1.53E-06    -13.823     0.5127   4.12E-10       0.00   1.26E+10
-0.00917    64817.       0.00
   63.0000   1.47E-06     -8.809     0.4143  -9.29E-09       0.00   1.26E+10
-0.00905    66528.       0.00
   63.9000   1.33E-06     -4.834     0.3202  -1.51E-08       0.00   1.26E+10
-0.00839    68239.       0.00
   64.8000   1.14E-06     -1.828     0.2349  -1.80E-08       0.00   1.26E+10
-0.00739    69949.       0.00
   65.7000   9.39E-07     0.3187     0.1614  -1.87E-08       0.00   1.26E+10
-0.00623    71660.       0.00
   66.6000   7.39E-07     1.7382     0.1006  -1.78E-08       0.00   1.26E+10
-0.00502    73371.       0.00
   67.5000   5.55E-07     2.5689    0.05268  -1.59E-08       0.00   1.26E+10
-0.00386    75082.       0.00
   68.4000   3.95E-07     2.9448    0.01668  -1.36E-08       0.00   1.26E+10
-0.00281    76792.       0.00
   69.3000   2.62E-07     2.9877   -0.00878  -1.10E-08       0.00   1.26E+10
-0.00191    78503.       0.00
   70.2000   1.57E-07     2.8027   -0.02538  -8.53E-09       0.00   1.26E+10
-0.00117    80214.       0.00
   71.1000   7.80E-08     2.4763   -0.03488  -6.26E-09       0.00   1.26E+10
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-5.92E-04	81924.	0.00					
72.0000	2.18E-08	2.0764	-0.03973	-4.31E-09	0.00	1.26E+10	
-3.07E-04	152064.	0.00					
72.9000	-1.51E-08	1.6367	-0.04029	-2.72E-09	0.00	1.26E+10	
2.04E-04	145905.	0.00					
73.8000	-3.69E-08	1.2178	-0.03661	-1.49E-09	0.00	1.26E+10	
4.77E-04	139747.	0.00					
74.7000	-4.74E-08	0.8524	-0.03087	-6.07E-10	0.00	1.26E+10	
5.86E-04	133588.	0.00					
75.6000	-5.00E-08	0.5537	-0.02451	-4.00E-12	0.00	1.26E+10	
5.90E-04	127430.	0.00					
76.5000	-4.75E-08	0.3229	-0.01845	3.72E-10	0.00	1.26E+10	
5.33E-04	121271.	0.00					
77.4000	-4.20E-08	0.1536	-0.01315	5.76E-10	0.00	1.26E+10	
4.47E-04	115112.	0.00					
78.3000	-3.50E-08	0.03626	-0.00883	6.58E-10	0.00	1.26E+10	
3.53E-04	108954.	0.00					
79.2000	-2.78E-08	-0.03993	-0.00549	6.56E-10	0.00	1.26E+10	
2.64E-04	102795.	0.00					
80.1000	-2.09E-08	-0.08521	-0.00306	6.02E-10	0.00	1.26E+10	
1.87E-04	96637.	0.00					
81.0000	-1.48E-08	-0.109	-0.00138	5.19E-10	0.00	1.26E+10	
1.24E-04	90478.	0.00					
81.9000	-9.65E-09	-0.117	-3.07E-04	4.23E-10	0.00	1.26E+10	
7.53E-05	84319.	0.00					
82.8000	-5.63E-09	-0.117	6.88E-04	3.22E-10	0.00	1.26E+10	
1.09E-04	209088.	0.00					
83.7000	-2.69E-09	-0.104	0.00159	2.27E-10	0.00	1.26E+10	
5.74E-05	230472.	0.00					
84.6000	-7.18E-10	-0.08374	0.00199	1.47E-10	0.00	1.26E+10	
1.67E-05	251856.	0.00					
85.5000	4.80E-10	-0.06154	0.00201	8.46E-11	0.00	1.26E+10	
-1.22E-05	273240.	0.00					
86.4000	1.11E-09	-0.04064	0.00178	4.07E-11	0.00	1.26E+10	
-3.02E-05	294624.	0.00					
87.3000	1.36E-09	-0.02320	0.00140	1.34E-11	0.00	1.26E+10	
-3.98E-05	316008.	0.00					
88.2000	1.40E-09	-0.01036	9.54E-04	-1.05E-12	0.00	1.26E+10	
-4.36E-05	337392.	0.00					
89.1000	1.34E-09	-0.00259	4.78E-04	-6.60E-12	0.00	1.26E+10	
-4.44E-05	358776.	0.00					
90.0000	1.25E-09	0.00	0.00	-7.71E-12	0.00	1.26E+10	
-4.42E-05	190080.	0.00					

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.50000000 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1384933. inch-lbs
Maximum shear force              =         52558. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             11
Number of zero deflection points =              6
```

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

Pile-head conditions are Displacement and Moment (Loading Type 4)
Displacement of pile head = 0.500000 inches
Moment at pile head = 0.0 in-lbs
Axial load at pile head = 200000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.5000	0.00	32529.	-0.00808	0.00	1.26E+10	-764.975	8262.	0.00
0.9000	0.4127	324157.	24435.	-0.00794	0.00	1.26E+10	-733.908	19204.	0.00
1.8000	0.3285	562109.	16794.	-0.00754	0.00	1.14E+10	-681.144	22395.	0.00
2.7000	0.2500	719464.	9840.	-0.00685	0.00	9.33E+09	-606.695	26213.	0.00
3.6000	0.1804	804256.	3788.	-0.00591	0.00	8.17E+09	-514.059	30767.	0.00
4.5000	0.1224	826793.	-1203.	-0.00481	0.00	7.88E+09	-410.175	36192.	0.00
5.4000	0.07660	799039.	-5055.	-0.00372	0.00	8.24E+09	-303.139	42743.	0.00
6.3000	0.04210	733666.	-7515.	-0.00276	0.00	9.14E+09	-152.333	39083.	0.00
7.2000	0.01696	648652.	-8751.	-0.00199	0.00	1.03E+10			

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-76.626     48799.       0.00
    8.1000  -8.42E-04    553233.     -9147.   -0.00139       0.00   1.15E+10
3.2613     41818.       0.00
    9.0000   -0.01304    457074.     -8857.  -9.32E-04       0.00   1.25E+10
50.4753     41818.       0.00
    9.9000   -0.02098    365951.     -8171.  -5.78E-04       0.00   1.26E+10
76.4659     39368.       0.00
   10.8000   -0.02552    283067.     -7279.  -2.99E-04       0.00   1.26E+10
88.8323     37596.       0.00
   11.7000   -0.02743    210019.     -6292.  -8.70E-05       0.00   1.26E+10
93.8328     36942.       0.00
   12.6000   -0.02740    147526.     -5280.   6.66E-05       0.00   1.26E+10
93.7429     36954.       0.00
   13.5000   -0.02599     95694.     -4287.   1.71E-04       0.00   1.26E+10
90.0868     37429.       0.00
   14.4000   -0.02370     54192.     -3347.   2.35E-04       0.00   1.26E+10
83.9806     38263.       0.00
   15.3000   -0.02091     22385.     -2481.   2.68E-04       0.00   1.26E+10
76.2821     39397.       0.00
   16.2000   -0.01791   -566.244     -1704.   2.78E-04       0.00   1.26E+10
67.6615     40797.       0.00
   17.1000   -0.01492    -15624.     -1112.   2.71E-04       0.00   1.26E+10
42.0067     30413.       0.00
   18.0000   -0.01207    -25753.   -701.622   2.53E-04       0.00   1.26E+10
33.9816     30413.       0.00
   18.9000   -0.00946    -31871.   -374.327   2.28E-04       0.00   1.26E+10
26.6285     30413.       0.00
   19.8000   -0.00714    -34824.   -121.955   1.99E-04       0.00   1.26E+10
20.1072     30413.       0.00
   20.7000   -0.00515    -35367.    64.8958   1.69E-04       0.00   1.26E+10
14.4947     30413.       0.00
   21.6000   -0.00348    -34154.   196.1161   1.40E-04       0.00   1.26E+10
9.8053     30413.       0.00
   22.5000   -0.00213    -31734.   289.6142   1.11E-04       0.00   1.26E+10
7.5091     38016.       0.00
   23.4000   -0.00108    -28379.   350.6665   8.55E-05       0.00   1.26E+10
3.7968     38016.       0.00
   24.3000  -2.87E-04    -24529.   376.6249   6.28E-05       0.00   1.26E+10
1.0103     38016.       0.00
   25.2000   2.77E-04    -20515.   376.8090   4.35E-05       0.00   1.26E+10
-0.976     38016.       0.00
   26.1000   6.52E-04    -16578.   359.1525   2.75E-05       0.00   1.26E+10
-2.294     38016.       0.00
   27.0000   8.72E-04    -12877.   326.8719   1.49E-05       0.00   1.26E+10
-3.684     45619.       0.00
   27.9000   9.74E-04     -9582.   284.7684   5.28E-06       0.00   1.26E+10
-4.113     45619.       0.00
   28.8000   9.86E-04     -6748.   240.0647  -1.73E-06       0.00   1.26E+10
-4.166     45619.       0.00
   29.7000   9.36E-04     -4389.   196.2112  -6.50E-06       0.00   1.26E+10
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-3.955     45619.       0.00
   30.6000   8.46E-04     -2482.   155.5614  -9.45E-06       0.00   1.26E+10
-3.573     45619.       0.00
   31.5000   7.32E-04   -987.725   119.5672  -1.09E-05       0.00   1.26E+10
-3.093     45619.       0.00
   32.4000   6.10E-04   147.7567    85.4858  -1.13E-05       0.00   1.26E+10
-3.218     57024.       0.00
   33.3000   4.88E-04   907.5727    54.1866  -1.08E-05       0.00   1.26E+10
-2.578     57024.       0.00
   34.2000   3.75E-04      1365.    29.5664  -9.87E-06       0.00   1.26E+10
-1.982     57024.       0.00
   35.1000   2.75E-04      1589.    11.0250  -8.60E-06       0.00   1.26E+10
-1.452     57024.       0.00
   36.0000   1.89E-04      1640.     -2.218  -7.22E-06       0.00   1.26E+10
-1.000     57024.       0.00
   36.9000   1.19E-04      1572.    -11.015  -5.84E-06       0.00   1.26E+10
-0.629     57024.       0.00
   37.8000   6.33E-05      1428.    -16.215  -4.55E-06       0.00   1.26E+10
-0.334     57024.       0.00
   38.7000   2.07E-05      1242.    -18.611  -3.41E-06       0.00   1.26E+10
-0.109     57024.       0.00
   39.6000  -1.03E-05      1040.    -18.907  -2.43E-06       0.00   1.26E+10
0.05464     57024.       0.00
   40.5000  -3.18E-05   843.6573    -17.706  -1.62E-06       0.00   1.26E+10
0.1678     57024.       0.00
   41.4000  -4.54E-05   664.9457    -15.505  -9.76E-07       0.00   1.26E+10
0.2397     57024.       0.00
   42.3000  -5.29E-05   512.9606    -13.307  -4.70E-07       0.00   1.26E+10
0.1674     34214.       0.00
   43.2000  -5.56E-05   379.5555    -11.452  -8.77E-08       0.00   1.26E+10
0.1760     34214.       0.00
   44.1000  -5.47E-05   265.9774     -9.565   1.89E-07       0.00   1.26E+10
0.1734     34214.       0.00
   45.0000  -5.15E-05   172.1368     -7.748   3.77E-07       0.00   1.26E+10
0.1631     34214.       0.00
   45.9000  -4.66E-05    96.9974     -6.070   4.93E-07       0.00   1.26E+10
0.1476     34214.       0.00
   46.8000  -4.08E-05    38.8990     -4.574   5.51E-07       0.00   1.26E+10
0.1294     34214.       0.00
   47.7000  -3.47E-05     -4.182     -3.329   5.66E-07       0.00   1.26E+10
0.1012     31477.       0.00
   48.6000  -2.86E-05    -35.457     -2.313   5.49E-07       0.00   1.26E+10
0.08703     32846.       0.00
   49.5000  -2.29E-05    -56.516     -1.452   5.09E-07       0.00   1.26E+10
0.07240     34214.       0.00
   50.4000  -1.76E-05    -69.024     -0.748   4.55E-07       0.00   1.26E+10
0.05804     35583.       0.00
   51.3000  -1.30E-05    -74.634     -0.194   3.94E-07       0.00   1.26E+10
0.04454     36952.       0.00
   52.2000  -9.11E-06    -74.911     0.2213   3.30E-07       0.00   1.26E+10
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0.03233     38320.       0.00
   53.1000  -5.90E-06    -71.279     0.5129   2.67E-07       0.00   1.26E+10
0.02167     39689.       0.00
   54.0000  -3.35E-06    -64.986     0.6986   2.09E-07       0.00   1.26E+10
0.01272     41057.       0.00
   54.9000  -1.39E-06    -57.090     0.7968   1.56E-07       0.00   1.26E+10
0.00548     42426.       0.00
   55.8000   2.77E-08    -48.449     0.8258   1.11E-07       0.00   1.26E+10
-1.13E-04    43794.       0.00
   56.7000   1.00E-06    -39.731     0.8026   7.31E-08       0.00   1.26E+10
-0.00419     45163.       0.00
   57.6000   1.61E-06    -31.429     0.7434   4.25E-08       0.00   1.26E+10
-0.00678     45619.       0.00
   58.5000   1.92E-06    -23.859     0.6629   1.88E-08       0.00   1.26E+10
-0.00811     45619.       0.00
   59.4000   2.01E-06    -17.190     0.5732   1.23E-09       0.00   1.26E+10
-0.00850     45619.       0.00
   60.3000   1.95E-06    -11.482     0.4829  -1.11E-08       0.00   1.26E+10
-0.00822     45619.       0.00
   61.2000   1.77E-06     -6.711     0.3981  -1.89E-08       0.00   1.26E+10
-0.00749     45619.       0.00
   62.1000   1.54E-06     -2.801     0.3078  -2.30E-08       0.00   1.26E+10
-0.00923     64817.       0.00
   63.0000   1.28E-06    0.03663     0.2154  -2.41E-08       0.00   1.26E+10
-0.00787     66528.       0.00
   63.9000   1.02E-06     1.9562     0.1382  -2.33E-08       0.00   1.26E+10
-0.00643     68239.       0.00
   64.8000   7.75E-07     3.1226    0.07641  -2.11E-08       0.00   1.26E+10
-0.00502     69949.       0.00
   65.7000   5.61E-07     3.6978    0.02919  -1.82E-08       0.00   1.26E+10
-0.00372     71660.       0.00
   66.6000   3.82E-07     3.8317   -0.00493  -1.50E-08       0.00   1.26E+10
-0.00260     73371.       0.00
   67.5000   2.38E-07     3.6558   -0.02790  -1.17E-08       0.00   1.26E+10
-0.00166     75082.       0.00
   68.4000   1.29E-07     3.2797   -0.04178  -8.77E-09       0.00   1.26E+10
-9.14E-04    76792.       0.00
   69.3000   4.90E-08     2.7911   -0.04864  -6.16E-09       0.00   1.26E+10
-3.56E-04    78503.       0.00
   70.2000  -4.58E-09     2.2557   -0.05039  -4.00E-09       0.00   1.26E+10
3.40E-05     80214.       0.00
   71.1000  -3.73E-08     1.7200   -0.04867  -2.29E-09       0.00   1.26E+10
2.83E-04     81924.       0.00
   72.0000  -5.41E-08     1.2142   -0.04303  -1.03E-09       0.00   1.26E+10
7.62E-04    152064.       0.00
   72.9000  -5.96E-08     0.7950   -0.03457  -1.72E-10       0.00   1.26E+10
8.06E-04    145905.       0.00
   73.8000  -5.78E-08     0.4682   -0.02618   3.70E-10       0.00   1.26E+10
7.48E-04    139747.       0.00
   74.7000  -5.16E-08     0.2278   -0.01869   6.68E-10       0.00   1.26E+10
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6.39E-04    133588.       0.00
   75.6000  -4.34E-08    0.06154   -0.01248   7.92E-10       0.00   1.26E+10
5.12E-04    127430.       0.00
   76.5000  -3.45E-08   -0.04519   -0.00762   7.99E-10       0.00   1.26E+10
3.88E-04    121271.       0.00
   77.4000  -2.61E-08     -0.107   -0.00403   7.34E-10       0.00   1.26E+10
2.78E-04    115112.       0.00
   78.3000  -1.87E-08     -0.135   -0.00151   6.31E-10       0.00   1.26E+10
1.88E-04    108954.       0.00
   79.2000  -1.25E-08     -0.142   1.49E-04   5.12E-10       0.00   1.26E+10
1.19E-04    102795.       0.00
   80.1000  -7.62E-09     -0.134    0.00116   3.93E-10       0.00   1.26E+10
6.81E-05     96637.       0.00
   81.0000  -3.99E-09     -0.119    0.00171   2.85E-10       0.00   1.26E+10
3.35E-05     90478.       0.00
   81.9000  -1.47E-09   -0.09872    0.00195   1.91E-10       0.00   1.26E+10
1.15E-05     84319.       0.00
   82.8000   1.41E-10   -0.07731    0.00200   1.16E-10       0.00   1.26E+10
-2.72E-06    209088.       0.00
   83.7000   1.03E-09   -0.05608    0.00186   5.87E-11       0.00   1.26E+10
-2.21E-05    230472.       0.00
   84.6000   1.41E-09   -0.03732    0.00157   1.86E-11       0.00   1.26E+10
-3.28E-05    251856.       0.00
   85.5000   1.44E-09   -0.02232    0.00119  -6.96E-12       0.00   1.26E+10
-3.63E-05    273240.       0.00
   86.4000   1.26E-09   -0.01151   8.12E-04  -2.15E-11       0.00   1.26E+10
-3.43E-05    294624.       0.00
   87.3000   9.72E-10   -0.00469   4.73E-04  -2.84E-11       0.00   1.26E+10
-2.84E-05    316008.       0.00
   88.2000   6.44E-10   -0.00117   2.11E-04  -3.09E-11       0.00   1.26E+10
-2.01E-05    337392.       0.00
   89.1000   3.04E-10   4.65E-06   4.78E-05  -3.14E-11       0.00   1.26E+10
-1.01E-05    358776.       0.00
   90.0000  -3.53E-11       0.00       0.00  -3.14E-11       0.00   1.26E+10
1.24E-06    190080.       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 2:

Pile-head deflection             =     0.50000000 inches
Computed slope at pile head      =     -0.0080798 radians
Maximum bending moment           =        826793. inch-lbs
Maximum shear force              =         32529. lbs
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Depth of maximum bending moment = 4.50000000 feet below pile head
Depth of maximum shear force = 0.000000 feet below pile head
Number of iterations = 12
Number of zero deflection points = 7

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

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 34600.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 200000.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.2072	-962995.	34600.	0.00	0.00	6.31E+09	-553.253	14417.	0.00
0.9000	0.1983	-619800.	28692.	-0.00135	0.00	6.31E+09	-540.753	29447.	0.00
1.8000	0.1780	-337387.	23017.	-0.00203	0.00	1.26E+10	-510.181	30961.	0.00
2.7000	0.1545	-113854.	17718.	-0.00222	0.00	1.26E+10	-471.125	32940.	0.00
3.6000	0.1299	54937.	12877.	-0.00225	0.00	1.26E+10	-425.343	35359.	0.00
4.5000	0.1059	174015.	8557.	-0.00215	0.00	1.26E+10	-374.666	38219.	0.00
5.4000	0.08345	249069.	4801.	-0.00197	0.00	1.26E+10	-321.002	41546.	0.00
6.3000	0.06333	286219.	1968.	-0.00174	0.00	1.26E+10	-203.581	34718.	0.00
7.2000	0.04587	299092.	-6.712	-0.00149	0.00	1.26E+10	-162.094	38165.	0.00
8.1000	0.03119	292503.	-1440.	-0.00123	0.00	1.26E+10	-103.325	35783.	0.00
9.0000	0.01922	273319.	-2384.	-9.91E-04	0.00	1.26E+10	-71.463	40160.	0.00

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    9.9000    0.00979    245292.     -2974.  -7.68E-04       0.00   1.26E+10
-37.894     41818.       0.00
   10.8000    0.00263    212390.     -3234.  -5.71E-04       0.00   1.26E+10
-10.190     41818.       0.00
   11.7000   -0.00255    177905.     -3236.  -4.04E-04       0.00   1.26E+10
9.8843     41818.       0.00
   12.6000   -0.00609    144243.     -3055.  -2.65E-04       0.00   1.26E+10
23.5699     41818.       0.00
   13.5000   -0.00828    113063.     -2755.  -1.55E-04       0.00   1.26E+10
32.0762     41818.       0.00
   14.4000   -0.00943     85414.     -2384.  -6.97E-05       0.00   1.26E+10
36.5234     41818.       0.00
   15.3000   -0.00979     61867.     -1982.  -6.48E-06       0.00   1.26E+10
37.9046     41818.       0.00
   16.2000   -0.00957     42627.     -1577.   3.84E-05       0.00   1.26E+10
37.0652     41818.       0.00
   17.1000   -0.00896     27631.     -1241.   6.85E-05       0.00   1.26E+10
25.2335     30413.       0.00
   18.0000   -0.00809     15527.   -981.607   8.70E-05       0.00   1.26E+10
22.7893     30413.       0.00
   18.9000   -0.00708      6052.   -750.868   9.63E-05       0.00   1.26E+10
19.9401     30413.       0.00
   19.8000   -0.00601     -1108.   -551.753   9.84E-05       0.00   1.26E+10
16.9331     30413.       0.00
   20.7000   -0.00496     -6291.   -384.958   9.52E-05       0.00   1.26E+10
13.9549     30413.       0.00
   21.6000   -0.00396     -9834.   -249.442   8.83E-05       0.00   1.26E+10
11.1408     30413.       0.00
   22.5000   -0.00305    -12060.   -131.345   7.89E-05       0.00   1.26E+10
10.7290     38016.       0.00
   23.4000   -0.00225    -13012.    -30.611   6.82E-05       0.00   1.26E+10
7.9254     38016.       0.00
   24.3000   -0.00158    -13016.    42.1349   5.70E-05       0.00   1.26E+10
5.5460     38016.       0.00
   25.2000   -0.00102    -12348.    91.4753   4.61E-05       0.00   1.26E+10
3.5911     38016.       0.00
   26.1000  -5.79E-04    -11239.   121.8769   3.60E-05       0.00   1.26E+10
2.0388     38016.       0.00
   27.0000  -2.42E-04     -9871.   138.4144   2.70E-05       0.00   1.26E+10
1.0237     45619.       0.00
   27.9000   3.08E-06     -8366.   143.8720   1.91E-05       0.00   1.26E+10
-0.01299     45619.       0.00
   28.8000   1.71E-04     -6846.   139.9015   1.26E-05       0.00   1.26E+10
-0.722     45619.       0.00
   29.7000   2.75E-04     -5398.   129.7172   7.36E-06       0.00   1.26E+10
-1.164     45619.       0.00
   30.6000   3.30E-04     -4076.   115.9065   3.30E-06       0.00   1.26E+10
-1.394     45619.       0.00
   31.5000   3.47E-04     -2909.   100.4715   3.01E-07       0.00   1.26E+10
-1.464     45619.       0.00
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   32.4000   3.36E-04     -1907.    82.9693  -1.76E-06       0.00   1.26E+10
-1.777     57024.       0.00
   33.3000   3.09E-04     -1109.    64.5768  -3.06E-06       0.00   1.26E+10
-1.629     57024.       0.00
   34.2000   2.70E-04   -499.215    48.0677  -3.75E-06       0.00   1.26E+10
-1.428     57024.       0.00
   35.1000   2.28E-04    -54.798    33.8670  -3.99E-06       0.00   1.26E+10
-1.202     57024.       0.00
   36.0000   1.84E-04   249.5304    22.1209  -3.90E-06       0.00   1.26E+10
-0.973     57024.       0.00
   36.9000   1.43E-04   439.8719    12.7781  -3.61E-06       0.00   1.26E+10
-0.757     57024.       0.00
   37.8000   1.06E-04   541.1170     5.6563  -3.19E-06       0.00   1.26E+10
-0.562     57024.       0.00
   38.7000   7.45E-05   575.8116     0.4966  -2.71E-06       0.00   1.26E+10
-0.394     57024.       0.00
   39.6000   4.80E-05   563.5375     -2.996  -2.22E-06       0.00   1.26E+10
-0.253     57024.       0.00
   40.5000   2.66E-05   520.6785     -5.123  -1.75E-06       0.00   1.26E+10
-0.141     57024.       0.00
   41.4000   1.01E-05   460.4598     -6.170  -1.33E-06       0.00   1.26E+10
-0.05332     57024.       0.00
   42.3000  -2.16E-06   393.1683     -6.421  -9.66E-07       0.00   1.26E+10
0.00683     34214.       0.00
   43.2000  -1.08E-05   325.9454     -6.200  -6.58E-07       0.00   1.26E+10
0.03412     34214.       0.00
   44.1000  -1.64E-05   262.0987     -5.735  -4.06E-07       0.00   1.26E+10
0.05185     34214.       0.00
   45.0000  -1.95E-05   203.8138     -5.121  -2.06E-07       0.00   1.26E+10
0.06188     34214.       0.00
   45.9000  -2.08E-05   152.3687     -4.431  -5.30E-08       0.00   1.26E+10
0.06593     34214.       0.00
   46.8000  -2.07E-05   108.3311     -3.721   5.88E-08       0.00   1.26E+10
0.06551     34214.       0.00
   47.7000  -1.95E-05    71.7335     -3.060   1.36E-07       0.00   1.26E+10
0.05695     31477.       0.00
   48.6000  -1.77E-05    41.6458     -2.461   1.85E-07       0.00   1.26E+10
0.05395     32846.       0.00
   49.5000  -1.56E-05    17.7738     -1.904   2.10E-07       0.00   1.26E+10
0.04927     34214.       0.00
   50.4000  -1.32E-05     -0.384     -1.403   2.18E-07       0.00   1.26E+10
0.04349     35583.       0.00
   51.3000  -1.09E-05    -13.469     -0.968   2.12E-07       0.00   1.26E+10
0.03713     36952.       0.00
   52.2000  -8.63E-06    -22.198     -0.602   1.96E-07       0.00   1.26E+10
0.03062     38320.       0.00
   53.1000  -6.61E-06    -27.314     -0.305   1.75E-07       0.00   1.26E+10
0.02430     39689.       0.00
   54.0000  -4.85E-06    -29.546   -0.07450   1.51E-07       0.00   1.26E+10
0.01842     41057.       0.00
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54.9000	-3.36E-06	-29.574	0.09617	1.25E-07	0.00	1.26E+10
0.01318	42426.	0.00				
55.8000	-2.14E-06	-28.010	0.2142	1.01E-07	0.00	1.26E+10
0.00867	43794.	0.00				
56.7000	-1.18E-06	-25.383	0.2877	7.78E-08	0.00	1.26E+10
0.00494	45163.	0.00				
57.6000	-4.58E-07	-22.133	0.3248	5.74E-08	0.00	1.26E+10
0.00194	45619.	0.00				
58.5000	5.90E-08	-18.616	0.3339	3.99E-08	0.00	1.26E+10
-2.49E-04	45619.	0.00				
59.4000	4.04E-07	-15.093	0.3233	2.55E-08	0.00	1.26E+10
-0.00171	45619.	0.00				
60.3000	6.09E-07	-11.742	0.3002	1.40E-08	0.00	1.26E+10
-0.00257	45619.	0.00				
61.2000	7.05E-07	-8.669	0.2702	5.20E-09	0.00	1.26E+10
-0.00298	45619.	0.00				
62.1000	7.21E-07	-5.927	0.2308	-1.06E-09	0.00	1.26E+10
-0.00433	64817.	0.00				
63.0000	6.82E-07	-3.679	0.1847	-5.18E-09	0.00	1.26E+10
-0.00420	66528.	0.00				
63.9000	6.09E-07	-1.915	0.1412	-7.58E-09	0.00	1.26E+10
-0.00385	68239.	0.00				
64.8000	5.19E-07	-0.596	0.1023	-8.66E-09	0.00	1.26E+10
-0.00336	69949.	0.00				
65.7000	4.22E-07	0.3317	0.06900	-8.77E-09	0.00	1.26E+10
-0.00280	71660.	0.00				
66.6000	3.29E-07	0.9320	0.04178	-8.23E-09	0.00	1.26E+10
-0.00224	73371.	0.00				
67.5000	2.45E-07	1.2697	0.02052	-7.28E-09	0.00	1.26E+10
-0.00170	75082.	0.00				
68.4000	1.72E-07	1.4067	0.00473	-6.14E-09	0.00	1.26E+10
-0.00122	76792.	0.00				
69.3000	1.12E-07	1.3983	-0.00628	-4.93E-09	0.00	1.26E+10
-8.16E-04	78503.	0.00				
70.2000	6.54E-08	1.2923	-0.01331	-3.78E-09	0.00	1.26E+10
-4.86E-04	80214.	0.00				
71.1000	3.06E-08	1.1272	-0.01719	-2.74E-09	0.00	1.26E+10
-2.32E-04	81924.	0.00				
72.0000	6.22E-09	0.9329	-0.01891	-1.86E-09	0.00	1.26E+10
-8.76E-05	152064.	0.00				
72.9000	-9.52E-09	0.7266	-0.01869	-1.15E-09	0.00	1.26E+10
1.29E-04	145905.	0.00				
73.8000	-1.85E-08	0.5340	-0.01670	-6.05E-10	0.00	1.26E+10
2.40E-04	139747.	0.00				
74.7000	-2.26E-08	0.3684	-0.01390	-2.18E-10	0.00	1.26E+10
2.79E-04	133588.	0.00				
75.6000	-2.32E-08	0.2347	-0.01091	4.09E-11	0.00	1.26E+10
2.74E-04	127430.	0.00				
76.5000	-2.17E-08	0.1325	-0.00812	1.98E-10	0.00	1.26E+10
2.44E-04	121271.	0.00				

```
   77.4000  -1.89E-08    0.05847   -0.00571   2.80E-10       0.00   1.26E+10
2.02E-04    115112.       0.00
   78.3000  -1.56E-08    0.00789   -0.00377   3.09E-10       0.00   1.26E+10
1.58E-04    108954.       0.00
   79.2000  -1.23E-08   -0.02430   -0.00229   3.02E-10       0.00   1.26E+10
1.17E-04    102795.       0.00
   80.1000  -9.13E-09   -0.04282   -0.00122   2.73E-10       0.00   1.26E+10
8.17E-05     96637.       0.00
   81.0000  -6.38E-09   -0.05173  -4.86E-04   2.32E-10       0.00   1.26E+10
5.34E-05     90478.       0.00
   81.9000  -4.11E-09   -0.05431  -2.37E-05   1.87E-10       0.00   1.26E+10
3.21E-05     84319.       0.00
   82.8000  -2.34E-09   -0.05305   3.95E-04   1.41E-10       0.00   1.26E+10
4.54E-05    209088.       0.00
   83.7000  -1.07E-09   -0.04640   7.63E-04   9.81E-11       0.00   1.26E+10
2.28E-05    230472.       0.00
   84.6000  -2.24E-10   -0.03700   9.14E-04   6.24E-11       0.00   1.26E+10
5.23E-06    251856.       0.00
   85.5000   2.78E-10   -0.02691   9.05E-04   3.50E-11       0.00   1.26E+10
-7.03E-06    273240.       0.00
   86.4000   5.31E-10   -0.01760   7.89E-04   1.59E-11       0.00   1.26E+10
-1.45E-05    294624.       0.00
   87.3000   6.21E-10   -0.00995   6.12E-04   4.05E-12       0.00   1.26E+10
-1.82E-05    316008.       0.00
   88.2000   6.18E-10   -0.00439   4.10E-04  -2.10E-12       0.00   1.26E+10
-1.93E-05    337392.       0.00
   89.1000   5.75E-10   -0.00108   2.02E-04  -4.45E-12       0.00   1.26E+10
-1.91E-05    358776.       0.00
   90.0000   5.22E-10       0.00       0.00  -4.91E-12       0.00   1.26E+10
-1.84E-05    190080.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 3:

```
Pile-head deflection             =     0.20722932 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =       -962995. inch-lbs
Maximum shear force              =         34600. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             14
Number of zero deflection points =              6
```

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

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 34600.0 lbs
Applied moment at pile head = 0.0 in-lbs
Axial thrust load on pile head = 200000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. p	Distrib. Lat. Load
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.5981	2.40E-08	34600.	-0.00968	0.00	1.26E+10	-776.422	7010.	0.00
0.9000	0.4935	349316.	26285.	-0.00953	0.00	1.26E+10	-763.406	16706.	0.00
1.8000	0.3922	608941.	18257.	-0.00908	0.00	1.08E+10	-723.292	19918.	0.00
2.7000	0.2974	782890.	10814.	-0.00828	0.00	8.46E+09	-654.945	23785.	0.00
3.6000	0.2134	878288.	4245.	-0.00712	0.00	7.24E+09	-561.605	28423.	0.00
4.5000	0.1435	905352.	-1225.	-0.00576	0.00	6.93E+09	-451.416	33965.	0.00
5.4000	0.08893	876712.	-5471.	-0.00440	0.00	7.26E+09	-334.774	40656.	0.00
6.3000	0.04841	806207.	-8188.	-0.00322	0.00	8.15E+09	-168.491	37589.	0.00
7.2000	0.01943	713742.	-9558.	-0.00227	0.00	9.42E+09	-85.172	47346.	0.00
8.1000	-7.14E-04	609575.	-10003.	-0.00156	0.00	1.08E+10	2.7645	41818.	0.00
9.0000	-0.01429	504417.	-9689.	-0.00104	0.00	1.25E+10	55.3412	41818.	0.00
9.9000	-0.02317	404774.	-8945.	-6.48E-04	0.00	1.25E+10	82.5366	38469.	0.00
10.8000	-0.02829	314006.	-7981.	-3.39E-04	0.00	1.26E+10	96.0364	36664.	0.00
11.7000	-0.03049	233856.	-6913.	-1.03E-04	0.00	1.26E+10	101.5963	35987.	0.00
12.6000	-0.03052	165123.	-5816.	6.80E-05	0.00	1.26E+10			

```
101.6747     35977.       0.00
   13.5000   -0.02902    107943.     -4738.   1.85E-04       0.00   1.26E+10
97.9025     36433.       0.00
   14.4000   -0.02652     61981.     -3715.   2.58E-04       0.00   1.26E+10
91.4672     37248.       0.00
   15.3000   -0.02345     26574.     -2772.   2.96E-04       0.00   1.26E+10
83.2802     38362.       0.00
   16.2000   -0.02012   831.3312     -1922.   3.08E-04       0.00   1.26E+10
74.0558     39744.       0.00
   17.1000   -0.01679    -16275.     -1270.   3.01E-04       0.00   1.26E+10
46.7979     30094.       0.00
   18.0000   -0.01362    -27893.   -809.809   2.82E-04       0.00   1.26E+10
38.3427     30413.       0.00
   18.9000   -0.01070    -34987.   -440.111   2.55E-04       0.00   1.26E+10
30.1198     30413.       0.00
   19.8000   -0.00810    -38502.   -154.290   2.24E-04       0.00   1.26E+10
22.8100     30413.       0.00
   20.7000   -0.00586    -39286.    58.0120   1.90E-04       0.00   1.26E+10
16.5052     30413.       0.00
   21.6000   -0.00399    -38072.   207.7583   1.57E-04       0.00   1.26E+10
11.2256     30413.       0.00
   22.5000   -0.00246    -35478.   315.2204   1.26E-04       0.00   1.26E+10
8.6747     38016.       0.00
   23.4000   -0.00127    -31806.   386.2283   9.68E-05       0.00   1.26E+10
4.4749     38016.       0.00
   24.3000  -3.73E-04    -27554.   417.4806   7.14E-05       0.00   1.26E+10
1.3126     38016.       0.00
   25.2000   2.70E-04    -23097.   419.4338   4.96E-05       0.00   1.26E+10
-0.951     38016.       0.00
   26.1000   6.99E-04    -18709.   401.0096   3.17E-05       0.00   1.26E+10
-2.461     38016.       0.00
   27.0000   9.55E-04    -14572.   365.9412   1.74E-05       0.00   1.26E+10
-4.033     45619.       0.00
   27.9000    0.00108    -10879.   319.6306   6.51E-06       0.00   1.26E+10
-4.543     45619.       0.00
   28.8000    0.00110     -7696.   270.1138  -1.46E-06       0.00   1.26E+10
-4.627     45619.       0.00
   29.7000    0.00104     -5039.   221.3160  -6.92E-06       0.00   1.26E+10
-4.410     45619.       0.00
   30.6000   9.46E-04     -2886.   175.9281  -1.03E-05       0.00   1.26E+10
-3.995     45619.       0.00
   31.5000   8.21E-04     -1194.   135.6248  -1.21E-05       0.00   1.26E+10
-3.468     45619.       0.00
   32.4000   6.85E-04    95.6042    97.3610  -1.25E-05       0.00   1.26E+10
-3.618     57024.       0.00
   33.3000   5.50E-04   963.1170    62.1387  -1.21E-05       0.00   1.26E+10
-2.905     57024.       0.00
   34.2000   4.24E-04     1490.     34.3602  -1.10E-05       0.00   1.26E+10
-2.239     57024.       0.00
   35.1000   3.12E-04     1753.     13.3776  -9.64E-06       0.00   1.26E+10
```

-1.646 57024. 0.00
36.0000 2.16E-04 1821. -1.666 -8.11E-06 0.00 1.26E+10
-1.139 57024. 0.00
36.9000 1.37E-04 1752. -11.714 -6.58E-06 0.00 1.26E+10
-0.721 57024. 0.00
37.8000 7.37E-05 1596. -17.710 -5.14E-06 0.00 1.26E+10
-0.389 57024. 0.00
38.7000 2.55E-05 1392. -20.539 -3.86E-06 0.00 1.26E+10
-0.135 57024. 0.00
39.6000 -9.73E-06 1169. -20.989 -2.76E-06 0.00 1.26E+10
0.05137 57024. 0.00
40.5000 -3.42E-05 950.2873 -19.738 -1.85E-06 0.00 1.26E+10
0.1804 57024. 0.00
41.4000 -4.98E-05 750.7631 -17.344 -1.12E-06 0.00 1.26E+10
0.2629 57024. 0.00
42.3000 -5.85E-05 580.5080 -14.925 -5.54E-07 0.00 1.26E+10
0.1852 34214. 0.00
43.2000 -6.17E-05 430.7774 -12.869 -1.20E-07 0.00 1.26E+10
0.1956 34214. 0.00
44.1000 -6.11E-05 303.0656 -10.768 1.95E-07 0.00 1.26E+10
0.1934 34214. 0.00
45.0000 -5.75E-05 197.3514 -8.739 4.09E-07 0.00 1.26E+10
0.1823 34214. 0.00
45.9000 -5.22E-05 112.5354 -6.861 5.42E-07 0.00 1.26E+10
0.1654 34214. 0.00
46.8000 -4.58E-05 46.8039 -5.184 6.10E-07 0.00 1.26E+10
0.1452 34214. 0.00
47.7000 -3.90E-05 -2.077 -3.786 6.30E-07 0.00 1.26E+10
0.1137 31477. 0.00
48.6000 -3.22E-05 -37.687 -2.642 6.13E-07 0.00 1.26E+10
0.09804 32846. 0.00
49.5000 -2.58E-05 -61.793 -1.671 5.70E-07 0.00 1.26E+10
0.08172 34214. 0.00
50.4000 -1.99E-05 -76.252 -0.876 5.11E-07 0.00 1.26E+10
0.06565 35583. 0.00
51.3000 -1.48E-05 -82.912 -0.248 4.42E-07 0.00 1.26E+10
0.05051 36952. 0.00
52.2000 -1.04E-05 -83.528 0.2231 3.71E-07 0.00 1.26E+10
0.03679 38320. 0.00
53.1000 -6.75E-06 -79.697 0.5557 3.01E-07 0.00 1.26E+10
0.02480 39689. 0.00
54.0000 -3.87E-06 -72.825 0.7690 2.36E-07 0.00 1.26E+10
0.01470 41057. 0.00
54.9000 -1.66E-06 -64.105 0.8835 1.77E-07 0.00 1.26E+10
0.00652 42426. 0.00
55.8000 -4.51E-08 -54.505 0.9197 1.26E-07 0.00 1.26E+10
1.83E-04 43794. 0.00
56.7000 1.06E-06 -44.784 0.8967 8.35E-08 0.00 1.26E+10
-0.00445 45163. 0.00
57.6000 1.76E-06 -35.498 0.8326 4.90E-08 0.00 1.26E+10

```
-0.00742     45619.       0.00
   58.5000   2.12E-06    -27.012     0.7441   2.22E-08       0.00   1.26E+10
-0.00897     45619.       0.00
   59.4000   2.24E-06    -19.522     0.6446   2.26E-09       0.00   1.26E+10
-0.00945     45619.       0.00
   60.3000   2.17E-06    -13.098     0.5441  -1.17E-08       0.00   1.26E+10
-0.00917     45619.       0.00
   61.2000   1.98E-06     -7.719     0.4493  -2.07E-08       0.00   1.26E+10
-0.00838     45619.       0.00
   62.1000   1.72E-06     -3.304     0.3481  -2.54E-08       0.00   1.26E+10
-0.01035     64817.       0.00
   63.0000   1.44E-06   -0.08994     0.2445  -2.68E-08       0.00   1.26E+10
-0.00884     66528.       0.00
   63.9000   1.15E-06     2.0928     0.1577  -2.60E-08       0.00   1.26E+10
-0.00724     68239.       0.00
   64.8000   8.74E-07     3.4278    0.08802  -2.36E-08       0.00   1.26E+10
-0.00566     69949.       0.00
   65.7000   6.35E-07     4.0960    0.03469  -2.04E-08       0.00   1.26E+10
-0.00421     71660.       0.00
   66.6000   4.34E-07     4.2652   -0.00397  -1.68E-08       0.00   1.26E+10
-0.00295     73371.       0.00
   67.5000   2.72E-07     4.0828   -0.03009  -1.32E-08       0.00   1.26E+10
-0.00189     75082.       0.00
   68.4000   1.48E-07     3.6724   -0.04598  -9.90E-09       0.00   1.26E+10
-0.00105     76792.       0.00
   69.3000   5.81E-08     3.1324   -0.05395  -6.98E-09       0.00   1.26E+10
-4.23E-04     78503.       0.00
   70.2000  -2.74E-09     2.5372   -0.05612  -4.55E-09       0.00   1.26E+10
2.03E-05     80214.       0.00
   71.1000  -4.01E-08     1.9397   -0.05437  -2.63E-09       0.00   1.26E+10
3.04E-04     81924.       0.00
   72.0000  -5.95E-08     1.3742   -0.04820  -1.21E-09       0.00   1.26E+10
8.38E-04    152064.       0.00
   72.9000  -6.62E-08     0.9038   -0.03885  -2.31E-10       0.00   1.26E+10
8.94E-04    145905.       0.00
   73.8000  -6.45E-08     0.5361   -0.02951   3.87E-10       0.00   1.26E+10
8.35E-04    139747.       0.00
   74.7000  -5.78E-08     0.2647   -0.02114   7.30E-10       0.00   1.26E+10
7.15E-04    133588.       0.00
   75.6000  -4.87E-08    0.07629   -0.01417   8.77E-10       0.00   1.26E+10
5.75E-04    127430.       0.00
   76.5000  -3.89E-08   -0.04521   -0.00871   8.90E-10       0.00   1.26E+10
4.37E-04    121271.       0.00
   77.4000  -2.95E-08     -0.116   -0.00465   8.21E-10       0.00   1.26E+10
3.14E-04    115112.       0.00
   78.3000  -2.12E-08     -0.149   -0.00180   7.07E-10       0.00   1.26E+10
2.14E-04    108954.       0.00
   79.2000  -1.42E-08     -0.158   8.36E-05   5.76E-10       0.00   1.26E+10
1.35E-04    102795.       0.00
   80.1000  -8.74E-09     -0.150    0.00124   4.44E-10       0.00   1.26E+10
```

```
7.82E-05     96637.       0.00
   81.0000  -4.64E-09     -0.133    0.00187   3.23E-10       0.00   1.26E+10
3.88E-05     90478.       0.00
   81.9000  -1.77E-09     -0.111    0.00215   2.18E-10       0.00   1.26E+10
1.38E-05     84319.       0.00
   82.8000   7.22E-11   -0.08727    0.00222   1.33E-10       0.00   1.26E+10
-1.40E-06    209088.       0.00
   83.7000   1.10E-09   -0.06359    0.00209   6.83E-11       0.00   1.26E+10
-2.36E-05    230472.       0.00
   84.6000   1.55E-09   -0.04253    0.00176   2.28E-11       0.00   1.26E+10
-3.61E-05    251856.       0.00
   85.5000   1.60E-09   -0.02560    0.00135  -6.45E-12       0.00   1.26E+10
-4.04E-05    273240.       0.00
   86.4000   1.41E-09   -0.01334   9.25E-04  -2.32E-11       0.00   1.26E+10
-3.84E-05    294624.       0.00
   87.3000   1.10E-09   -0.00553   5.44E-04  -3.12E-11       0.00   1.26E+10
-3.21E-05    316008.       0.00
   88.2000   7.33E-10   -0.00145   2.48E-04  -3.42E-11       0.00   1.26E+10
-2.29E-05    337392.       0.00
   89.1000   3.56E-10  -3.32E-05   6.00E-05  -3.49E-11       0.00   1.26E+10
-1.18E-05    358776.       0.00
   90.0000  -2.05E-11       0.00       0.00  -3.49E-11       0.00   1.26E+10
7.22E-07    190080.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =     0.59811917 inches
Computed slope at pile head      =     -0.0096836 radians
Maximum bending moment           =        905352. inch-lbs
Maximum shear force              =         34600. lbs
Depth of maximum bending moment  =     4.50000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             28
Number of zero deflection points =              7
```

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

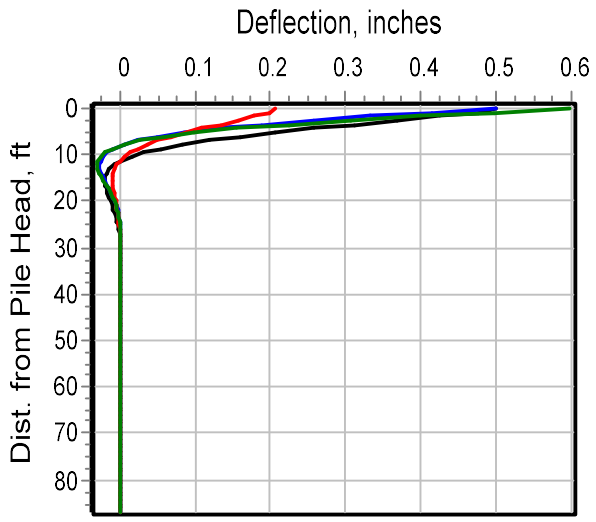
Load Case No.	Load Type 1	Load Pile-head Load 1	Load Type 2	Load Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	y, in	0.5000	S, rad	0.00	200000.	0.5000	0.00	52558.	-1384933.
2	y, in	0.5000	M, in-lb	0.00	200000.	0.5000	-0.00808	32529.	826793.
3	V, lb	34600.	S, rad	0.00	200000.	0.2072	0.00	34600.	-962995.
4	V, lb	34600.	M, in-lb	0.00	200000.	0.5981	-0.00968	34600.	905352.

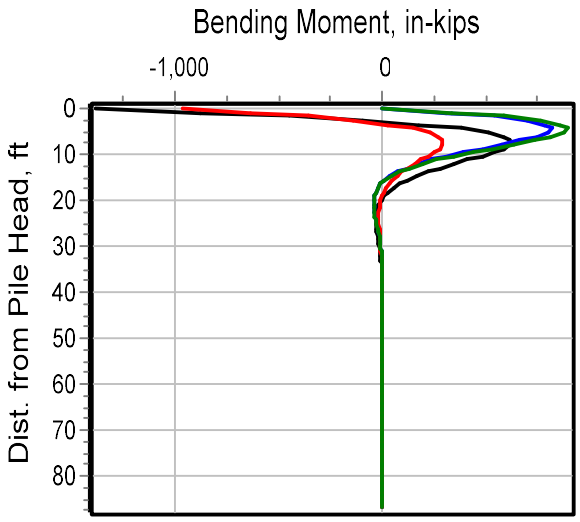
Maximum pile-head deflection = 0.5981191748 inches
Maximum pile-head rotation = -0.0096836086 radians = -0.554830 deg.

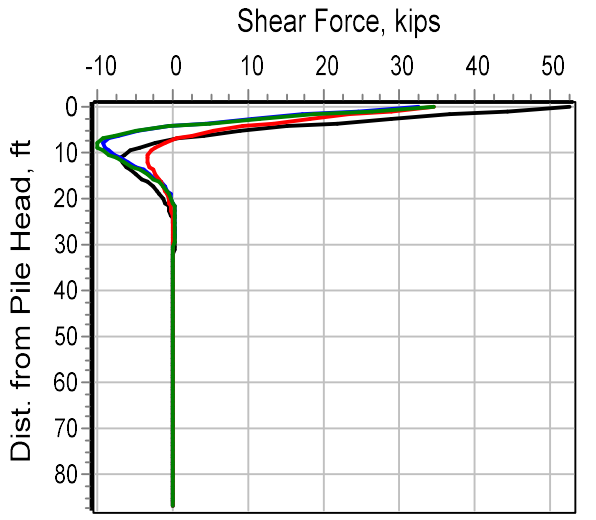
The analysis ended normally.

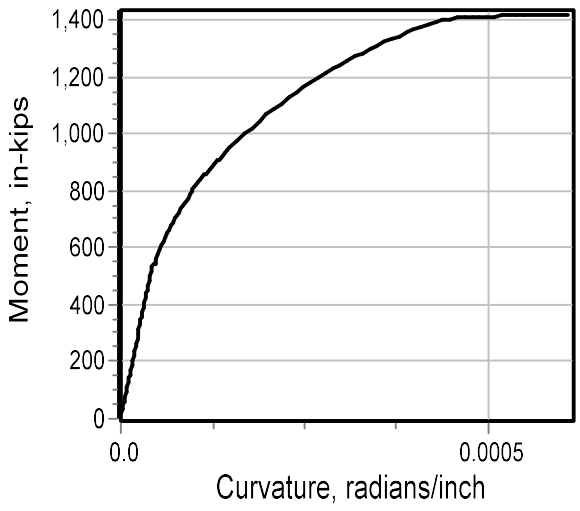
FCWS Elevated Storage Tank
Fayette County
Oasis Project No. 224927

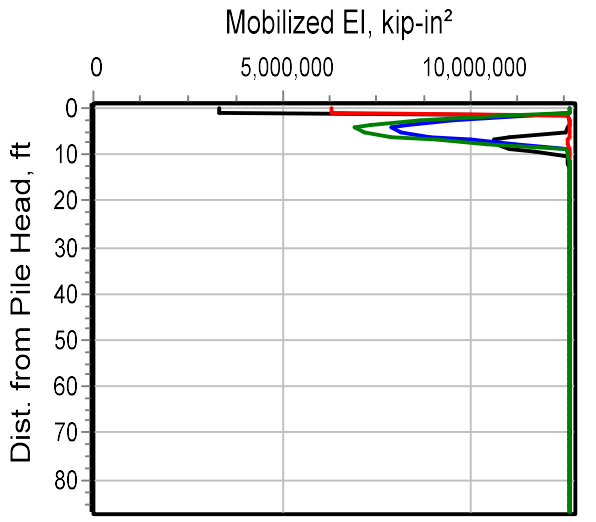
Lateral Pile Analysis
16-Inch ACIP

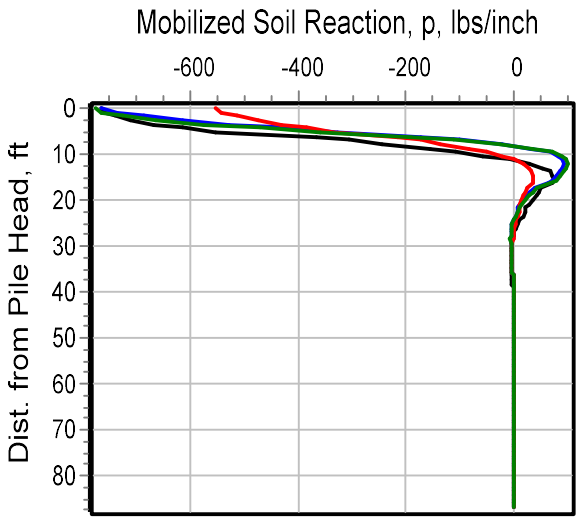












---- Fixed Head w 0.5" Deflection, ---- Fixed Head w Shear
---- Pinned Head w 0.5" Deflection, ---- Pinned Head w Shear

==========

LPile for Windows, Version 2022-12.005

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

==========

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Files Used for Analysis

Path to file locations:
\D-OCS\PROJECTS\Arcadis.10004\224927.Trilith Studios Above Ground Storage Tank\01.Subsurface Exploration\07.Redesign of ACIPs\

Name of input data file:
LPile 18 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12d

Name of output report file:
LPile 18 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12o

Name of plot output file:
LPile 18 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12p

Name of runtime message file:
LPile 18 inch ACIP Axial & Shear (USCS units) 6-21-23.lp12r

Date and Time of Analysis

Date: June 22, 2023 Time: 9:23:14

Problem Title

Project Name: FCWS Elevated Storage Tank

Job Number: 224927

Client: Arcadis

Engineer:

Description:

Program Options and Settings

Computational Options:
- Conventional Analysis

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:

- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis uses layering correction (Method of Georgiadis)
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 90.000 ft
Depth of ground surface below top of pile = 0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	18.0000
2	90.000	18.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section = 90.000000 ft
Shaft Diameter = 18.000000 in

Soil and Rock Layering Information

The soil profile is modelled using 16 layers

Layer 1 is Piedmont residual soil

Distance from top of pile to top of layer = 0.0000 ft
Distance from top of pile to bottom of layer = 3.000000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)
SPT N60 at top of layer = 17.000000 blows/ft
SPT N60 at bottom of layer = 17.000000 blows/ft

Layer 2 is Piedmont residual soil

Distance from top of pile to top of layer = 3.000000 ft
Distance from top of pile to bottom of layer = 5.500000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)
SPT N60 at top of layer = 17.000000 blows/ft
SPT N60 at bottom of layer = 17.000000 blows/ft

Layer 3 is Piedmont residual soil

Distance from top of pile to top of layer = 5.500000 ft
Distance from top of pile to bottom of layer = 8.000000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf
The type of field test is the Standard Penetration Test (SPT)
SPT N60 at top of layer = 13.000000 blows/ft
SPT N60 at bottom of layer = 13.000000 blows/ft

Layer 4 is Piedmont residual soil

Distance from top of pile to top of layer = 8.000000 ft
Distance from top of pile to bottom of layer = 12.000000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf

```
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    11.000000 blows/ft
   SPT N60 at bottom of layer                       =    11.000000 blows/ft


Layer 5 is Piedmont residual soil

   Distance from top of pile to top of layer        =    12.000000 ft
   Distance from top of pile to bottom of layer     =    17.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    11.000000 blows/ft
   SPT N60 at bottom of layer                       =    11.000000 blows/ft


Layer 6 is Piedmont residual soil

   Distance from top of pile to top of layer        =    17.000000 ft
   Distance from top of pile to bottom of layer     =    22.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =     8.000000 blows/ft
   SPT N60 at bottom of layer                       =     8.000000 blows/ft


Layer 7 is Piedmont residual soil

   Distance from top of pile to top of layer        =    22.000000 ft
   Distance from top of pile to bottom of layer     =    27.000000 ft
   Effective unit weight at top of layer            =   110.000000 pcf
   Effective unit weight at bottom of layer         =   110.000000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    10.000000 blows/ft
   SPT N60 at bottom of layer                       =    10.000000 blows/ft


Layer 8 is Piedmont residual soil

   Distance from top of pile to top of layer        =    27.000000 ft
   Distance from top of pile to bottom of layer     =    32.000000 ft
   Effective unit weight at top of layer            =    47.600000 pcf
   Effective unit weight at bottom of layer         =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                          =    12.000000 blows/ft
   SPT N60 at bottom of layer                       =    12.000000 blows/ft


Layer 9 is Piedmont residual soil
```

```
   Distance from top of pile to top of layer           =    32.000000 ft
   Distance from top of pile to bottom of layer        =    37.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =    15.000000 blows/ft
   SPT N60 at bottom of layer                          =    15.000000 blows/ft


Layer 10 is Piedmont residual soil

   Distance from top of pile to top of layer           =    37.000000 ft
   Distance from top of pile to bottom of layer        =    42.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =    15.000000 blows/ft
   SPT N60 at bottom of layer                          =    15.000000 blows/ft


Layer 11 is Piedmont residual soil

   Distance from top of pile to top of layer           =    42.000000 ft
   Distance from top of pile to bottom of layer        =    47.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =     9.000000 blows/ft
   SPT N60 at bottom of layer                          =     8.000000 blows/ft


Layer 12 is Piedmont residual soil

   Distance from top of pile to top of layer           =    47.000000 ft
   Distance from top of pile to bottom of layer        =    57.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                             =     8.000000 blows/ft
   SPT N60 at bottom of layer                          =    12.000000 blows/ft


Layer 13 is Piedmont residual soil

   Distance from top of pile to top of layer           =    57.000000 ft
   Distance from top of pile to bottom of layer        =    62.000000 ft
   Effective unit weight at top of layer               =    47.600000 pcf
   Effective unit weight at bottom of layer            =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
```

```
   SPT N60 at top of layer                              =    12.000000 blows/ft
   SPT N60 at bottom of layer                           =    12.000000 blows/ft


Layer 14 is Piedmont residual soil

   Distance from top of pile to top of layer            =    62.000000 ft
   Distance from top of pile to bottom of layer         =    72.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    17.000000 blows/ft
   SPT N60 at bottom of layer                           =    22.000000 blows/ft


Layer 15 is Piedmont residual soil

   Distance from top of pile to top of layer            =    72.000000 ft
   Distance from top of pile to bottom of layer         =    82.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    47.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    40.000000 blows/ft
   SPT N60 at bottom of layer                           =    22.000000 blows/ft


Layer 16 is Piedmont residual soil

   Distance from top of pile to top of layer            =    82.000000 ft
   Distance from top of pile to bottom of layer         =    90.000000 ft
   Effective unit weight at top of layer                =    47.600000 pcf
   Effective unit weight at bottom of layer             =    68.600000 pcf
   The type of field test is the Standard Penetration Test (SPT)
   SPT N60 at top of layer                              =    50.000000 blows/ft
   SPT N60 at bottom of layer                           =   100.000000 blows/ft


 (Depth of the lowest soil layer extends 0.000 ft below the pile tip)



-------------------------------------------------------------------------------
                        Summary of Input Soil Properties
-------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective     In-situ      In-situ
 Num.           Name             Depth       Unit Wt.      Test         Test
          (p-y Curve Type)        ft           pcf         Type       Property
-----   ------------------   ----------   ----------   ----------   ----------
  1          Piedmont               0.00     110.0000       SPT         17.0000
```

	Residual Soil	3.0000	110.0000	SPT	17.0000
2	Piedmont	3.0000	110.0000	SPT	17.0000
	Residual Soil	5.5000	110.0000	SPT	17.0000
3	Piedmont	5.5000	110.0000	SPT	13.0000
	Residual Soil	8.0000	110.0000	SPT	13.0000
4	Piedmont	8.0000	110.0000	SPT	11.0000
	Residual Soil	12.0000	110.0000	SPT	11.0000
5	Piedmont	12.0000	110.0000	SPT	11.0000
	Residual Soil	17.0000	110.0000	SPT	11.0000
6	Piedmont	17.0000	110.0000	SPT	8.0000
	Residual Soil	22.0000	110.0000	SPT	8.0000
7	Piedmont	22.0000	110.0000	SPT	10.0000
	Residual Soil	27.0000	110.0000	SPT	10.0000
8	Piedmont	27.0000	47.6000	SPT	12.0000
	Residual Soil	32.0000	47.6000	SPT	12.0000
9	Piedmont	32.0000	47.6000	SPT	15.0000
	Residual Soil	37.0000	47.6000	SPT	15.0000
10	Piedmont	37.0000	47.6000	SPT	15.0000
	Residual Soil	42.0000	47.6000	SPT	15.0000
11	Piedmont	42.0000	47.6000	SPT	9.0000
	Residual Soil	47.0000	47.6000	SPT	8.0000
12	Piedmont	47.0000	47.6000	SPT	8.0000
	Residual Soil	57.0000	47.6000	SPT	12.0000
13	Piedmont	57.0000	47.6000	SPT	12.0000
	Residual Soil	62.0000	47.6000	SPT	12.0000
14	Piedmont	62.0000	47.6000	SPT	17.0000
	Residual Soil	72.0000	47.6000	SPT	22.0000
15	Piedmont	72.0000	47.6000	SPT	40.0000
	Residual Soil	82.0000	47.6000	SPT	22.0000
16	Piedmont	82.0000	47.6000	SPT	50.0000
	Residual Soil	90.0000	68.6000	SPT	100.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Concentrated Loads Applied to All Load Cases

Concentrated loads along depth defined using 1 points

Point No.	Depth X ft	Shear Force lbs	Moment in-lbs

```
  1          0.00000        0.00000          0.00000
```

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y Run Analysis vs. Pile Length
1	5	y = 0.500000 in	S = 0.0000 in/in	230000.	N.A. Yes
2	4	y = 0.500000 in	M = 0.0000 in-lbs	230000.	N.A. Yes
3	2	V = 34600. lbs	S = 0.0000 in/in	230000.	No Yes
4	1	V = 34600. lbs	M = 0.0000 in-lbs	230000.	No Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	90.000000 ft
Shaft Diameter	=	18.000000 in
Concrete Cover Thickness (to edge of trans. reinf.)	=	3.000000 in
Number of Reinforcing Bars	=	6 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	254.469005 sq. in.
Total Area of Reinforcing Steel	=	2.640000 sq. in.
Area Ratio of Steel Reinforcement	=	1.04 percent
Edge-to-Edge Bar Spacing	=	4.500000 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	6.00
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Transverse Reinforcement
Type: Hoop

Number of Transverse Reinf. (per spacing)	=	45
Spacing of Transverse Reinf.	=	12.000000 in
Yield Stress of Transverse Reinf.	=	60000. psi
Diameter of Transverse Reinf.	=	0.375000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	1014.619 kips
Tensile Load for Cracking of Concrete	=	-113.571 kips
Nominal Axial Tensile Capacity	=	-158.400 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	0.750000	0.440000	5.250000	0.00000
2	0.750000	0.440000	2.625000	4.546633
3	0.750000	0.440000	-2.62500	4.546633
4	0.750000	0.440000	-5.25000	0.00000
5	0.750000	0.440000	-2.62500	-4.54663
6	0.750000	0.440000	2.625000	-4.54663

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 4.500 inches
between bars 4 and 5.

Ratio of bar spacing to maximum aggregate size = 6.00

Concrete Properties:

Compressive Strength of Concrete	=	4000. psi
Modulus of Elasticity of Concrete	=	3604997. psi
Modulus of Rupture of Concrete	=	-474.34165 psi
Compression Strain at Peak Stress	=	0.001886
Tensile Strain at Fracture of Concrete	=	-0.0001154
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	230.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-14, Section 21.2.3.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 230.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi	Run Msg
0.00000125	25.4110799	20328864.	178.6591279	0.0002233	0.0002008	0.8906656	6.3295809	
0.00000250	50.8107404	20324296.	93.8400675	0.0002346	0.0001896	0.9322701	6.5097799	

```
0.00000375    76.2088897    20322371.    65.5717269    0.0002459    0.0001784
0.9736591     6.6904878
0.00000500   101.6047705    20320954.    51.4410664    0.0002572    0.0001672
1.0148312     6.8717046
0.00000625   126.9976255    20319620.    42.9654783    0.0002685    0.0001560
1.0557853     7.0534305
0.00000750   152.3866973    20318226.    37.3174267    0.0002799    0.0001449
1.0965199     7.2356653
0.00000875   177.7712282    20316712.    33.2851105    0.0002912    0.0001337
1.1370337     7.4184093
0.00001000   203.1504605    20315046.    30.2626294    0.0003026    0.0001226
1.1773255     7.6016625
0.00001125   228.5236358    20313212.    27.9133719    0.0003140    0.0001115
1.2173939     7.7854251
0.00001250   253.8899959    20311200.    26.0353713    0.0003254    0.0001004
1.2572375     7.9696971
0.00001375   279.2487820    20309002.    24.5001034    0.0003369    0.00008938
1.2968551     8.1544788
0.00001500   304.5992349    20306616.    23.2218853    0.0003483    0.00007833
1.3362453     8.3397702
0.00001625   329.9405952    20304037.    22.1413983    0.0003598    0.00006730
1.3754068     8.5255715
0.00001750   355.2721029    20301263.    21.2162717    0.0003713    0.00005628
1.4143383     8.7118829
0.00001875   380.5929976    20298293.    20.4154338    0.0003828    0.00004529
1.4530384     8.8987047
0.00002000   405.9025182    20295126.    19.7155809    0.0003943    0.00003431
1.4915058     9.0860370
0.00002125   431.1999034    20291760.    19.0988924    0.0004059    0.00002335
1.5297393     9.2738800
0.00002250   456.4843909    20288195.    18.5515081    0.0004174    0.00001241
1.5677374     9.4622341
0.00002375   481.7552181    20284430.    18.0624854    0.0004290    0.00000148
1.6054989     9.6510994
0.00002500   507.0110851    20280443.    17.6230682    0.0004406   -0.00000942
1.6430221     9.8404745
0.00002625   532.2458858    20276034.    17.2261466    0.0004522   -0.00002031
1.6803038    10.0303417
0.00002750   557.4497949    20270902.    16.8658862    0.0004638   -0.00003119
1.7173392    10.2206693
0.00002875   582.6128515    20264795.    16.5374645    0.0004755   -0.00004205
1.7541233    10.4114236
0.00003000   607.7259367    20257531.    16.2368645    0.0004871   -0.00005289
1.7906515    10.6025722
0.00003125   632.7809179    20248989.    15.9607143    0.0004988   -0.00006373
1.8269195    10.7940849
0.00003250   657.7708912    20239104.    15.7061644    0.0005105   -0.00007455
1.8629233    10.9859350
0.00003375   682.6896998    20227843.    15.4707896    0.0005221   -0.00008536
1.8986595    11.1780979
```

```
0.00003500   707.5322088     20215206.    15.2525145     0.0005338   -0.00009616
1.9341251    11.3705523
0.00003625   732.2939668     20201213.    15.0495520     0.0005455     -0.000107
1.9693172    11.5632791
0.00003750   732.2939668     19527839.    14.6819689     0.0005506     -0.000124
1.9841428    11.5622663 C
0.00003875   732.2939668     18897909.    14.4770581     0.0005610     -0.000137
2.0150341    11.7174066 C
0.00004000   738.8996655     18472492.    14.2825240     0.0005713     -0.000149
2.0453986    11.8697279 C
0.00004125   753.5232066     18267229.    14.0976203     0.0005815     -0.000161
2.0752671    12.0194658 C
0.00004250   767.6350238     18062001.    13.9215783     0.0005917     -0.000173
2.1046555    12.1667204 C
0.00004375   781.2781344     17857786.    13.7537636     0.0006017     -0.000186
2.1335857    12.3116502 C
0.00004500   794.5026549     17655615.    13.5936567     0.0006117     -0.000198
2.1620844    12.4544721 C
0.00004625   807.2953598     17455035.    13.4405022     0.0006216     -0.000211
2.1901393    12.5950111 C
0.00004750   819.7305961     17257486.    13.2940337     0.0006315     -0.000224
2.2177935    12.7336566 C
0.00004875   831.8316486     17063213.    13.1537998     0.0006412     -0.000236
2.2450600    12.8704971 C
0.00005125   855.0706457     16684305.    12.8902414     0.0006606     -0.000262
2.2984504    13.1388089 C
0.00005375   876.9973067     16316229.    12.6461869     0.0006797     -0.000288
2.3502821    13.3993064 C
0.00005625   897.8163307     15961179.    12.4196633     0.0006986     -0.000314
2.4006841    13.6530118 C
0.00005875   917.6703047     15619920.    12.2088412     0.0007173     -0.000340
2.4497497    13.9006259 C
0.00006125   936.6336776     15291978.    12.0119346     0.0007357     -0.000367
2.4975262    14.1423859 C
0.00006375   954.7803584     14976947.    11.8274586     0.0007540     -0.000393
2.5440635    14.3785757 C
0.00006625   972.1830527     14674461.    11.6541736     0.0007721     -0.000420
2.5894129    14.6095173 C
0.00006875   988.9130939     14384190.    11.4910423     0.0007900     -0.000447
2.6336275    14.8355768 C
0.00007125        1005.      14105828.    11.3371956     0.0008078     -0.000475
2.6767624    15.0571682 C
0.00007375        1021.      13839080.    11.1919058     0.0008254     -0.000502
2.7188736    15.2747512 C
0.00007625        1036.      13583668.    11.0545649     0.0008429     -0.000530
2.7600197    15.4888437 C
0.00007875        1050.      13337480.    10.9239227     0.0008603     -0.000557
2.8001246    15.6983209 C
0.00008125        1064.      13101008.    10.7997741     0.0008775     -0.000585
2.8392833    15.9041555 C
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0.00008375        1078.     12874865.    10.6820981     0.0008946     -0.000613
2.8776155    16.1077084 C
0.00008625        1092.     12656778.    10.5696955     0.0009116     -0.000641
2.9150092    16.3073886 C
0.00008875        1105.     12447005.    10.4624353     0.0009285     -0.000669
2.9515401    16.5040056 C
0.00009125        1117.     12246251.    10.3605125     0.0009454     -0.000697
2.9873402    16.6991939 C
0.00009375        1130.     12051384.    10.2622913     0.0009621     -0.000725
3.0221776    16.8896673 C
0.00009625        1142.     11865599.    10.1692233     0.0009788     -0.000754
3.0564153    17.0802823 C
0.00009875        1154.     11684481.    10.0790067     0.0009953     -0.000782
3.0896711    17.2655681 C
 0.0001013        1166.     11511840.     9.9935320     0.0010118     -0.000811
3.1223879    17.4516960 C
 0.0001038        1177.     11343405.     9.9104791     0.0010282     -0.000839
3.1541626    17.6327167 C
 0.0001063        1188.     11182302.     9.8315168     0.0010446     -0.000868
3.1853885    17.8142991 C
 0.0001088        1199.     11025737.     9.7550398     0.0010609     -0.000897
3.2157933    17.9922696 C
 0.0001113        1210.     10874866.     9.6817124     0.0010771     -0.000925
3.2455609    18.1693126 C
 0.0001138        1220.     10729429.     9.6113630     0.0010933     -0.000954
3.2747021    18.3455465 C
 0.0001163        1231.     10587691.     9.5429388     0.0011094     -0.000983
3.3030430    18.5180702 C
 0.0001188        1241.     10451548.     9.4776273     0.0011255     -0.001012
3.3308667    18.6913918 C
 0.0001213        1251.     10319182.     9.4142637     0.0011415     -0.001041
3.3579702    18.8620925 C
 0.0001238        1261.     10190693.     9.3529391     0.0011574     -0.001070
3.3844059    19.0309202 C
 0.0001263        1271.     10066951.     9.2942583     0.0011734     -0.001099
3.4103303    19.2005400 C
 0.0001288        1281.      9946451.     9.2371943     0.0011893     -0.001128
3.4355611    19.3676866 C
 0.0001313        1290.      9829324.     9.1818716     0.0012051     -0.001157
3.4601518    19.5331865 C
 0.0001338        1300.      9716257.     9.1288181     0.0012210     -0.001187
3.4842359    19.6994662 C
 0.0001363        1309.      9606592.     9.0775774     0.0012368     -0.001216
3.5077431    19.8652157 C
 0.0001388        1318.      9499249.     9.0273492     0.0012525     -0.001245
3.5305340    20.0276093 C
 0.0001413        1327.      9395408.     8.9790880     0.0012683     -0.001274
3.5528226    -20.362098 C
 0.0001438        1336.      9294883.     8.9326923     0.0012841     -0.001303
3.5746062    -20.915901 C
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 0.0001463         1345.      9196765.     8.8874422     0.0012998     -0.001333
3.5957591    -21.471573 C
 0.0001488         1354.      9100929.     8.8432692     0.0013154     -0.001362
3.6162859    -22.029159 C
 0.0001588         1388.      8743564.     8.6807265     0.0013781     -0.001479
3.6930886    -24.258419 C
 0.0001688         1421.      8420946.     8.5365588     0.0014405     -0.001597
3.7611684    -26.492028 C
 0.0001788         1453.      8126991.     8.4071106     0.0015028     -0.001715
3.8204955    -28.732953 C
 0.0001888         1483.      7858344.     8.2910300     0.0015649     -0.001833
3.8713162    -30.975787 C
 0.0001988         1513.      7612308.     8.1876434     0.0016273     -0.001950
3.9138241    -33.212782 C
 0.0002088         1541.      7384141.     8.0930400     0.0016894     -0.002068
3.9477248    -35.456571 C
 0.0002188         1569.      7173692.     8.0092123     0.0017520     -0.002185
3.9733576    -37.686871 C
 0.0002288         1596.      6976784.     7.9319234     0.0018144     -0.002303
3.9903953    -39.922415 C
 0.0002388         1622.      6793427.     7.8632082     0.0018773     -0.002420
3.9989599    -42.143424 C
 0.0002488         1647.      6621204.     7.8009795     0.0019405     -0.002537
3.9998118    -44.357496 C
 0.0002588         1671.      6458566.     7.7445150     0.0020039     -0.002654
3.9996285    -46.564407 C
 0.0002688         1694.      6304958.     7.6944890     0.0020679     -0.002770
3.9985378    -48.753888 C
 0.0002788         1717.      6159551.     7.6501690     0.0021325     -0.002885
3.9990051    -50.926258 C
 0.0002888         1739.      6020981.     7.6091207     0.0021971     -0.003000
3.9991820    -53.096937 C
 0.0002988         1759.      5889356.     7.5727588     0.0022624     -0.003115
3.9991669    -55.250823 C
 0.0003088         1780.      5764119.     7.5405956     0.0023282     -0.003229
3.9989542    -57.388203 C
 0.0003188         1799.      5644783.     7.5121922     0.0023945     -0.003343
3.9984757    -59.509485 C
 0.0003288         1818.      5529739.     7.4865642     0.0024612     -0.003456
3.9975796    -60.000000 CY
 0.0003388         1832.      5409375.     7.4578852     0.0025264     -0.003571
4.0000000    -60.000000 CY
 0.0003488         1842.      5281301.     7.4239284     0.0025891     -0.003688
3.9995904    -60.000000 CY
 0.0003588         1848.      5149995.     7.3872446     0.0026502     -0.003807
3.9978937    -60.000000 CY
 0.0003688         1852.      5022125.     7.3515804     0.0027109     -0.003927
3.9999712    -60.000000 CY
 0.0003788         1856.      4900350.     7.3187812     0.0027720     -0.004046
3.9986506    -60.000000 CY
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0.0003888	1860.	4784372.	7.2882948	0.0028333	-0.004164
3.9992503	-60.000000 CY				
0.0003988	1863.	4673206.	7.2584905	0.0028943	-0.004283
3.9987990	-60.000000 CY				
0.0004088	1867.	4567156.	7.2307615	0.0029556	-0.004402
3.9992271	-60.000000 CY				
0.0004188	1870.	4465691.	7.2051926	0.0030172	-0.004520
3.9984267	-60.000000 CY				
0.0004288	1873.	4368698.	7.1813467	0.0030790	-0.004638
3.9999864	-60.000000 CY				
0.0004388	1876.	4275706.	7.1593535	0.0031412	-0.004756
3.9973890	-60.000000 CY				
0.0004488	1879.	4186619.	7.1388394	0.0032036	-0.004874
3.9997298	-60.000000 CY				
0.0004588	1881.	4101106.	7.1198306	0.0032662	-0.004991
3.9952339	-60.000000 CY				
0.0004688	1884.	4018881.	7.1015885	0.0033289	-0.005109
3.9987032	-60.000000 CY				
0.0004788	1886.	3939807.	7.0838181	0.0033914	-0.005226
3.9999902	-60.000000 CY				
0.0004888	1888.	3863671.	7.0674269	0.0034542	-0.005343
3.9960061	-60.000000 CY				
0.0004988	1890.	3790434.	7.0520853	0.0035172	-0.005460
3.9989962	-60.000000 CY				
0.0005088	1893.	3719934.	7.0377150	0.0035804	-0.005577
3.9999909	-60.000000 CY				
0.0005188	1894.	3651886.	7.0245118	0.0036440	-0.005694
3.9955213	-60.000000 CY				
0.0005288	1896.	3586296.	7.0121280	0.0037077	-0.005810
3.9986603	-60.000000 CY				
0.0005388	1898.	3523025.	7.0005259	0.0037715	-0.005926
3.9999628	-60.000000 CY				
0.0005488	1900.	3461852.	6.9898622	0.0038357	-0.006042
3.9935965	-60.000000 CY				

Summary of Results for Nominal Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain	Max. Tens. Strain
1	230.000	1869.121	0.00300000	

-0.00448732

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318,
or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor	Nominal Ax. Thrust kips	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	230.000000	1869.	149.500000	1215.	10805183.
1	0.75	230.000000	1869.	172.500000	1402.	8608628.
1	0.90	230.000000	1869.	207.000000	1682.	6385697.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	Yes	N.A.	N.A.
2	3.0000	3.0000	No	Yes	N.A.	N.A.
3	5.5000	5.5000	No	Yes	N.A.	N.A.
4	8.0000	8.0000	No	Yes	N.A.	N.A.
5	12.0000	12.0000	No	Yes	N.A.	N.A.

6	17.0000	17.0000	No	Yes	N.A.	N.A.
7	22.0000	22.0000	No	Yes	N.A.	N.A.
8	27.0000	27.0000	No	Yes	N.A.	N.A.
9	32.0000	32.0000	No	Yes	N.A.	N.A.
10	37.0000	37.0000	No	Yes	N.A.	N.A.
11	42.0000	42.0000	No	Yes	N.A.	N.A.
12	47.0000	47.0000	No	Yes	N.A.	N.A.
13	57.0000	57.0000	No	Yes	N.A.	N.A.
14	62.0000	62.0000	No	Yes	N.A.	N.A.
15	72.0000	72.0000	No	Yes	N.A.	N.A.
16	82.0000	82.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

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

Pile-head conditions are Displacement and Pile-head Rotation (Loading Type 5)
Displacement of pile head = 0.500000 inches
Rotation of pile head = 0.000E+00 radians
Axial load on pile head = 230000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. p	Distrib. Lat. Load
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.5000	-1855887.	67385.	0.00	0.00	4.91E+09	-946.330	10220.	0.00
0.9000	0.4779	-1179491.	57105.	-0.00334	0.00	4.91E+09	-935.970	21150.	0.00
1.8000	0.4278	-605816.	47154.	-0.00480	0.00	2.03E+10	-906.819	22892.	0.00
2.7000	0.3742	-137110.	37580.	-0.00500	0.00	2.03E+10	-866.133	24996.	0.00
3.6000	0.3198	230751.	28511.	-0.00497	0.00	2.03E+10	-813.379	27465.	0.00
4.5000	0.2668	503435.	20074.	-0.00478	0.00	2.03E+10			

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-748.894     30317.       0.00
    5.4000     0.2166    688101.     12392.   -0.00446       0.00   2.02E+10
-673.762     33591.       0.00
    6.3000     0.1704    793268.      6319.   -0.00404       0.00   1.77E+10
-450.859     28571.       0.00
    7.2000     0.1295    844642.      1821.   -0.00352       0.00   1.69E+10
-382.115     31876.       0.00
    8.1000    0.09435    850102.     -1667.   -0.00298       0.00   1.68E+10
-263.752     30191.       0.00
    9.0000    0.06515    823437.     -4197.   -0.00245       0.00   1.72E+10
-204.853     33958.       0.00
    9.9000    0.04154    771593.     -6104.   -0.00196       0.00   1.80E+10
-148.217     38537.       0.00
   10.8000    0.02292    701312.     -7415.   -0.00154       0.00   2.02E+10
-94.633      44584.       0.00
   11.7000    0.00836    619062.     -8123.   -0.00118       0.00   2.03E+10
-36.397      47045.       0.00
   12.6000   -0.00265    531746.     -8257.  -8.77E-04       0.00   2.03E+10
11.5332      47045.       0.00
   13.5000   -0.01059    445073.     -7945.  -6.17E-04       0.00   2.03E+10
46.1387      47045.       0.00
   14.4000   -0.01598    363192.     -7320.  -4.02E-04       0.00   2.03E+10
69.5989      47045.       0.00
   15.3000   -0.01928    288950.     -6498.  -2.29E-04       0.00   2.03E+10
82.7253      46348.       0.00
   16.2000   -0.02092    223974.     -5575.  -9.23E-05       0.00   2.03E+10
88.1521      45518.       0.00
   17.1000   -0.02127    168986.     -4748.   1.22E-05       0.00   2.03E+10
64.9493      32980.       0.00
   18.0000   -0.02065    121349.     -4055.   8.94E-05       0.00   2.03E+10
63.4819      33197.       0.00
   18.9000   -0.01934     80957.     -3386.   1.43E-04       0.00   2.03E+10
60.3151      33683.       0.00
   19.8000   -0.01756     47494.     -2760.   1.77E-04       0.00   2.03E+10
55.6328      34214.       0.00
   20.7000   -0.01551     20456.     -2194.   1.95E-04       0.00   2.03E+10
49.1363      34214.       0.00
   21.6000   -0.01334   -876.905     -1701.   2.01E-04       0.00   2.03E+10
42.2680      34214.       0.00
   22.5000   -0.01118    -17279.     -1234.   1.96E-04       0.00   2.03E+10
44.2696      42768.       0.00
   23.4000   -0.00912    -28494.   -799.588   1.84E-04       0.00   2.03E+10
36.0967      42768.       0.00
   24.3000   -0.00721    -35462.   -450.380   1.67E-04       0.00   2.03E+10
28.5713      42768.       0.00
   25.2000   -0.00552    -39050.   -178.096   1.47E-04       0.00   2.03E+10
21.8518      42768.       0.00
   26.1000   -0.00405    -40037.    26.4095   1.26E-04       0.00   2.03E+10
16.0196      42768.       0.00
   27.0000   -0.00280    -39104.   184.8254   1.05E-04       0.00   2.03E+10
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13.3167     51322.       0.00
   27.9000   -0.00178    -36565.   302.5071   8.46E-05       0.00   2.03E+10
8.4762     51322.       0.00
   28.8000  -9.75E-04    -32990.   373.2963   6.61E-05       0.00   2.03E+10
4.6329     51322.       0.00
   29.7000  -3.55E-04    -28831.   407.4350   4.97E-05       0.00   2.03E+10
1.6891     51322.       0.00
   30.6000   9.86E-05    -24436.   414.0260   3.56E-05       0.00   2.03E+10
-0.469     51322.       0.00
   31.5000   4.12E-04    -20064.   400.9121   2.37E-05       0.00   2.03E+10
-1.960     51322.       0.00
   32.4000   6.11E-04    -15895.   370.7246   1.42E-05       0.00   2.03E+10
-3.630     64152.       0.00
   33.3000   7.19E-04    -12127.   328.0679   6.73E-06       0.00   2.03E+10
-4.269     64152.       0.00
   34.2000   7.57E-04     -8842.   280.7452   1.16E-06       0.00   2.03E+10
-4.494     64152.       0.00
   35.1000   7.44E-04     -6069.   232.6156  -2.80E-06       0.00   2.03E+10
-4.418     64152.       0.00
   36.0000   6.96E-04     -3803.   186.4233  -5.42E-06       0.00   2.03E+10
-4.136     64152.       0.00
   36.9000   6.27E-04     -2015.   143.9850  -6.96E-06       0.00   2.03E+10
-3.723     64152.       0.00
   37.8000   5.46E-04   -658.655   106.3717  -7.67E-06       0.00   2.03E+10
-3.242     64152.       0.00
   38.7000   4.61E-04   320.5742    74.0755  -7.76E-06       0.00   2.03E+10
-2.739     64152.       0.00
   39.6000   3.78E-04   979.9480    47.1586  -7.42E-06       0.00   2.03E+10
-2.246     64152.       0.00
   40.5000   3.01E-04      1376.    25.3816  -6.79E-06       0.00   2.03E+10
-1.787     64152.       0.00
   41.4000   2.31E-04      1562.     8.3109  -6.01E-06       0.00   2.03E+10
-1.374     64152.       0.00
   42.3000   1.71E-04      1585.     -2.379  -5.18E-06       0.00   2.03E+10
-0.605     38235.       0.00
   43.2000   1.20E-04      1536.     -7.887  -4.35E-06       0.00   2.03E+10
-0.415     37465.       0.00
   44.1000   7.70E-05      1437.    -11.540  -3.56E-06       0.00   2.03E+10
-0.262     36695.       0.00
   45.0000   4.27E-05      1305.    -13.722  -2.83E-06       0.00   2.03E+10
-0.142     35925.       0.00
   45.9000   1.59E-05      1154.    -14.769  -2.18E-06       0.00   2.03E+10
-0.05185     35155.       0.00
   46.8000  -4.26E-06   996.4540    -14.976  -1.60E-06       0.00   2.03E+10
0.01356     34385.       0.00
   47.7000  -1.87E-05   838.8303    -14.571  -1.12E-06       0.00   2.03E+10
0.06142     35412.       0.00
   48.6000  -2.84E-05   687.2637    -13.715  -7.12E-07       0.00   2.03E+10
0.09714     36952.       0.00
   49.5000  -3.41E-05   546.1203    -12.534  -3.84E-07       0.00   2.03E+10
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0.1216     38491.       0.00
   50.4000  -3.67E-05   418.4347    -11.143  -1.28E-07       0.00   2.03E+10
0.1360     40031.       0.00
   51.3000  -3.69E-05   306.0588     -9.643   6.45E-08       0.00   2.03E+10
0.1419     41570.       0.00
   52.2000  -3.53E-05   209.8325     -8.115   2.02E-07       0.00   2.03E+10
0.1409     43110.       0.00
   53.1000  -3.25E-05   129.7629     -6.629   2.92E-07       0.00   2.03E+10
0.1344     44650.       0.00
   54.0000  -2.90E-05    65.2026     -5.233   3.44E-07       0.00   2.03E+10
0.1240     46189.       0.00
   54.9000  -2.51E-05    15.0201     -3.965   3.65E-07       0.00   2.03E+10
0.1109     47729.       0.00
   55.8000  -2.11E-05    -22.245     -2.846   3.63E-07       0.00   2.03E+10
0.09632    49269.       0.00
   56.7000  -1.73E-05    -48.246     -1.887   3.44E-07       0.00   2.03E+10
0.08119    50808.       0.00
   57.6000  -1.37E-05    -64.713     -1.097   3.14E-07       0.00   2.03E+10
0.06501    51322.       0.00
   58.5000  -1.05E-05    -73.513     -0.478   2.77E-07       0.00   2.03E+10
0.04976    51322.       0.00
   59.4000  -7.69E-06    -76.411   -0.01178   2.38E-07       0.00   2.03E+10
0.03652    51322.       0.00
   60.3000  -5.34E-06    -74.948     0.3225   1.97E-07       0.00   2.03E+10
0.02537    51322.       0.00
   61.2000  -3.42E-06    -70.427     0.5472   1.59E-07       0.00   2.03E+10
0.01626    51322.       0.00
   62.1000  -1.91E-06    -63.916     0.7046   1.23E-07       0.00   2.03E+10
0.01288    72919.       0.00
   63.0000  -7.62E-07    -55.819     0.8027   9.13E-08       0.00   2.03E+10
0.00528    74844.       0.00
   63.9000   6.45E-08    -47.032     0.8287   6.40E-08       0.00   2.03E+10
-4.59E-04    76769.       0.00
   64.8000   6.21E-07    -38.236     0.8018   4.14E-08       0.00   2.03E+10
-0.00452    78693.       0.00
   65.7000   9.58E-07    -29.918     0.7388   2.33E-08       0.00   2.03E+10
-0.00715    80618.       0.00
   66.6000   1.12E-06    -22.394     0.6538   9.36E-09       0.00   2.03E+10
-0.00859    82542.       0.00
   67.5000   1.16E-06    -15.842     0.5584  -7.94E-10       0.00   2.03E+10
-0.00907    84467.       0.00
   68.4000   1.11E-06    -10.328     0.4617  -7.75E-09       0.00   2.03E+10
-0.00885    86391.       0.00
   69.3000   9.93E-07     -5.832     0.3700  -1.20E-08       0.00   2.03E+10
-0.00812    88316.       0.00
   70.2000   8.46E-07     -2.275     0.2880  -1.42E-08       0.00   2.03E+10
-0.00707    90240.       0.00
   71.1000   6.86E-07     0.4599     0.2182  -1.47E-08       0.00   2.03E+10
-0.00586    92165.       0.00
   72.0000   5.29E-07     2.5110     0.1413  -1.39E-08       0.00   2.03E+10
```

-0.00838	171072.	0.00				
72.9000	3.86E-07	3.5811	0.06432	-1.23E-08	0.00	2.03E+10
-0.00587	164144.	0.00				
73.8000	2.64E-07	3.9613	0.01183	-1.03E-08	0.00	2.03E+10
-0.00385	157215.	0.00				
74.7000	1.65E-07	3.8876	-0.02133	-8.18E-09	0.00	2.03E+10
-0.00229	150287.	0.00				
75.6000	8.76E-08	3.5412	-0.04000	-6.20E-09	0.00	2.03E+10
-0.00116	143358.	0.00				
76.5000	3.08E-08	3.0545	-0.04838	-4.45E-09	0.00	2.03E+10
-3.89E-04	136430.	0.00				
77.4000	-8.52E-09	2.5183	-0.04993	-2.97E-09	0.00	2.03E+10
1.02E-04	129502.	0.00				
78.3000	-3.34E-08	1.9908	-0.04733	-1.77E-09	0.00	2.03E+10
3.79E-04	122573.	0.00				
79.2000	-4.68E-08	1.5048	-0.04257	-8.46E-10	0.00	2.03E+10
5.02E-04	115645.	0.00				
80.1000	-5.17E-08	1.0754	-0.03706	-1.60E-10	0.00	2.03E+10
5.20E-04	108716.	0.00				
81.0000	-5.03E-08	0.7051	-0.03169	3.13E-10	0.00	2.03E+10
4.74E-04	101788.	0.00				
81.9000	-4.49E-08	0.3893	-0.02700	6.04E-10	0.00	2.03E+10
3.94E-04	94859.	0.00				
82.8000	-3.73E-08	0.1189	-0.02049	7.39E-10	0.00	2.03E+10
8.12E-04	235224.	0.00				
83.7000	-2.89E-08	-0.05692	-0.01235	7.55E-10	0.00	2.03E+10
6.95E-04	259281.	0.00				
84.6000	-2.10E-08	-0.152	-0.00563	7.00E-10	0.00	2.03E+10
5.50E-04	283338.	0.00				
85.5000	-1.38E-08	-0.182	-5.35E-04	6.11E-10	0.00	2.03E+10
3.94E-04	307395.	0.00				
86.4000	-7.76E-09	-0.166	0.00288	5.18E-10	0.00	2.03E+10
2.38E-04	331452.	0.00				
87.3000	-2.64E-09	-0.122	0.00463	4.42E-10	0.00	2.03E+10
8.68E-05	355509.	0.00				
88.2000	1.78E-09	-0.06838	0.00476	3.91E-10	0.00	2.03E+10
-6.27E-05	379566.	0.00				
89.1000	5.81E-09	-0.02154	0.00325	3.67E-10	0.00	2.03E+10
-2.17E-04	403623.	0.00				
90.0000	9.72E-09	0.00	0.00	3.62E-10	0.00	2.03E+10
-3.85E-04	213840.	0.00				

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.50000000 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1855887. inch-lbs
Maximum shear force              =         67385. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             14
Number of zero deflection points =              6
```

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

Pile-head conditions are Displacement and Moment (Loading Type 4)
Displacement of pile head = 0.500000 inches
Moment at pile head = 0.0 in-lbs
Axial load at pile head = 230000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.5000	0.00	42120.	-0.00751	0.00	2.03E+10	-946.330	10220.	0.00
0.9000	0.4188	418370.	32146.	-0.00740	0.00	2.03E+10	-900.728	23225.	0.00
1.8000	0.3401	731126.	22775.	-0.00709	0.00	1.91E+10	-834.496	26501.	0.00
2.7000	0.2658	945519.	14232.	-0.00654	0.00	1.51E+10	-747.585	30375.	0.00
3.6000	0.1988	1071036.	6722.	-0.00576	0.00	1.30E+10	-643.210	34941.	0.00
4.5000	0.1414	1119319.	399.1107	-0.00482	0.00	1.22E+10	-527.683	40295.	0.00
5.4000	0.09474	1103594.	-4658.	-0.00385	0.00	1.25E+10	-408.728	46596.	0.00
6.3000	0.05837	1037821.	-8074.	-0.00295	0.00	1.35E+10	-224.043	41455.	0.00
7.2000	0.03094	943860.	-10044.	-0.00220	0.00	1.52E+10	-140.612	49087.	0.00
8.1000	0.01076	831828.	-11056.	-0.00160	0.00	1.71E+10			

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-46.891     47045.       0.00
    9.0000   -0.00372    713019.    -11222.   -0.00115       0.00   2.02E+10
16.2104     47045.       0.00
    9.9000   -0.01409    595154.    -10803.  -8.02E-04       0.00   2.03E+10
61.3880     47045.       0.00
   10.8000   -0.02104    483662.     -9993.  -5.14E-04       0.00   2.03E+10
88.5507     45458.       0.00
   11.7000   -0.02520    381858.     -8965.  -2.84E-04       0.00   2.03E+10
101.7901     43621.       0.00
   12.6000   -0.02717    291423.     -7833.  -1.05E-04       0.00   2.03E+10
107.8195     42856.       0.00
   13.5000   -0.02747    213179.     -6664.   2.93E-05       0.00   2.03E+10
108.7133     42745.       0.00
   14.4000   -0.02654    147333.     -5505.   1.25E-04       0.00   2.03E+10
105.8989     43095.       0.00
   15.3000   -0.02477     93645.     -4391.   1.89E-04       0.00   2.03E+10
100.4342     43799.       0.00
   16.2000   -0.02245     51548.     -3346.   2.28E-04       0.00   2.03E+10
93.1325     44796.       0.00
   17.1000   -0.01985     20246.     -2510.   2.47E-04       0.00   2.03E+10
61.5458     33492.       0.00
   18.0000   -0.01712     -3904.     -1885.   2.51E-04       0.00   2.03E+10
54.2452     34214.       0.00
   18.9000   -0.01442    -21721.     -1346.   2.44E-04       0.00   2.03E+10
45.6882     34214.       0.00
   19.8000   -0.01185    -34181.   -896.189   2.29E-04       0.00   2.03E+10
37.5260     34214.       0.00
   20.7000   -0.00947    -42219.   -531.629   2.09E-04       0.00   2.03E+10
29.9852     34214.       0.00
   21.6000   -0.00733    -46704.   -244.364   1.86E-04       0.00   2.03E+10
23.2119     34214.       0.00
   22.5000   -0.00546    -48419.     -2.327   1.60E-04       0.00   2.03E+10
21.6097     42768.       0.00
   23.4000   -0.00386    -47550.   197.0113   1.35E-04       0.00   2.03E+10
15.3049     42768.       0.00
   24.3000   -0.00255    -44833.   334.0929   1.10E-04       0.00   2.03E+10
10.0806     42768.       0.00
   25.2000   -0.00148    -40881.   420.2548   8.75E-05       0.00   2.03E+10
5.8753     42768.       0.00
   26.1000  -6.56E-04    -36190.   466.0155   6.70E-05       0.00   2.03E+10
2.5989     42768.       0.00
   27.0000  -3.66E-05    -31148.   480.9894   4.91E-05       0.00   2.03E+10
0.1740     51322.       0.00
   27.9000   4.04E-04    -26045.   471.5535   3.39E-05       0.00   2.03E+10
-1.921     51322.       0.00
   28.8000   6.96E-04    -21131.   443.3223   2.14E-05       0.00   2.03E+10
-3.307     51322.       0.00
   29.7000   8.66E-04    -16575.   403.2415   1.14E-05       0.00   2.03E+10
-4.116     51322.       0.00
   30.6000   9.41E-04    -12478.   356.8628   3.64E-06       0.00   2.03E+10
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-4.473     51322.       0.00
   31.5000   9.45E-04     -8885.   308.4639  -2.03E-06       0.00   2.03E+10
-4.490     51322.       0.00
   32.4000   8.97E-04     -5805.   255.4328  -5.93E-06       0.00   2.03E+10
-5.331     64152.       0.00
   33.3000   8.17E-04     -3338.   200.4503  -8.36E-06       0.00   2.03E+10
-4.851     64152.       0.00
   34.2000   7.17E-04     -1434.   151.2603  -9.63E-06       0.00   2.03E+10
-4.258     64152.       0.00
   35.1000   6.09E-04    -23.372   108.7411  -1.00E-05       0.00   2.03E+10
-3.616     64152.       0.00
   36.0000   5.01E-04   965.0457    73.1609  -9.77E-06       0.00   2.03E+10
-2.973     64152.       0.00
   36.9000   3.98E-04      1605.    44.3463  -9.08E-06       0.00   2.03E+10
-2.363     64152.       0.00
   37.8000   3.04E-04      1968.    21.8243  -8.13E-06       0.00   2.03E+10
-1.808     64152.       0.00
   38.7000   2.22E-04      2117.     4.9371  -7.05E-06       0.00   2.03E+10
-1.320     64152.       0.00
   39.6000   1.52E-04      2110.     -7.067  -5.93E-06       0.00   2.03E+10
-0.903     64152.       0.00
   40.5000   9.42E-05      1994.    -14.966  -4.83E-06       0.00   2.03E+10
-0.559     64152.       0.00
   41.4000   4.77E-05      1810.    -19.515  -3.82E-06       0.00   2.03E+10
-0.283     64152.       0.00
   42.3000   1.16E-05      1591.    -21.265  -2.92E-06       0.00   2.03E+10
-0.04090     38235.       0.00
   43.2000  -1.54E-05      1366.    -21.197  -2.14E-06       0.00   2.03E+10
0.05350     37465.       0.00
   44.1000  -3.46E-05      1144.    -20.274  -1.47E-06       0.00   2.03E+10
0.1174     36695.       0.00
   45.0000  -4.71E-05   935.0317    -18.793  -9.16E-07       0.00   2.03E+10
0.1568     35925.       0.00
   45.9000  -5.44E-05   742.8755    -16.990  -4.70E-07       0.00   2.03E+10
0.1769     35155.       0.00
   46.8000  -5.73E-05   570.3764    -15.050  -1.22E-07       0.00   2.03E+10
0.1824     34385.       0.00
   47.7000  -5.70E-05   418.4055    -13.056   1.41E-07       0.00   2.03E+10
0.1868     35412.       0.00
   48.6000  -5.43E-05   287.6750    -11.044   3.29E-07       0.00   2.03E+10
0.1856     36952.       0.00
   49.5000  -4.99E-05   178.2181     -9.082   4.52E-07       0.00   2.03E+10
0.1778     38491.       0.00
   50.4000  -4.45E-05    89.2632     -7.231   5.23E-07       0.00   2.03E+10
0.1649     40031.       0.00
   51.3000  -3.86E-05    19.4238     -5.539   5.52E-07       0.00   2.03E+10
0.1485     41570.       0.00
   52.2000  -3.26E-05    -33.121     -4.035   5.49E-07       0.00   2.03E+10
0.1300     43110.       0.00
   53.1000  -2.67E-05    -70.463     -2.737   5.21E-07       0.00   2.03E+10
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0.1105     44650.       0.00
   54.0000  -2.13E-05    -94.824     -1.648   4.77E-07       0.00   2.03E+10
0.09110     46189.       0.00
   54.9000  -1.64E-05   -108.433     -0.764   4.23E-07       0.00   2.03E+10
0.07257     47729.       0.00
   55.8000  -1.22E-05   -113.435   -0.07286   3.64E-07       0.00   2.03E+10
0.05547     49269.       0.00
   56.7000  -8.55E-06   -111.816     0.4439   3.04E-07       0.00   2.03E+10
0.04023     50808.       0.00
   57.6000  -5.58E-06   -105.358     0.8045   2.47E-07       0.00   2.03E+10
0.02653     51322.       0.00
   58.5000  -3.22E-06    -95.666     1.0304   1.93E-07       0.00   2.03E+10
0.01531     51322.       0.00
   59.4000  -1.41E-06    -84.062     1.1492   1.46E-07       0.00   2.03E+10
0.00669     51322.       0.00
   60.3000  -7.54E-08    -71.567     1.1872   1.04E-07       0.00   2.03E+10
3.58E-04     51322.       0.00
   61.2000   8.46E-07    -58.937     1.1674   6.96E-08       0.00   2.03E+10
-0.00402     51322.       0.00
   62.1000   1.43E-06    -46.697     1.0937   4.16E-08       0.00   2.03E+10
-0.00964     72919.       0.00
   63.0000   1.74E-06    -35.520     0.9763   1.97E-08       0.00   2.03E+10
-0.01208     74844.       0.00
   63.9000   1.85E-06    -25.705     0.8399   3.46E-09       0.00   2.03E+10
-0.01318     76769.       0.00
   64.8000   1.82E-06    -17.395     0.6972  -7.99E-09       0.00   2.03E+10
-0.01325     78693.       0.00
   65.7000   1.68E-06    -10.606     0.5579  -1.54E-08       0.00   2.03E+10
-0.01256     80618.       0.00
   66.6000   1.48E-06     -5.268     0.4288  -1.96E-08       0.00   2.03E+10
-0.01135     82542.       0.00
   67.5000   1.26E-06     -1.247     0.3144  -2.14E-08       0.00   2.03E+10
-0.00984     84467.       0.00
   68.4000   1.02E-06     1.6288     0.2171  -2.13E-08       0.00   2.03E+10
-0.00819     86391.       0.00
   69.3000   7.98E-07     3.5475     0.1376  -1.99E-08       0.00   2.03E+10
-0.00653     88316.       0.00
   70.2000   5.94E-07     4.7002    0.07559  -1.77E-08       0.00   2.03E+10
-0.00496     90240.       0.00
   71.1000   4.16E-07     5.2682    0.02965  -1.51E-08       0.00   2.03E+10
-0.00355     92165.       0.00
   72.0000   2.68E-07     5.4154   -0.01246  -1.22E-08       0.00   2.03E+10
-0.00425    171072.       0.00
   72.9000   1.52E-07     5.0598   -0.04787  -9.44E-09       0.00   2.03E+10
-0.00231    164144.       0.00
   73.8000   6.44E-08     4.4283   -0.06540  -6.92E-09       0.00   2.03E+10
-9.38E-04    157215.       0.00
   74.7000   2.45E-09     3.6815   -0.07065  -4.76E-09       0.00   2.03E+10
-3.41E-05    150287.       0.00
   75.6000  -3.84E-08     2.9259   -0.06808  -3.01E-09       0.00   2.03E+10
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5.10E-04    143358.       0.00
   76.5000  -6.25E-08     2.2260   -0.06106  -1.64E-09       0.00   2.03E+10
7.90E-04    136430.       0.00
   77.4000  -7.38E-08     1.6152   -0.05202  -6.18E-10       0.00   2.03E+10
8.85E-04    129502.       0.00
   78.3000  -7.59E-08     1.1055   -0.04259   1.04E-10       0.00   2.03E+10
8.61E-04    122573.       0.00
   79.2000  -7.16E-08     0.6948   -0.03380   5.82E-10       0.00   2.03E+10
7.66E-04    115645.       0.00
   80.1000  -6.33E-08     0.3726   -0.02622   8.66E-10       0.00   2.03E+10
6.37E-04    108716.       0.00
   81.0000  -5.29E-08     0.1242   -0.02009   9.98E-10       0.00   2.03E+10
4.98E-04    101788.       0.00
   81.9000  -4.17E-08   -0.06631   -0.01542   1.01E-09       0.00   2.03E+10
3.67E-04     94859.       0.00
   82.8000  -3.10E-08     -0.214   -0.00980   9.39E-10       0.00   2.03E+10
6.75E-04    235224.       0.00
   83.7000  -2.15E-08     -0.283   -0.00337   8.07E-10       0.00   2.03E+10
5.15E-04    259281.       0.00
   84.6000  -1.35E-08     -0.291    0.00133   6.55E-10       0.00   2.03E+10
3.55E-04    283338.       0.00
   85.5000  -7.31E-09     -0.257    0.00437   5.09E-10       0.00   2.03E+10
2.08E-04    307395.       0.00
   86.4000  -2.55E-09     -0.199    0.00592   3.88E-10       0.00   2.03E+10
7.83E-05    331452.       0.00
   87.3000   1.07E-09     -0.131    0.00615   3.00E-10       0.00   2.03E+10
-3.52E-05   355509.       0.00
   88.2000   3.94E-09   -0.06743    0.00522   2.48E-10       0.00   2.03E+10
-1.38E-04   379566.       0.00
   89.1000   6.42E-09   -0.01974    0.00317   2.24E-10       0.00   2.03E+10
-2.40E-04   403623.       0.00
   90.0000   8.78E-09       0.00       0.00   2.19E-10       0.00   2.03E+10
-3.48E-04   213840.       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 2:

Pile-head deflection             =     0.50000000 inches
Computed slope at pile head      =     -0.0075144 radians
Maximum bending moment           =       1119319. inch-lbs
Maximum shear force              =         42120. lbs
Depth of maximum bending moment  =     4.50000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
```

Number of iterations = 17
Number of zero deflection points = 6

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

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 34600.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 230000.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. p	Distrib. Lat. Load
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.1391	-1067278.	34600.	0.00	0.00	1.31E+10	-522.387	20278.	0.00
0.9000	0.1343	-722967.	29018.	-7.40E-04	0.00	1.31E+10	-511.304	41104.	0.00
1.8000	0.1231	-436809.	23642.	-0.00116	0.00	2.03E+10	-484.217	42476.	0.00
2.7000	0.1094	-206553.	18603.	-0.00133	0.00	2.03E+10	-449.028	44336.	0.00
3.6000	0.09446	-28398.	13975.	-0.00139	0.00	2.03E+10	-407.936	46642.	0.00
4.5000	0.07937	102212.	9813.	-0.00137	0.00	2.03E+10	-362.891	49377.	0.00
5.4000	0.06487	190360.	6149.	-0.00129	0.00	2.03E+10	-315.651	52549.	0.00
6.3000	0.05147	241439.	3338.	-0.00118	0.00	2.03E+10	-204.761	42968.	0.00
7.2000	0.03945	268315.	1322.	-0.00104	0.00	2.03E+10	-168.621	46165.	0.00
8.1000	0.02897	275170.	-199.797	-8.97E-04	0.00	2.03E+10	-113.203	42204.	0.00
9.0000	0.02007	268457.	-1272.	-7.53E-04	0.00	2.03E+10	-85.367	45937.	0.00
9.9000	0.01271	251431.	-2032.	-6.14E-04	0.00	2.03E+10	-55.380	47045.	0.00

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   10.8000    0.00680    227615.     -2491.  -4.87E-04       0.00   2.03E+10
-29.624     47045.       0.00
   11.7000    0.00219    200042.     -2703.  -3.73E-04       0.00   2.03E+10
-9.560     47045.       0.00
   12.6000   -0.00126    171090.     -2725.  -2.75E-04       0.00   2.03E+10
5.4998     47045.       0.00
   13.5000   -0.00374    142554.     -2607.  -1.91E-04       0.00   2.03E+10
16.2814     47045.       0.00
   14.4000   -0.00539    115729.     -2392.  -1.23E-04       0.00   2.03E+10
23.4983     47045.       0.00
   15.3000   -0.00639     91491.     -2115.  -6.76E-05       0.00   2.03E+10
27.8216     47045.       0.00
   16.2000   -0.00685     70378.     -1804.  -2.46E-05       0.00   2.03E+10
29.8573     47045.       0.00
   17.1000   -0.00692     52655.     -1524.   8.12E-06       0.00   2.03E+10
21.9153     34214.       0.00
   18.0000   -0.00668     37418.     -1291.   3.20E-05       0.00   2.03E+10
21.1589     34214.       0.00
   18.9000   -0.00623     24600.     -1071.   4.85E-05       0.00   2.03E+10
19.7222     34214.       0.00
   19.8000   -0.00563     14050.   -867.876   5.88E-05       0.00   2.03E+10
17.8383     34214.       0.00
   20.7000   -0.00496      5562.   -686.773   6.40E-05       0.00   2.03E+10
15.6991     34214.       0.00
   21.6000   -0.00425     -1102.   -529.321   6.52E-05       0.00   2.03E+10
13.4588     34214.       0.00
   22.5000   -0.00355     -6195.   -380.784   6.32E-05       0.00   2.03E+10
14.0481     42768.       0.00
   23.4000   -0.00288     -9641.   -243.291   5.90E-05       0.00   2.03E+10
11.4135     42768.       0.00
   24.3000   -0.00227    -11743.   -133.070   5.34E-05       0.00   2.03E+10
8.9979     42768.       0.00
   25.2000   -0.00173    -12781.    -47.495   4.68E-05       0.00   2.03E+10
6.8492     42768.       0.00
   26.1000   -0.00126    -13002.    16.4407   4.00E-05       0.00   2.03E+10
4.9908     42768.       0.00
   27.0000  -8.66E-04    -12624.    65.6041   3.32E-05       0.00   2.03E+10
4.1135     51322.       0.00
   27.9000  -5.43E-04    -11750.   101.7609   2.67E-05       0.00   2.03E+10
2.5822     51322.       0.00
   28.8000  -2.89E-04    -10559.   123.1095   2.08E-05       0.00   2.03E+10
1.3713     51322.       0.00
   29.7000  -9.43E-05     -9194.   132.9346   1.55E-05       0.00   2.03E+10
0.4482     51322.       0.00
   30.6000   4.72E-05     -7765.   134.1445   1.10E-05       0.00   2.03E+10
-0.224     51322.       0.00
   31.5000   1.44E-04     -6351.   129.2361   7.29E-06       0.00   2.03E+10
-0.685     51322.       0.00
   32.4000   2.05E-04     -5009.   118.9751   4.27E-06       0.00   2.03E+10
-1.215     64152.       0.00
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   33.3000   2.36E-04     -3803.   104.8305   1.93E-06       0.00   2.03E+10
-1.404     64152.       0.00
   34.2000   2.46E-04     -2755.    89.3486   1.88E-07       0.00   2.03E+10
-1.463     64152.       0.00
   35.1000   2.40E-04     -1874.    73.7362  -1.04E-06       0.00   2.03E+10
-1.428     64152.       0.00
   36.0000   2.24E-04     -1157.    58.8451  -1.85E-06       0.00   2.03E+10
-1.329     64152.       0.00
   36.9000   2.01E-04   -593.495    45.2332  -2.31E-06       0.00   2.03E+10
-1.191     64152.       0.00
   37.8000   1.74E-04   -168.321    33.2224  -2.51E-06       0.00   2.03E+10
-1.033     64152.       0.00
   38.7000   1.46E-04   136.5957    22.9531  -2.52E-06       0.00   2.03E+10
-0.869     64152.       0.00
   39.6000   1.19E-04   339.9948    14.4311  -2.40E-06       0.00   2.03E+10
-0.709     64152.       0.00
   40.5000   9.45E-05   460.2068     7.5686  -2.18E-06       0.00   2.03E+10
-0.561     64152.       0.00
   41.4000   7.23E-05   514.3204     2.2184  -1.92E-06       0.00   2.03E+10
-0.429     64152.       0.00
   42.3000   5.30E-05   517.6823     -1.112  -1.65E-06       0.00   2.03E+10
-0.188     38235.       0.00
   43.2000   3.66E-05   498.4881     -2.811  -1.38E-06       0.00   2.03E+10
-0.127     37465.       0.00
   44.1000   2.32E-05   463.8117     -3.923  -1.12E-06       0.00   2.03E+10
-0.07871     36695.       0.00
   45.0000   1.24E-05   419.3424     -4.570  -8.90E-07       0.00   2.03E+10
-0.04110     35925.       0.00
   45.9000   3.95E-06   369.5261     -4.861  -6.80E-07       0.00   2.03E+10
-0.01286     35155.       0.00
   46.8000  -2.33E-06   317.7222     -4.890  -4.97E-07       0.00   2.03E+10
0.00743     34385.       0.00
   47.7000  -6.80E-06   266.3656     -4.730  -3.42E-07       0.00   2.03E+10
0.02228     35412.       0.00
   48.6000  -9.73E-06   217.2564     -4.430  -2.14E-07       0.00   2.03E+10
0.03328     36952.       0.00
   49.5000  -1.14E-05   171.7428     -4.030  -1.11E-07       0.00   2.03E+10
0.04068     38491.       0.00
   50.4000  -1.21E-05   130.7478     -3.568  -3.02E-08       0.00   2.03E+10
0.04491     40031.       0.00
   51.3000  -1.21E-05    94.8183     -3.075   2.97E-08       0.00   2.03E+10
0.04645     41570.       0.00
   52.2000  -1.15E-05    64.1814     -2.577   7.20E-08       0.00   2.03E+10
0.04580     43110.       0.00
   53.1000  -1.05E-05    38.8019     -2.095   9.93E-08       0.00   2.03E+10
0.04346     44650.       0.00
   54.0000  -9.33E-06    18.4406     -1.645   1.15E-07       0.00   2.03E+10
0.03990     46189.       0.00
   54.9000  -8.04E-06     2.7085     -1.237   1.20E-07       0.00   2.03E+10
0.03553     47729.       0.00
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55.8000	-6.73E-06	-8.883	-0.880	1.19E-07	0.00	2.03E+10
0.03072	49269.	0.00				
56.7000	-5.48E-06	-16.880	-0.575	1.12E-07	0.00	2.03E+10
0.02578	50808.	0.00				
57.6000	-4.32E-06	-21.849	-0.324	1.01E-07	0.00	2.03E+10
0.02054	51322.	0.00				
58.5000	-3.29E-06	-24.392	-0.129	8.91E-08	0.00	2.03E+10
0.01563	51322.	0.00				
59.4000	-2.40E-06	-25.081	0.01679	7.59E-08	0.00	2.03E+10
0.01139	51322.	0.00				
60.3000	-1.65E-06	-24.407	0.1206	6.28E-08	0.00	2.03E+10
0.00784	51322.	0.00				
61.2000	-1.04E-06	-22.787	0.1897	5.03E-08	0.00	2.03E+10
0.00495	51322.	0.00				
62.1000	-5.64E-07	-20.560	0.2369	3.87E-08	0.00	2.03E+10
0.00381	72919.	0.00				
63.0000	-2.04E-07	-17.861	0.2651	2.85E-08	0.00	2.03E+10
0.00141	74844.	0.00				
63.9000	5.29E-08	-14.975	0.2707	1.98E-08	0.00	2.03E+10
-3.76E-04	76769.	0.00				
64.8000	2.24E-07	-12.112	0.2599	1.26E-08	0.00	2.03E+10
-0.00163	78693.	0.00				
65.7000	3.26E-07	-9.423	0.2380	6.91E-09	0.00	2.03E+10
-0.00243	80618.	0.00				
66.6000	3.73E-07	-7.006	0.2094	2.54E-09	0.00	2.03E+10
-0.00285	82542.	0.00				
67.5000	3.80E-07	-4.912	0.1780	-6.25E-10	0.00	2.03E+10
-0.00298	84467.	0.00				
68.4000	3.60E-07	-3.159	0.1464	-2.77E-09	0.00	2.03E+10
-0.00288	86391.	0.00				
69.3000	3.21E-07	-1.737	0.1167	-4.07E-09	0.00	2.03E+10
-0.00262	88316.	0.00				
70.2000	2.72E-07	-0.619	0.09025	-4.70E-09	0.00	2.03E+10
-0.00227	90240.	0.00				
71.1000	2.19E-07	0.2356	0.06788	-4.80E-09	0.00	2.03E+10
-0.00187	92165.	0.00				
72.0000	1.68E-07	0.8714	0.04340	-4.50E-09	0.00	2.03E+10
-0.00266	171072.	0.00				
72.9000	1.22E-07	1.1954	0.01900	-3.95E-09	0.00	2.03E+10
-0.00185	164144.	0.00				
73.8000	8.27E-08	1.3015	0.00249	-3.29E-09	0.00	2.03E+10
-0.00120	157215.	0.00				
74.7000	5.09E-08	1.2654	-0.00784	-2.61E-09	0.00	2.03E+10
-7.09E-04	150287.	0.00				
75.6000	2.64E-08	1.1451	-0.01356	-1.97E-09	0.00	2.03E+10
-3.50E-04	143358.	0.00				
76.5000	8.40E-09	0.9824	-0.01602	-1.40E-09	0.00	2.03E+10
-1.06E-04	136430.	0.00				
77.4000	-3.94E-09	0.8061	-0.01634	-9.28E-10	0.00	2.03E+10
4.73E-05	129502.	0.00				

78.3000	-1.17E-08	0.6342	-0.01537	-5.46E-10	0.00	2.03E+10	1.32E-04
122573.	0.00						
79.2000	-1.57E-08	0.4769	-0.01374	-2.51E-10	0.00	2.03E+10	1.68E-04
115645.	0.00						
80.1000	-1.71E-08	0.3386	-0.01191	-3.40E-11	0.00	2.03E+10	1.72E-04
108716.	0.00						
81.0000	-1.65E-08	0.2199	-0.01014	1.14E-10	0.00	2.03E+10	1.55E-04
101788.	0.00						
81.9000	-1.46E-08	0.1190	-0.00861	2.04E-10	0.00	2.03E+10	1.28E-04
94859.	0.00						
82.8000	-1.21E-08	0.03291	-0.00650	2.45E-10	0.00	2.03E+10	2.63E-04
235224.	0.00						
83.7000	-9.32E-09	-0.02259	-0.00387	2.47E-10	0.00	2.03E+10	2.24E-04
259281.	0.00						
84.6000	-6.71E-09	-0.05197	-0.00171	2.28E-10	0.00	2.03E+10	1.76E-04
283338.	0.00						
85.5000	-4.40E-09	-0.06076	-8.75E-05	1.98E-10	0.00	2.03E+10	1.25E-04
307395.	0.00						
86.4000	-2.44E-09	-0.05485	9.93E-04	1.67E-10	0.00	2.03E+10	7.49E-05
331452.	0.00						
87.3000	-7.95E-10	-0.04013	0.00154	1.42E-10	0.00	2.03E+10	2.62E-05
355509.	0.00						
88.2000	6.21E-10	-0.02231	0.00156	1.25E-10	0.00	2.03E+10	-2.18E-05
379566.	0.00						
89.1000	1.91E-09	-0.00700	0.00106	1.17E-10	0.00	2.03E+10	-7.13E-05
403623.	0.00						
90.0000	3.16E-09	0.00	0.00	1.15E-10	0.00	2.03E+10	-1.25E-04
213840.	0.00						

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 3:

Pile-head deflection	=	0.13911148 inches
Computed slope at pile head	=	0.000000 radians
Maximum bending moment	=	-1067278. inch-lbs
Maximum shear force	=	34600. lbs
Depth of maximum bending moment	=	0.000000 feet below pile head
Depth of maximum shear force	=	0.000000 feet below pile head
Number of iterations	=	12
Number of zero deflection points	=	6

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

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 34600.0 lbs
Applied moment at pile head = 0.0 in-lbs
Axial thrust load on pile head = 230000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.3309	-3.87E-08	34600.	-0.00494	0.00	2.03E+10	-825.100	13467.	0.00
0.9000	0.2775	337836.	26024.	-0.00485	0.00	2.03E+10	-763.063	29699.	0.00
1.8000	0.2261	586222.	18182.	-0.00461	0.00	2.03E+10	-689.086	32922.	0.00
2.7000	0.1780	753458.	11197.	-0.00423	0.00	1.83E+10	-604.517	36680.	0.00
3.6000	0.1347	849076.	5166.	-0.00373	0.00	1.68E+10	-512.232	41057.	0.00
4.5000	0.09739	883589.	152.4698	-0.00316	0.00	1.62E+10	-416.275	46160.	0.00
5.4000	0.06641	868085.	-3828.	-0.00258	0.00	1.65E+10	-320.862	52181.	0.00
6.3000	0.04158	813741.	-6507.	-0.00205	0.00	1.74E+10	-175.285	45533.	0.00
7.2000	0.02221	737694.	-8043.	-0.00158	0.00	1.86E+10	-109.146	53068.	0.00
8.1000	0.00748	647850.	-8809.	-0.00119	0.00	2.02E+10	-32.586	47045.	0.00
9.0000	-0.00352	553348.	-8902.	-8.71E-04	0.00	2.03E+10	15.3246	47045.	0.00
9.9000	-0.01133	459900.	-8552.	-6.01E-04	0.00	2.03E+10	49.3660	47045.	0.00
10.8000	-0.01650	371602.	-7898.	-3.80E-04	0.00	2.03E+10	71.8897	47045.	0.00
11.7000	-0.01954	291199.	-7058.	-2.04E-04	0.00	2.03E+10	83.6027	46210.	0.00
12.6000	-0.02090	220162.	-6131.	-6.77E-05	0.00	2.03E+10	88.1066	45524.	0.00
13.5000	-0.02100	159111.	-5177.	3.31E-05	0.00	2.03E+10			

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88.4296     45476.       0.00
   14.4000   -0.02019    108164.     -4237.   1.04E-04       0.00   2.03E+10
85.7517     45878.       0.00
   15.3000   -0.01875     67077.     -3337.   1.51E-04       0.00   2.03E+10
80.9566     46629.       0.00
   16.2000   -0.01693     35344.     -2501.   1.78E-04       0.00   2.03E+10
73.7490     47045.       0.00
   17.1000   -0.01491     12166.     -1848.   1.91E-04       0.00   2.03E+10
47.2260     34214.       0.00
   18.0000   -0.01281     -5519.     -1374.   1.92E-04       0.00   2.03E+10
40.5952     34214.       0.00
   18.9000   -0.01075    -18462.   -970.572   1.86E-04       0.00   2.03E+10
34.0647     34214.       0.00
   19.8000   -0.00880    -27407.   -636.126   1.74E-04       0.00   2.03E+10
27.8698     34214.       0.00
   20.7000   -0.00700    -33066.   -365.894   1.58E-04       0.00   2.03E+10
22.1731     34214.       0.00
   21.6000   -0.00539    -36094.   -153.941   1.39E-04       0.00   2.03E+10
17.0775     34214.       0.00
   22.5000   -0.00399    -37083.    23.5849   1.20E-04       0.00   2.03E+10
15.7976     42768.       0.00
   23.4000   -0.00280    -36180.   168.7832   1.00E-04       0.00   2.03E+10
11.0910     42768.       0.00
   24.3000   -0.00182    -33936.   267.5900   8.18E-05       0.00   2.03E+10
7.2066     42768.       0.00
   25.2000   -0.00103    -30807.   328.6092   6.46E-05       0.00   2.03E+10
4.0933     42768.       0.00
   26.1000  -4.24E-04    -27159.   359.7852   4.92E-05       0.00   2.03E+10
1.6800     42768.       0.00
   27.0000   2.93E-05    -23280.   368.1052   3.58E-05       0.00   2.03E+10
-0.139     51322.       0.00
   27.9000   3.49E-04    -19386.   358.3892   2.45E-05       0.00   2.03E+10
-1.660     51322.       0.00
   28.8000   5.58E-04    -15660.   335.1047   1.52E-05       0.00   2.03E+10
-2.652     51322.       0.00
   29.7000   6.77E-04    -12223.   303.4117   7.76E-06       0.00   2.03E+10
-3.217     51322.       0.00
   30.6000   7.26E-04     -9145.   267.4157   2.09E-06       0.00   2.03E+10
-3.449     51322.       0.00
   31.5000   7.22E-04     -6458.   230.2628  -2.06E-06       0.00   2.03E+10
-3.431     51322.       0.00
   32.4000   6.81E-04     -4161.   189.8794  -4.88E-06       0.00   2.03E+10
-4.047     64152.       0.00
   33.3000   6.17E-04     -2332.   148.2435  -6.60E-06       0.00   2.03E+10
-3.663     64152.       0.00
   34.2000   5.39E-04   -926.580   111.1825  -7.47E-06       0.00   2.03E+10
-3.200     64152.       0.00
   35.1000   4.55E-04   106.7355    79.2960  -7.69E-06       0.00   2.03E+10
-2.705     64152.       0.00
   36.0000   3.73E-04   824.3998    52.7350  -7.44E-06       0.00   2.03E+10
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-2.214     64152.       0.00
   36.9000   2.95E-04      1283.    31.3280  -6.88E-06       0.00   2.03E+10
-1.751     64152.       0.00
   37.8000   2.24E-04      1535.    14.6872  -6.13E-06       0.00   2.03E+10
-1.331     64152.       0.00
   38.7000   1.62E-04      1630.     2.2941  -5.29E-06       0.00   2.03E+10
-0.964     64152.       0.00
   39.6000   1.10E-04      1611.     -6.434  -4.43E-06       0.00   2.03E+10
-0.652     64152.       0.00
   40.5000   6.66E-05      1513.    -12.094  -3.60E-06       0.00   2.03E+10
-0.396     64152.       0.00
   41.4000   3.21E-05      1368.    -15.260  -2.83E-06       0.00   2.03E+10
-0.191     64152.       0.00
   42.3000   5.42E-06      1198.    -16.393  -2.15E-06       0.00   2.03E+10
-0.01918     38235.       0.00
   43.2000  -1.44E-05      1024.    -16.227  -1.56E-06       0.00   2.03E+10
0.04990     37465.       0.00
   44.1000  -2.83E-05   855.1971    -15.438  -1.06E-06       0.00   2.03E+10
0.09619     36695.       0.00
   45.0000  -3.73E-05   696.1460    -14.248  -6.50E-07       0.00   2.03E+10
0.1242     35925.       0.00
   45.9000  -4.24E-05   550.6601    -12.833  -3.19E-07       0.00   2.03E+10
0.1379     35155.       0.00
   46.8000  -4.42E-05   420.5290    -11.329  -6.10E-08       0.00   2.03E+10
0.1408     34385.       0.00
   47.7000  -4.37E-05   306.2649     -9.795   1.32E-07       0.00   2.03E+10
0.1432     35412.       0.00
   48.6000  -4.14E-05   208.2997     -8.257   2.69E-07       0.00   2.03E+10
0.1415     36952.       0.00
   49.5000  -3.79E-05   126.5691     -6.764   3.58E-07       0.00   2.03E+10
0.1350     38491.       0.00
   50.4000  -3.36E-05    60.4141     -5.362   4.07E-07       0.00   2.03E+10
0.1247     40031.       0.00
   51.3000  -2.91E-05     8.7246     -4.084   4.26E-07       0.00   2.03E+10
0.1119     41570.       0.00
   52.2000  -2.44E-05    -29.925     -2.953   4.20E-07       0.00   2.03E+10
0.09759     43110.       0.00
   53.1000  -2.00E-05    -57.151     -1.980   3.97E-07       0.00   2.03E+10
0.08267     44650.       0.00
   54.0000  -1.59E-05    -74.660     -1.167   3.62E-07       0.00   2.03E+10
0.06789     46189.       0.00
   54.9000  -1.22E-05    -84.150     -0.509   3.20E-07       0.00   2.03E+10
0.05383     47729.       0.00
   55.8000  -8.97E-06    -87.251    0.00218   2.74E-07       0.00   2.03E+10
0.04091     49269.       0.00
   56.7000  -6.26E-06    -85.465     0.3821   2.28E-07       0.00   2.03E+10
0.02944     50808.       0.00
   57.6000  -4.04E-06    -80.133     0.6446   1.84E-07       0.00   2.03E+10
0.01918     51322.       0.00
   58.5000  -2.28E-06    -72.458     0.8065   1.44E-07       0.00   2.03E+10
```

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0.01081     51322.       0.00
   59.4000  -9.30E-07    -63.426     0.8888   1.08E-07       0.00   2.03E+10
0.00442     51322.       0.00
   60.3000   5.15E-08    -53.795     0.9113   7.66E-08       0.00   2.03E+10
-2.45E-04     51322.       0.00
   61.2000   7.24E-07    -44.122     0.8914   5.06E-08       0.00   2.03E+10
-0.00344     51322.       0.00
   62.1000   1.14E-06    -34.792     0.8311   2.96E-08       0.00   2.03E+10
-0.00772     72919.       0.00
   63.0000   1.36E-06    -26.316     0.7384   1.34E-08       0.00   2.03E+10
-0.00945     74844.       0.00
   63.9000   1.43E-06    -18.909     0.6324   1.36E-09       0.00   2.03E+10
-0.01018     76769.       0.00
   64.8000   1.39E-06    -12.663     0.5226  -7.03E-09       0.00   2.03E+10
-0.01015     78693.       0.00
   65.7000   1.28E-06     -7.586     0.4162  -1.24E-08       0.00   2.03E+10
-0.00956     80618.       0.00
   66.6000   1.13E-06     -3.613     0.3181  -1.54E-08       0.00   2.03E+10
-0.00860     82542.       0.00
   67.5000   9.49E-07     -0.638     0.2316  -1.65E-08       0.00   2.03E+10
-0.00742     84467.       0.00
   68.4000   7.68E-07     1.4718     0.1583  -1.63E-08       0.00   2.03E+10
-0.00615     86391.       0.00
   69.3000   5.97E-07     2.8629    0.09880  -1.51E-08       0.00   2.03E+10
-0.00488     88316.       0.00
   70.2000   4.42E-07     3.6810    0.05252  -1.34E-08       0.00   2.03E+10
-0.00369     90240.       0.00
   71.1000   3.07E-07     4.0640    0.01844  -1.13E-08       0.00   2.03E+10
-0.00262     92165.       0.00
   72.0000   1.97E-07     4.1356   -0.01254  -9.16E-09       0.00   2.03E+10
-0.00311    171072.       0.00
   72.9000   1.09E-07     3.8386   -0.03834  -7.04E-09       0.00   2.03E+10
-0.00166    164144.       0.00
   73.8000   4.44E-08     3.3425   -0.05081  -5.14E-09       0.00   2.03E+10
-6.46E-04    157215.       0.00
   74.7000  -1.50E-09     2.7666   -0.05419  -3.51E-09       0.00   2.03E+10
2.08E-05    150287.       0.00
   75.6000  -3.15E-08     2.1895   -0.05182  -2.20E-09       0.00   2.03E+10
4.18E-04    143358.       0.00
   76.5000  -4.90E-08     1.6583   -0.04622  -1.18E-09       0.00   2.03E+10
6.19E-04    136430.       0.00
   77.4000  -5.69E-08     1.1971   -0.03919  -4.17E-10       0.00   2.03E+10
6.82E-04    129502.       0.00
   78.3000  -5.80E-08     0.8138   -0.03195   1.17E-10       0.00   2.03E+10
6.58E-04    122573.       0.00
   79.2000  -5.44E-08     0.5063   -0.02526   4.68E-10       0.00   2.03E+10
5.82E-04    115645.       0.00
   80.1000  -4.79E-08     0.2660   -0.01951   6.73E-10       0.00   2.03E+10
4.82E-04    108716.       0.00
   81.0000  -3.98E-08    0.08149   -0.01488   7.65E-10       0.00   2.03E+10
```

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3.76E-04    101788.       0.00
   81.9000  -3.13E-08   -0.05928   -0.01137   7.71E-10       0.00   2.03E+10
2.75E-04     94859.       0.00
   82.8000  -2.32E-08     -0.168   -0.00715   7.11E-10       0.00   2.03E+10
5.05E-04    235224.       0.00
   83.7000  -1.60E-08     -0.217   -0.00235   6.08E-10       0.00   2.03E+10
3.84E-04    259281.       0.00
   84.6000  -1.00E-08     -0.222    0.00114   4.92E-10       0.00   2.03E+10
2.64E-04    283338.       0.00
   85.5000  -5.37E-09     -0.195    0.00339   3.81E-10       0.00   2.03E+10
1.53E-04    307395.       0.00
   86.4000  -1.81E-09     -0.150    0.00452   2.89E-10       0.00   2.03E+10
5.57E-05    331452.       0.00
   87.3000   8.81E-10   -0.09890    0.00466   2.23E-10       0.00   2.03E+10
-2.90E-05    355509.       0.00
   88.2000   3.01E-09   -0.05073    0.00393   1.83E-10       0.00   2.03E+10
-1.06E-04    379566.       0.00
   89.1000   4.84E-09   -0.01482    0.00239   1.66E-10       0.00   2.03E+10
-1.81E-04    403623.       0.00
   90.0000   6.59E-09       0.00       0.00   1.62E-10       0.00   2.03E+10
-2.61E-04    213840.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =     0.33085913 inches
Computed slope at pile head      =     -0.0049419 radians
Maximum bending moment           =        883589. inch-lbs
Maximum shear force              =         34600. lbs
Depth of maximum bending moment  =     4.50000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             20
Number of zero deflection points =              6
```

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians

Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

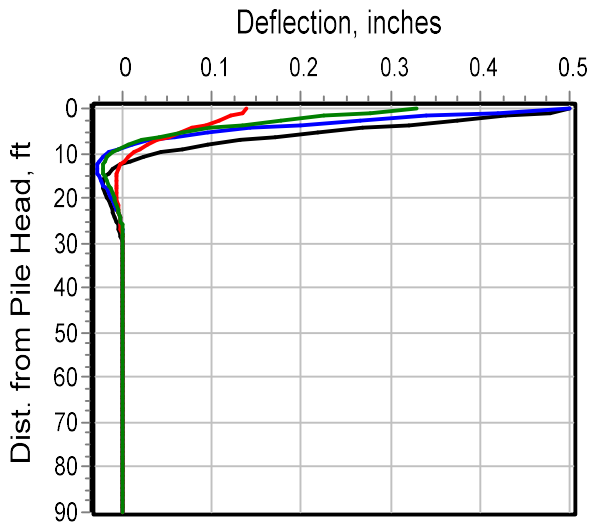
Load Case No.	Load Type 1	Load Pile-head 1	Load Type 2	Load Pile-head 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	y, in	0.5000	S, rad	0.00	230000.	0.5000	0.00	67385.	-1855887.
2	y, in	0.5000	M, in-lb	0.00	230000.	0.5000	-0.00751	42120.	1119319.
3	V, lb	34600.	S, rad	0.00	230000.	0.1391	0.00	34600.	-1067278.
4	V, lb	34600.	M, in-lb	0.00	230000.	0.3309	-0.00494	34600.	883589.

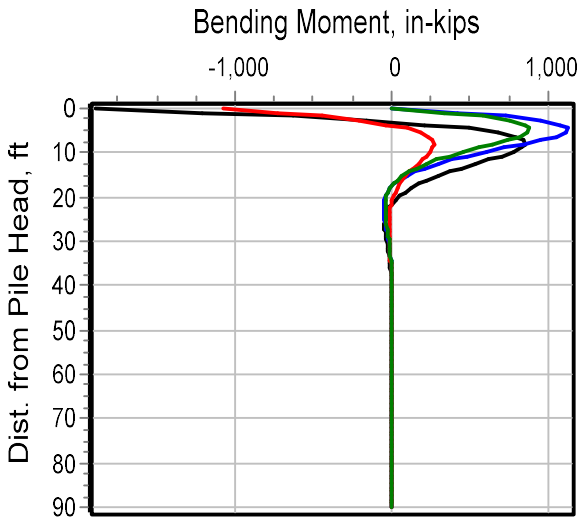
Maximum pile-head deflection = 0.5000000000 inches
Maximum pile-head rotation = -0.0075144291 radians = -0.430545 deg.

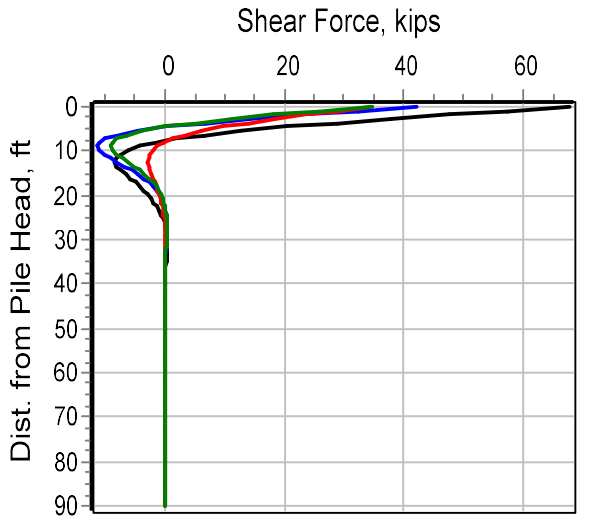
The analysis ended normally.

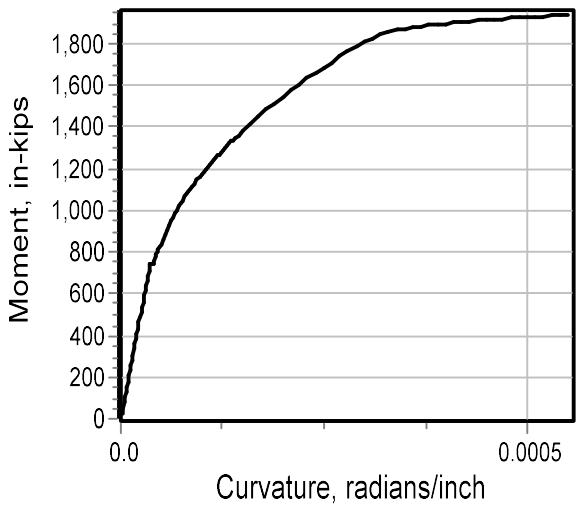
FCWS Elevated Storage Tank
Fayette County
Oasis Project No. 224927

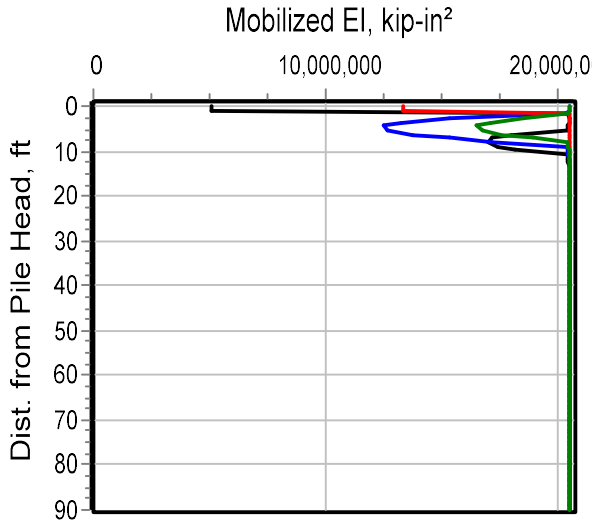
Lateral Pile Analysis
18-Inch ACIP

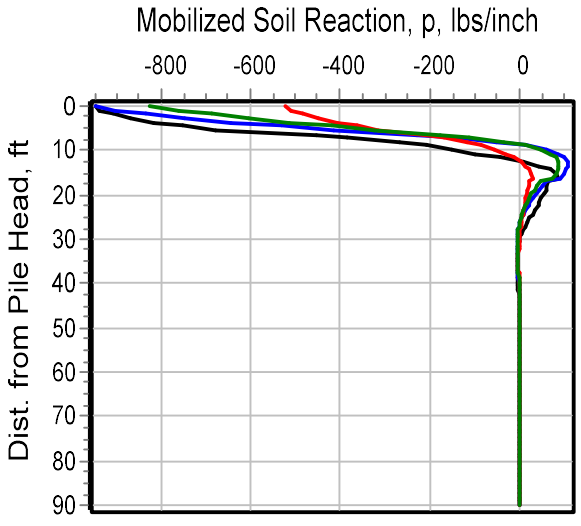












---- Fixed Head w 0.5" Deflection, ---- Fixed Head w Shear
---- Pinned Head w 0.5" Deflection, ---- Pinned Head w Shear

Attachment 2

ITB #2285-B: FCWS – Trilith Studios
Elevated Water Storage Tank

Addendum #2

OE/AAA Notice Criteria Tool
Results

Federal Aviation Administration

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

* **Structure Type:**	TANK | Water Tank Please select structure type and complete location point information.
Latitude:	33 Deg 28 M 9.70 S N
Longitude:	84 Deg 30 M 41.32 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	875 (nearest foot)
Structure Height :	162 (nearest foot)
Is structure on airport:	(•) No ( ) Yes

Results

You do not exceed Notice Criteria.