Report of Geotechnical Exploration
U-5114 Retaining Wall No. 1 and No. 2
Huntersville, North Carolina
S&ME Project No. 6235-15-014

Prepared for:

STV Engineers, Inc.
900 W. Trade Street, Suite 715
Charlotte, North Carolina 28202

Prepared by:

S&ME, Inc.
9751 Southern Pine Boulevard
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May 30, 2017

May 30, 2017

STV Engineers, Inc.
900 W. Trade Street, Suite 715
Charlotte, North Carolina 28208

Attention: Mrs. Nikki Honeycutt, P.E.

Reference: **Report of Geotechnical Services**
U-5114 Retaining Wall No. 1 and No. 2
Huntersville, North Carolina
S&ME Project No. 6235-15-014

Dear Mrs. Honeycutt:

S&ME, Inc. is pleased to submit this Report of Geotechnical Services for the proposed U-5114 Retaining Walls No. 1 and No. 2 adjacent to the northbound travel lane of Statesville Road in Huntersville, North Carolina. This exploration was performed in general accordance with our supplemental proposal dated February 2, 2017.

This exploration was performed to evaluate subsurface conditions at the site pertinent to site preparation, excavation, and structural support. The report presents a brief confirmation of our understanding of the project, the exploration results, and our geotechnical conclusions and recommendations regarding the above considerations.

We appreciate the opportunity to work with STV Engineers, Inc. and to provide the geotechnical consultation for this project. Should you have any questions regarding the information in this report, please do not hesitate to contact us.

Sincerely,

S&ME, Inc.

Kristen H. Hill, P.E., P.G.
Principal Geotechnical Engineer

NORTH CAROLINA PROFESSIONAL SEAL 042642 ENGINEER ROBERT E. KRAL
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Robert E. Kral, P.E.
Project Manager
N.C. Registration No. 042642

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1.0 Introduction

1.1 Project and Site Descriptions

Project information is based on email correspondence between Nikki Honeycutt of STV and Stewart Laney of S&ME between January 16 and 25, 2017. We understand that STV has determined that two retaining walls (-W1- and -W2-) will be required along -L- to provide grade separation. The first proposed retaining wall will be approximately 246 feet long, have a maximum height ranging between 11 to 12 feet, and will be adjacent to the Goodyear and Summit Insurance Group parking lots. The second proposed retaining wall will be approximately 280 feet long, have a maximum height ranging between 11 to 12 feet, and will be adjacent to the Taco Bell parking lot. We further understand that both walls will be pile and lagging type cut walls.

Microstation design files for both retaining walls were provided to us on February 15, 2017.

1.2 Purpose and Scope

The purpose of this geotechnical study was to explore the general subsurface conditions at the site with respect to the design and construction of the proposed retaining walls. S&ME has completed the following scope of geotechnical services for this project:

- Visited the site to observe site surface conditions and mark boring locations.
- Contacted North Carolina 811 and subcontracted a private utility locator to have them mark the locations of existing underground utilities at the site.
- Mobilized a Truck-mounted drill rig and crew to the site.
- Drilled twelve (12) soil test borings to depths ranging from approximately 10 feet to 45 feet below existing grades.
- Performed two (2) hand auger borings with dynamic cone penetrometer testing to depths ranging from approximately 7.5 to 10.4 feet below existing grades.
- Attempted water level measurements.
- Backfilled the boreholes with soil cuttings to the ground surface. A hole closure device was installed near the ground surface in each borehole. Asphalt cold patch was placed at locations where borings were performed in the asphalt parking lots.
- Performed laboratory testing consisting of moisture content, grain-size distribution, and Atterberg limits tests on a select soil samples.
- Performed geotechnical analysis and prepared this geotechnical report.

2.0 Exploration

2.1 Field Activities

In order to explore the general subsurface conditions at the project site, a total of twelve (12) Standard Penetration Test (SPT) soil test borings and two (2) hand auger borings with dynamic cone penetrometer (DCP) testing were performed between February 23 and March 2, 2017. Seven (7) SPT soil test borings (W1-1 through W1-7) were performed for Retaining Wall No. 1 and drilled to depths ranging from

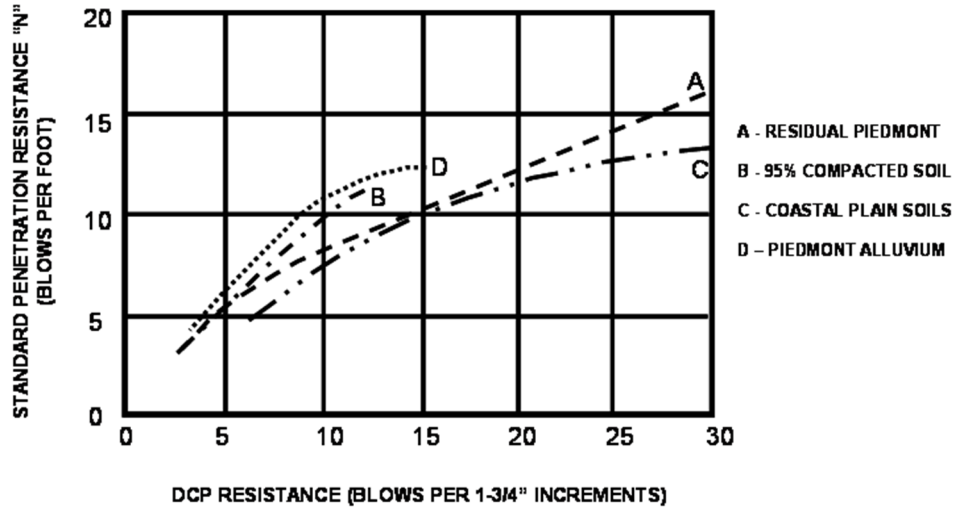
approximately 10 feet to 30 feet below existing grades. Five (5) soil test borings were performed for Retaining Wall No. 2 (W2-1 through W2-4, and W2-7) and drilled to depths ranging from approximately 10 feet to 45 feet below exiting grades. In addition to the SPT soil test borings, two (2) hand auger borings with DCP testing were performed for Retaining Wall No. 2 due to restricted access to the freshly seal coated and striped front parking lot at the Summit Insurance Group. The hand auger borings with DCP testing were performed to the approximate depths of 7.5 feet and 10.4 feet below existing grades.

The borings were advanced at the approximate locations shown on the Site Plan (Sheet 3 and Sheet 4) in the Appendix. The boring locations were located in the field by an S&ME project engineer from our office using a handheld GPS unit. Offsets from the proposed retaining wall locations were made to avoid underground and overhead utility conflicts. Taped measurements were performed to determine the offset distances. The taped measurements were used to interpolate elevations, northings, and eastings of the borings from drawings provided to S&ME and should be considered approximate.

The SPT soil test borings were performed with a CME-45-B drill rig mounted on a truck carrier. Hollow stem auger techniques were used to advance the holes. SPT split-spoon sampling was performed at designated intervals in the soil test borings in general accordance with ASTM D1586 to provide an index for estimating soil strength and relative density or consistency. The CME drill rigs used to drill the borings are equipped with hydraulic automatic hammers for Standard Penetration Tests.

The DCP test procedure is as follows: The cone point of the penetrometer is first seated 2 inches into the bearing materials to assure that the point is completely embedded. Then the cone point is driven an additional 1-3/4 inches using a 15 pound weight falling 20 inches. The penetrometer reading is the number of blows required to drive the cone point 1-3/4 inches. The cone point may be driven a second and third increment of 1-3/4 inches each and the penetrometer readings are recorded. The penetrometer reading is similar to the Standard Penetration Resistance “N-value” as defined by ASTM D 1586. When properly evaluated, the penetrometer test results provide an index for estimating soil strength and relative density. Figure 2-1 (from ASTM Special Technical Publication #399, 1966) presents generally accepted correlations between average DCP blow counts and the SPT N-value.

Figure 2-1: DCP and SPT Blow Count Correlations



The results of the SPT soil test borings and hand auger borings with DCP tests are included in the individual NCDOT Borelog Reports and Hand Auger Boring Logs included in the Appendix. Water level measurements were attempted in all borings at the termination of drilling and hand augering activities. A secondary water level reading was attempted in Borings W1-4, W2-2, W2-3, and W2-5. All borings were backfilled with soil cuttings (utilizing a hole closure device) to the ground surface on or before March 2, 2017.

A geotechnical staff professional visually examined each sample in the field in general accordance with American Association of State Highway and Transportation Officials (AASHTO) manual classification procedures to estimate the distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams and apparent geological origin. The results of the classifications, as well as the field test results, are presented on the individual NCDOT Borelog Reports and Hand Auger Boring Logs included in the Appendix. Similar materials were grouped into strata on the logs. The strata contact lines represent approximate boundaries between the soil and rock types; the actual transition between the soil and rock types in the field may be gradual in both the horizontal and vertical directions.

2.2 Laboratory Testing

The samples from the field testing program were transported to our laboratory where they were visually classified by our Geotechnical Engineering staff. The visual and manual classification was estimated in general accordance with the Unified Soil Classification System (USCS).

Representative soil samples were subjected to the following laboratory testing:

- Natural Moisture Content
- Atterberg Limits
- Grain Size Distribution

The testing was performed in accordance with ASTM or other applicable testing standards. The results are presented on data sheets in the Appendix.

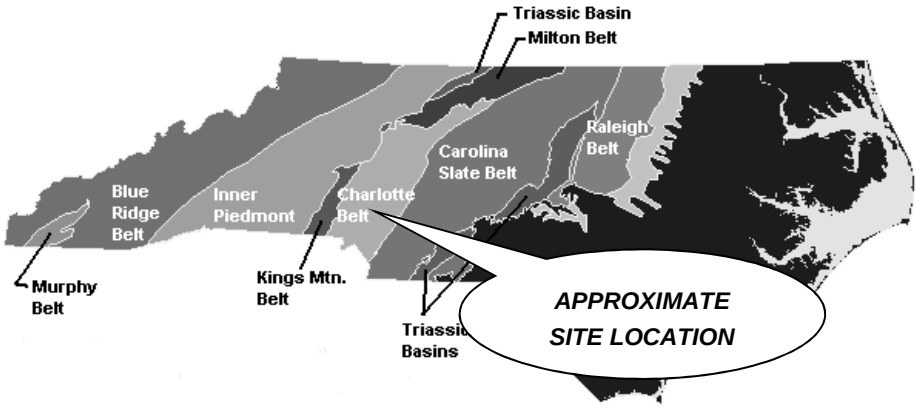
3.0 Site Conditions

3.1 Area Geology

The site is located in Huntersville, North Carolina which lie within the Charlotte Belt of the Piedmont Physiographic Province of North Carolina as shown in the following figure. The Piedmont Province generally consists of well-rounded hills and ridges, which are dissected by a well-developed system of draws and streams. The Piedmont Province is predominantly underlain by metamorphic rock (formed by heat, pressure and/or chemical action) and igneous rock (formed directly from molten material), which were initially formed during the Precambrian and Paleozoic eras. The volcanic and sedimentary rocks deposited in the Piedmont Province during the Precambrian eras were the host for the metamorphism and were changed to gneiss and schist. The more recent Paleozoic era had periods of igneous

emplacement, with at least several episodes of regional metamorphism resulting in the majority of the rock types seen today.

Figure 3-1: Physiographic Provinces of North Carolina

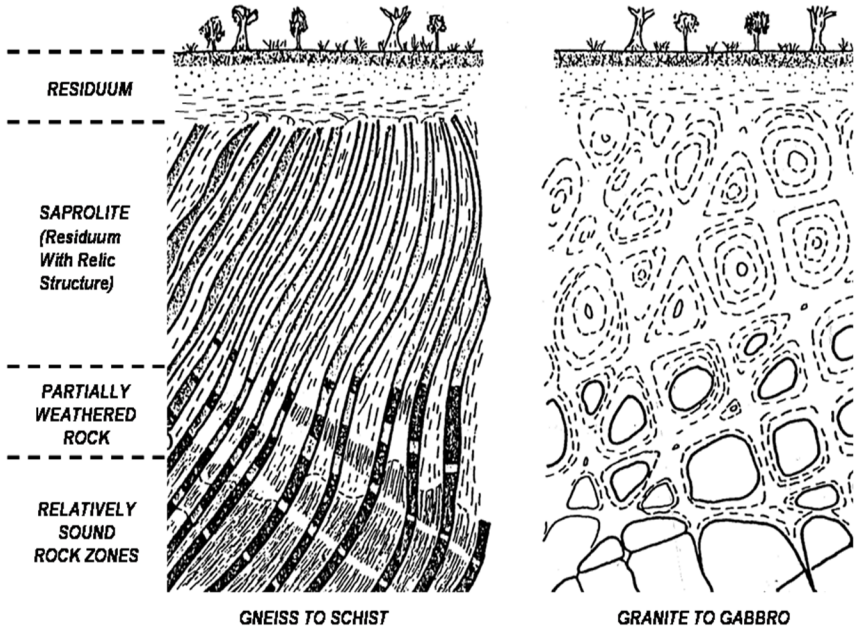


The topography and relief of the Piedmont Province have developed from differential weathering of the igneous and metamorphic rock. Because of the continued chemical and physical weathering, the rocks in the Piedmont Province are now generally covered with a mantle of soil that has weathered in place from the parent bedrock. These soils have variable thicknesses and are referred to as residuum or residual soils. The residuum is typically finer grained and has higher clay content near the surface because of the advanced weathering. Similarly, the soils typically become coarser grained with increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance, texture, gradation and foliations of the parent rock.

Based on the 1985 Geologic Map of North Carolina and the 1988 Geologic Map of the Charlotte Quadrangle, the site bedrock consists of metamorphosed quartz diorite.

The boundary between soil and rock in the Piedmont is not sharply defined. A transitional zone termed “Partially Weathered Rock” is normally found overlying the parent bedrock. Partially Weathered Rock (PWR) is defined for engineering purposes as residual material with Standard Penetration Resistances (N-values) exceeding 100 blows per foot. The transition between hard/dense residual soils and PWR occurs at irregular depths due to variations in degree of weathering. A depiction of typical weathering profiles in the Piedmont Province is presented in the following figure.

Figure 3-2: Typical Piedmont Weathering Profiles (After Sowers/Richardson, 1983)



Groundwater is typically present in the residual soils and within fractures in the PWR or underlying bedrock in the Piedmont. On upland ridges in the Piedmont, groundwater may or may not be present in the residual soils above the PWR and bedrock. Alluvial soils, which have been transported and deposited by water, are typically found in floodplains and are generally saturated to within a few feet of the ground surface. Fluctuations in groundwater levels are typical in residual soils and PWR in the Piedmont, depending on variations in precipitation, evaporation and surface water runoff. Seasonal high groundwater levels are expected to occur during or just after the typically wetter months of the year (November through April).

3.2 Subsurface Conditions

Subsurface conditions as indicated by the soil test borings generally consists of topsoil and asphalt pavement underlain by fill soils, residual soils, partially weathered rock (PWR), and possible bedrock. The generalized subsurface conditions at the site are described below. For more detailed soil descriptions and stratifications at a particular boring location, the respective boring log should be reviewed.

3.2.1 Retaining Wall -W1-

Surface Materials: SPT Soil Test Borings W1-1 through W1-4 and W1-7 encountered approximately 2 inches of asphalt surface course and approximately 4 to 10 inches of asphalt base course (ABC) stone. Hand Auger Borings W1-4 and W1-5 encountered approximately 4 inches of topsoil.

Artificial Fill: Artificial fill soils were encountered in SPT Soil Test Boring W1-1 and Hand Auger Borings W1-5 and W1-6 to depth of approximately 1.5 to 3.0 feet below existing grades. The artificial fill soils

encountered generally consisted of sandy clay (A-6) and sandy silt (A-4). A Standard Penetration Resistance (N-Value) of 17 blows per foot (bpf) and a DCP Resistance Value of 10 blows per 1 ¾ inches was recorded in the artificial fill material.

Residuum: Residual soils were encountered in all of the borings advanced for this study. The residual soils generally consisted of silty clays (A-7-5 and A-7-6) and sandy and clayey silts (A-4 and A-5). N-values in the residual soils ranged from 4 to 18 bpf and DCP Resistance Values ranged from 2 to 18 blows per 1 ¾ inches.

The results of the moisture content, grain-size distribution, and Atterberg limits testing performed on selected residual soil samples are presented in the following table. Detailed test results are presented in the Appendix.

Table 3-1: Retaining Wall -W1-Laboratory Testing Results

Test Location	Sample Depth (feet)	USCS Classification	Moisture Content (%)	Fines (%)	Liquid Limit	Plasticity Index
W1-1	3.5 - 5.0	A-7-5 (37)	26.8	75.3	80	44
W1-2	8.5 - 10.0	A-5 (0)	29.1	44.9	42	4
W1-4	3.5 - 5.0	A-7-5 (8)	30.4	59.8	56	13
W1-4	13.5 - 15.0	A-4 (1)	35.8	46.1	40	5

3.2.2 Retaining Wall -W2-

Surface Materials: SPT Soil Test Borings W2-1 through W2-3 encountered approximately 2 inches of topsoil. Approximately 2 inches to 4 inches of asphalt with 5 inches to 7 inches of ABC stone was encountered at SPT Soil Test Borings W2-4 through W2-7. The approximate 2 inches of asphalt at SPT Soil Test Boring W2-4 was underlain by approximately 5 inches of concrete bearing on artificial fill.

Artificial Fill: Artificial fill soils were encountered in SPT Soil Test Borings W2-4 and W2-5 through W2-7 to depths ranging from 3.0 feet to 5.5 feet below existing grades. The artificial fill soils encountered generally consisted of silty clays (A-7-5 and A-7-6) and sandy silt (A-4). N-Values of 4 to 13 bpf were recorded in the artificial fill material.

Residuum: Residual soils were encountered in all of the borings advanced for this study. The residual soils generally consisted of silty sand (A-2-4), silty clays (A-7-5 and A-7-6), and sandy and clayey silts (A-4 and A-5). N-values in the residual soils ranged from 4 to 15 bpf.

The results of the moisture content, grain-size distribution, and Atterberg limits testing performed on selected residual soil samples are presented in the following table. Detailed test results are presented in the Appendix.

Table 3-2: Retaining Wall -W2- Laboratory Testing Results

Test Location	Sample Depth (feet)	USCS Classification	Moisture Content (%)	Fines (%)	Liquid Limit	Plasticity Index
W2-2	13.5 - 15.0	A-7-5 (4)	31.4	49.5	49	11
W2-3	1.0 - 2.5	A-7-5 (9)	28.3	58.9	50	16
W2-4	6.0 - 7.5	A-5 (0)	27.2	50.9	44	1
W2-6	3.5 - 5.0	A-5 (2)	30.9	50.6	47	5

Weathered Rock: Weathered rock (WR) was encountered underlying the residual soils in SPT Soil Test Boring W2-6 at a depth of 12.5 feet below the existing ground surface. The WR was sampled as a Metamorphosed Quartz Diorite.

Crystalline Rock: Crystalline rock (CR) was encountered below the WR in SPT Soil Test Boring W2-6 at a depth of approximately 15.5 feet below existing grades. The SPT Soil Test Boring W2-6 was terminated upon encountering auger refusal and SPT refusal. Auger refusal is defined as material that could not be penetrated with the drill rig equipment (CME-45-B) used on the project. Standard Penetration Test Refusal is defined by the NCDOT Legend as material requiring 60 or more blows with less than 0.1 feet of penetration. Auger refusal material may consist of large boulders, rock ledges, lenses, seams or the top of parent bedrock. Rock coring techniques would be required to further evaluate the character and continuity of the refusal material at this test location.

3.3 Water Level Measurements

Groundwater level measurements were attempted in the borings at the completion of drilling operations. Twenty-four hour groundwater measurements were observed in Borings W1-4, W2-2, W2-3, and W2-5. Water was encountered in Borings W1-2, W1-3, W1-4, W1-6, W2-2, W2-3, and W2-4 at elevations ranging from 725.0 to 741.8 feet at drilling termination. Water was not encountered in the other borings at drilling termination. After the 1-day waiting period, water was encountered in Borings W1-4, W2-2, W2-3, and W2-5 at elevations ranging from 737.4 to 744.7 feet. Water was not encountered in the other borings after the waiting period. Water levels tend to fluctuate with seasonal and climatic variations, as well as with some types of construction operations. Therefore, groundwater may be encountered during construction at depths not indicated by the borings.

4.0 Conclusions and Recommendations

4.1 General

The following evaluations and recommendations are based on our observations at the site, interpretation of the field and laboratory data obtained during this exploration, and our experience with similar subsurface conditions and projects. Subsurface conditions in unexplored locations may vary from those encountered. If the retaining wall location or elevations are changed, S&ME should be informed, and provided the opportunity to re-evaluate recommendations presented in this report, as needed.

4.2 Retaining Wall Analysis and Design

4.2.1 Design Methodology and Retaining Wall Recommendations

We utilized PYWall, Version 2013.4.12 by Ensoft design software for the soldier pile retaining wall design. Our design methodology and assumptions are listed below:

- This retaining wall was designed in general accordance with the Federal Highway Administration (FHWA) Allowable Stress Design (ASD) procedure;
- A factor of safety of 1.5 was applied to the width of the pile accounting for the passive resistance;
- A parking lot / drive lanes were modeled with a uniform surcharge load of 250 pounds per square foot (psf) applied at the back of wall;
- A guardrail load of 300 pounds per foot (lbs/ft) was applied horizontally at the top of wall; and
- An additional 30% of pile embedment was added to the calculated embedment depth in accordance with FHWA design methodology.

Design recommendations for the soldier pile retaining walls are provided in the tables below.

Table 4-1: Retaining Wall -W1- Design Recommendations

Maximum Wall Height (ft)	H-Pile Section	Maximum Pile Spacing (ft)	Modeled Δ (in)	Required Pile Embedment (ft)	Soil Embedment Material	Total Pile Length (ft)
1	14X73	10.0	0.050	6.0	A-4	7.0
2.5	14X73	10.0	0.078	9.0	A-4	11.5
5.0	14X73	10.0	0.369	14.0	A-4	19.0
7.5	14X73	8.5	0.891	17.0	A-4	24.5
10.0	14X117	5.0	0.893	20.0	A-4	30.0
12.5	14X117	5.0	0.958	21.0	A-4	33.5

Table 4-2: Retaining Wall -W2- Design Recommendations

Maximum Wall Height (ft)	H-Pile Section	Maximum Pile Spacing (ft)	Modeled Δ (in)	Required Pile Embedment (ft)	Soil Embedment Material	Total Pile Length (ft)
1	14X73	10.0	0.050	6.0	A-4	7.0
2.5	14X73	10.0	0.078	9.0	A-4	11.5
5.0	14X73	10.0	0.366	14.0	A-4	19.0
7.5	14X73	8.5	0.908	17.0	A-4	24.5
10.0	14X117	5.0	0.968	19.0	A-4	29.0
12.5	14X117	5.0	0.918	21.0	A-4	33.5
12.5	14X117	5.0	0.145	6.0	3' CR Socket	18.5

4.2.2 Lagging Design Recommendations

The concrete lagging shall be used for permanent soldier pile retaining walls. The concrete lagging thickness, height, and reinforcement shall be designed by others. Concrete lagging shall be designed for a maximum bending moment of 12,500 lbs-ft/ft. Lagging shall maintain a minimum of three inches of bearing, per end, behind the front flange of the soldier piles. Lagging shall be installed a minimum of one foot below bottom of wall elevation. S&ME recommends that a roadway drainage system be designed (by others) to prevent the building up hydrostatic pressures against the back of the wall and to prevent water from overtopping the wall.

4.3 Retaining Wall Construction

Based on the material encountered and the maximum top-of-wall deflection requirement of less than 1 inch, drilled in piles will need to be installed to the minimum recommended embedment depth below the bottom of wall elevation as shown in Table 4-1 and Table 4-2. **Note that WR and CR was encountered in Boring W2-6 of Retaining Wall -W2-, the pile foundation contractor should be prepared to excavate through these materials to meet minimum embedment depth requirements.**

The pile foundation contractor should be prequalified to perform the work. The contractor should review the NCDOT "Soldier Pile Retaining Walls" Special Provision, attached in Appendix IV, prior to the development of their construction means and methods. We request that S&ME be allowed to review the contractor's proposed equipment and installation procedures prior to mobilization and construction.

In general, the contractor should be prepared to excavate holes with a diameter that provides at least 3 inches of clearance around the entire pile. S&ME recommends at least 30-inch diameter boreholes for the installation of the steel HP 14x73 and HP 14x117 piles. NCDOT Class A concrete should be used to backfill the boreholes to the bottom of wall elevation after the pile has been placed. The contractor has the option to backfill the remainder of the borehole to existing grade with either excavatable flowable fill or concrete. Pile installation will require special attention during construction to assure that newly placed concrete is not damaged by adjacent pile installation.

5.0 Limitations of Report

The boring locations given in this report should be considered accurate only to the degree implied by the methods used to determine them.

The recommendations provided in this report are based on our understanding of the project information given in this report and on our interpretation of the surface and subsurface data collected. We have made our recommendations based on our experience with similar subsurface conditions and similar projects. The recommendations apply to the specific project discussed in this report; therefore, any changes in the project information should be provided to us so we may review our conclusions and recommendations and make any appropriate modifications.

Regardless of the thoroughness of a geotechnical study, there is always a possibility that subsurface conditions will be different from those at boring locations, that conditions will not be as anticipated by the designers or contractors, or that the construction process will alter soil conditions. Therefore, qualified geotechnical personnel should observe construction to confirm that the conditions indicated by the

geotechnical borings actually exist. We recommend the owner retain S&ME for this service since we are already familiar with the project, the subsurface conditions at the site, and the intent of the recommendations and design.

This report has been prepared for the exclusive use of STV Engineers, Inc. for the specific application to the subject project and project site. It has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

Appendix I

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5114	1	16

REFERENCE: U-5114

PROJECT: 42376

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *MECKLENBURG*

PROJECT DESCRIPTION *US 21 (STATESVILLE RD.) AND SR 2136 (GILEAD RD) INTERSECTION IMPROVEMENTS*

SITE DESCRIPTION *RETAINING WALLS #1 & #2*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

S&ME, Inc.

INVESTIGATED BY *R.E. KRAL*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *R.E. KRAL*

SUBMITTED BY *R.E. KRALL*

DATE *APRIL 2017*

S&ME

NORTH CAROLINA PROFESSIONAL SEAL 042642 ENGINEER Robert E. Kral

rkral@smeinc.com
2017.05.30 09:02:12 -05'00'

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5114	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] CME-45B
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: *see note

ELEVATION: FEET

NOTES:

elevations derived from .tin '21-Gilead GIS Merge.tin' dated 3-1-17

DATE: 8-15-14

8/17/99

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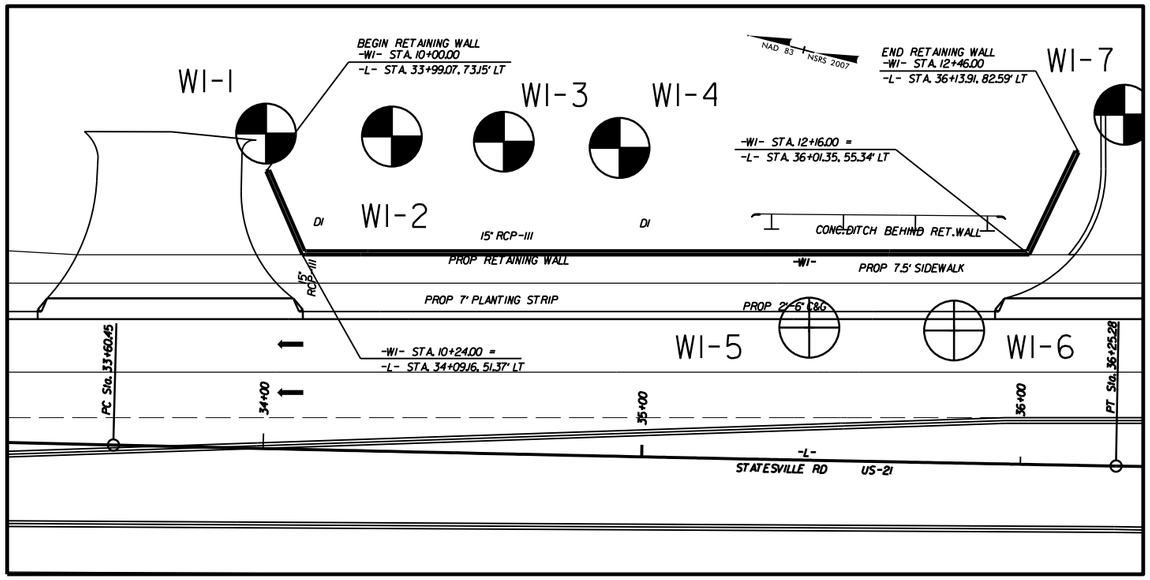
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

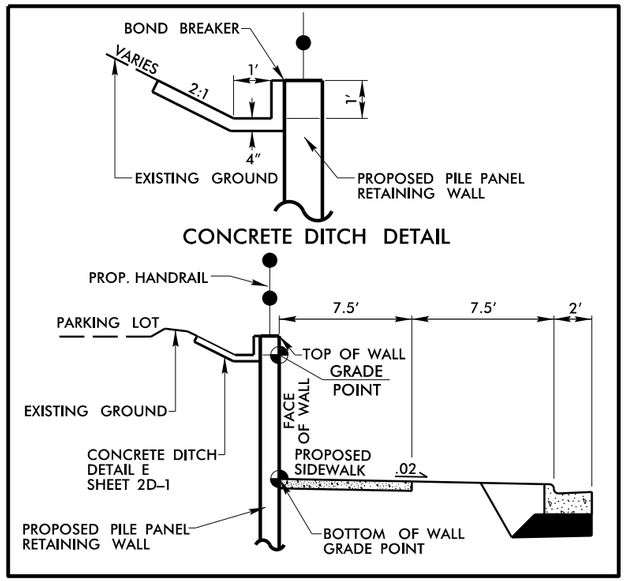
PROJECT REFERENCE NO.	SHEET NO.
U-5114	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

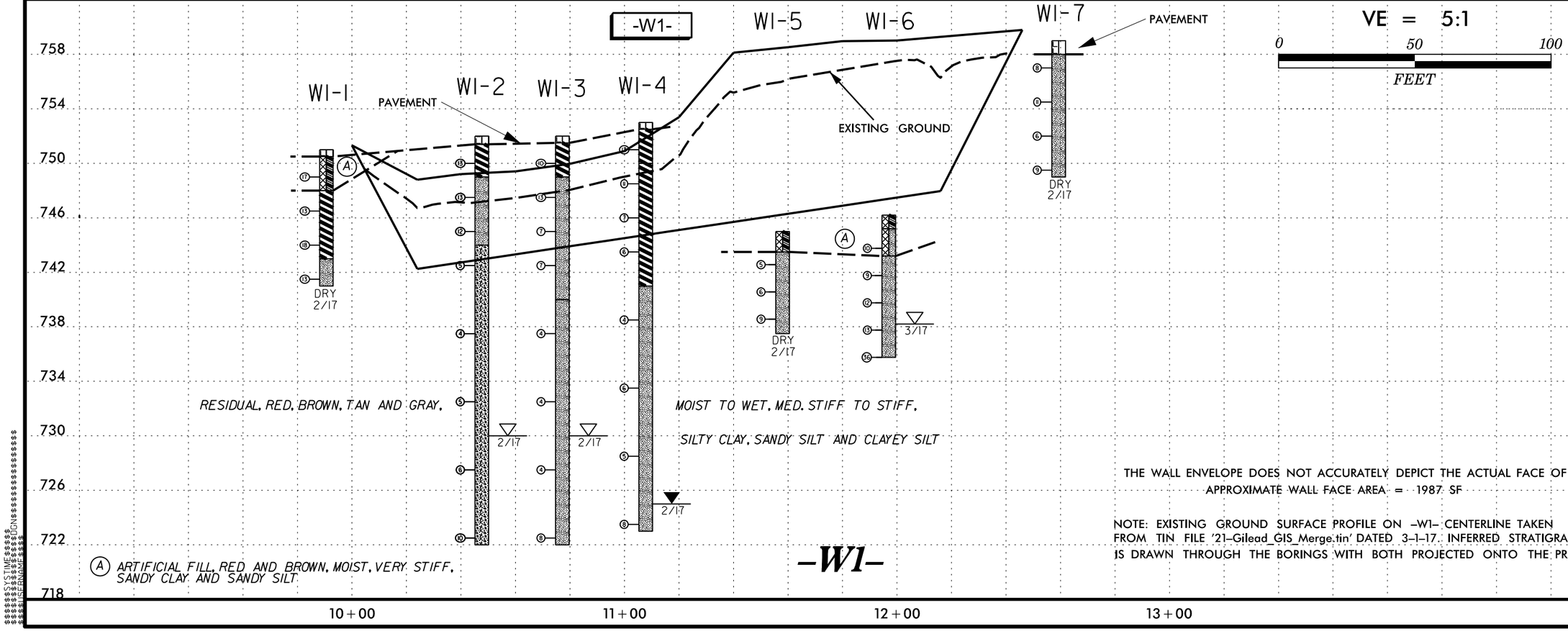
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RETAINING WALL W1 DETAIL SHEET



RETAINING WALL DETAIL
NOT TO SCALE





-W1-

THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL
APPROXIMATE WALL FACE AREA = 1987 SF

NOTE: EXISTING GROUND SURFACE PROFILE ON –W1– CENTERLINE TAKEN FROM TIN FILE '21-Gilead_GIS_Merge.tin' DATED 3-1-17. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

$$$$$$$SYSTIME$$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
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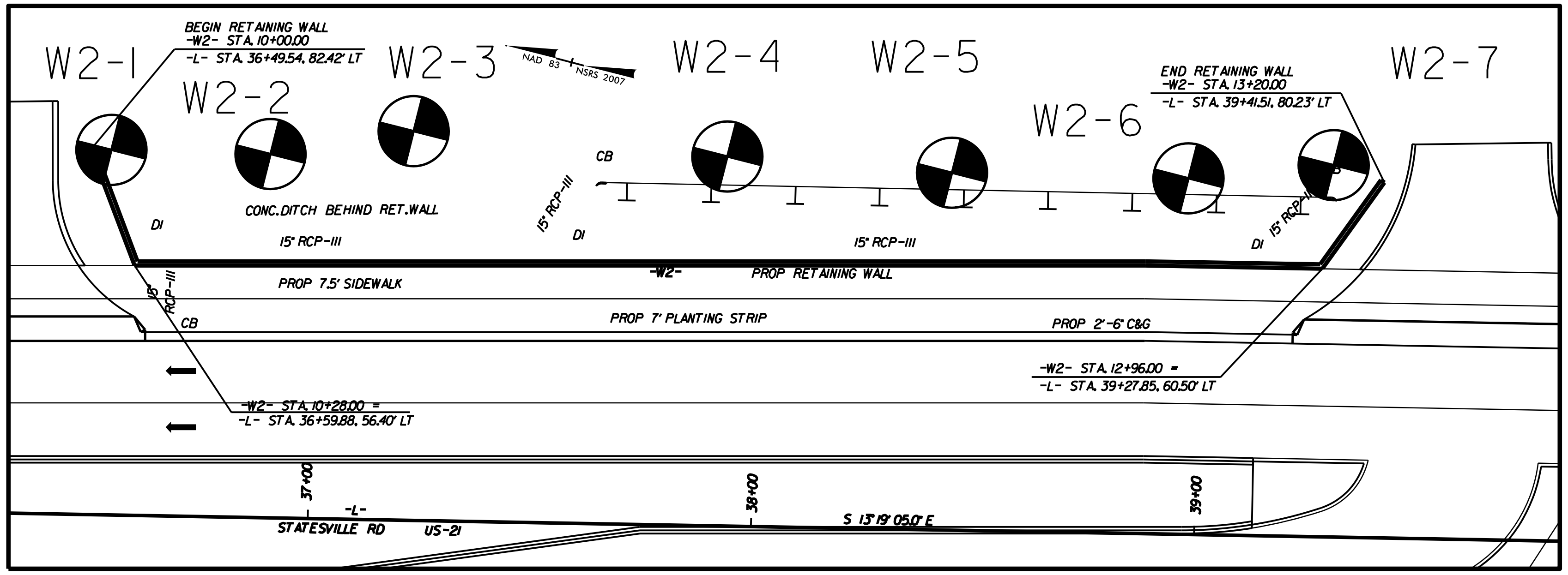
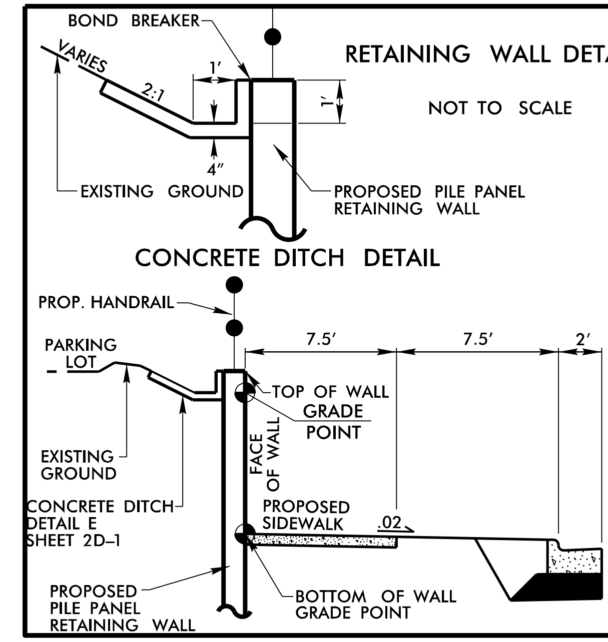
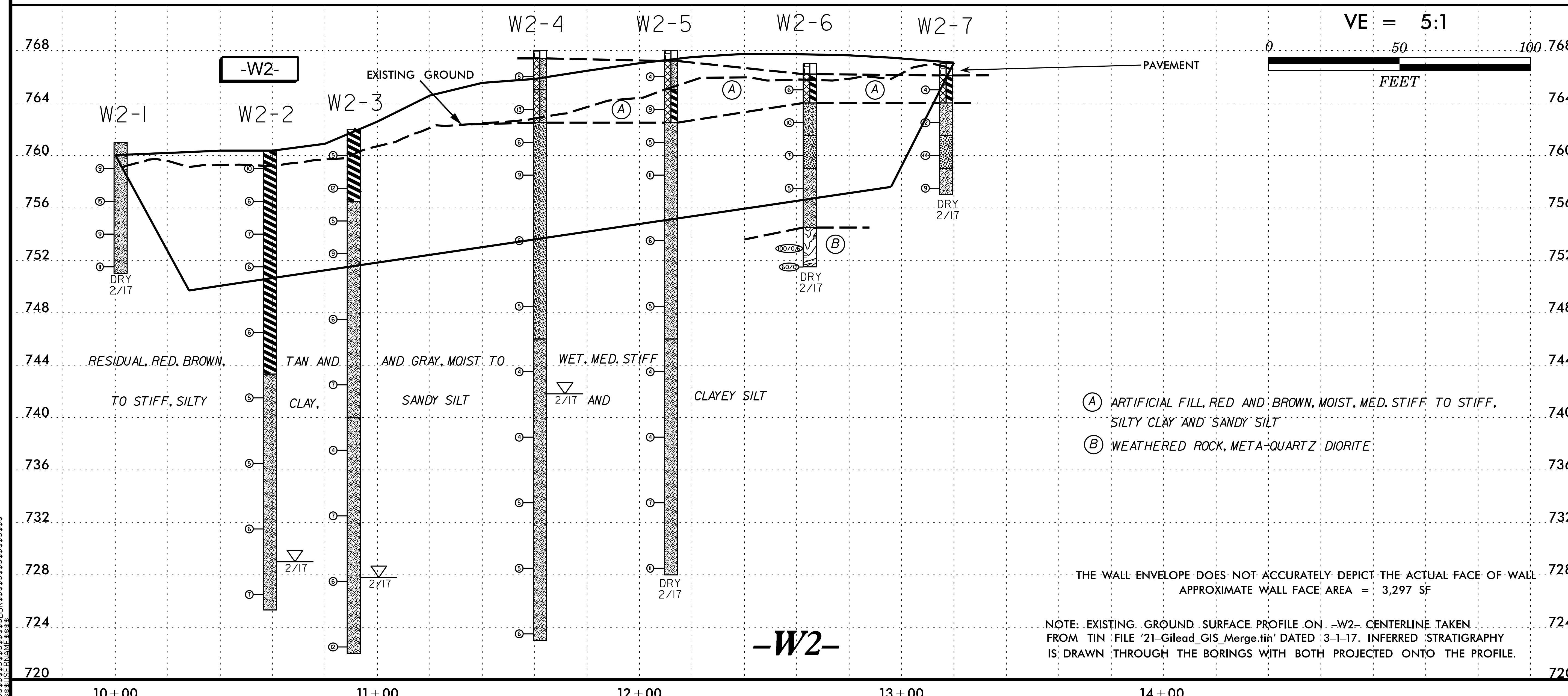
PROJECT REFERENCE NO.	SHEET NO.
U-5114	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED







GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-1	**STATION** 33+99	**OFFSET** 84 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 751.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 610,447	**EASTING** 1,447,150	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
755										
	751.0									GROUND SURFACE 0.0
	750.5	0.5								Asphalt (2 inches) over ABC Stone (4 inches)
750	750.0	1.0	4	9	8	17		M		**ARTIFICIAL FILL** Red Brown Sandy CLAY (A-6), Trace Mica
	748.0	3.0								**RESIDUUM** Red Brown Silty CLAY (A-7-6(36)), Trace Mica
	747.5	3.5	7	6	7	13	SS-1	27%		
745	745.0	6.0	4	7	11	18		M		
	743.0	8.0								Red Tan Sandy SILT (A-4), Trace Mica
	742.5	8.5	4	6	7	13		M		
	741.0	10.0								Boring Terminated at Elevation 741.0 ft In Residuum

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-2	**STATION** 10+48	**OFFSET** 31 ft LT	**ALIGNMENT** -W1-	**0 HR.** 22.0
COLLAR ELEV. 752.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 610,415	**EASTING** 1,447,157	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
755										
	752.0									GROUND SURFACE 0.0
	751.4	0.6								Asphalt (2 inches) over ABC Stone (5 inches)
	751.0	1.0	4	5	8	13		D		**RESIDUUM** Red Brown Silty CLAY (A-7-5)
750	749.0	3.0								Red Tan Sandy SILT (A-4), Trace Mica
	748.5	3.5	4	6	7	13		M		
	746.0	6.0	3	5	7	12		M		
745	744.0	8.0								Tan Gray Clayey SILT (A-5(0)), Trace Mica
	743.5	8.5	3	2	3	5	SS-2	29%		
740	738.5	13.5	2	2	2	4		W		
735	733.5	18.5	1	2	3	5		W		
730	728.5	23.5	2	2	4	6		W		
725	723.5	28.5	2	4	6	10		W		
	722.0	30.0								Boring Terminated at Elevation 722.0 ft In Residuum

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-3	**STATION** 10+77	**OFFSET** 30 ft LT	**ALIGNMENT** -W1-	**0 HR.** 22.0
COLLAR ELEV. 752.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 610,386	**EASTING** 1,447,163	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
755										
	752.0	0.0								752.0 / 0.0 GROUND SURFACE
	751.5	0.5								751.5 / 0.5 Asphalt (2 inches) over ABC Stone (4 inches)
	751.0	1.0	3	4	6	10		M		**RESIDUUM** Red Brown Silty CLAY (A-7-5)
750										
	749.0	3.0								749.0 / 3.0 Red Tan Sandy SILT (A-4), Trace Mica
	748.5	3.5	4	5	8	13		M		
	747.0	5.0								
	746.0	6.0	3	3	4	7		M		
745										
	744.5	8.5								
	743.5	8.5	3	4	3	7		M		
	742.0	10.0								
740										
	740.0	12.0								740.0 / 12.0 Tan Gray Sandy SILT (A-4), Trace Mica
	738.5	13.5	3	2	2	4		W		
735										
	734.5	18.5								
	733.5	18.5	1	2	2	4		W		
730										
	729.5	23.5								
	728.5	23.5	1	2	2	4		W		
725										
	724.5	28.5								
	723.5	28.5	2	3	5	8		W		
	722.0	30.0								722.0 / 30.0 Boring Terminated at Elevation 722.0 ft In Residuum

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-4	**STATION** 11+08	**OFFSET** 28 ft LT	**ALIGNMENT** -W1-	**0 HR.** 28.0
COLLAR ELEV. 753.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 610,356	**EASTING** 1,447,169	**24 HR.** 15.6
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
755										
	753.0	0.0								753.0 GROUND SURFACE 0.0
	752.5	0.5								752.5 Asphalt (2 inches) over ABC Stone (4 inches) 0.5
	752.0	1.0	3	5	8	13		M		**RESIDUUM** Red Brown Silty CLAY (A-7-5), Trace Mica
750										
	750.0	3.0								750.0 3.0 Red Tan Silty Clay (A-7-5(8)), Trace Mica
	749.5	3.5	3	5	6	11	SS-3	30%		
	747.0	6.0	3	3	4	7		M		
745										
	744.5	8.5	2	3	3	6		M		
	741.0	12.0								741.0 12.0 Tan Gray Sandy SILT (A-4(1)), Trace Mica
740	739.5	13.5	1	2	2	4	SS-4	36%		
735	734.5	18.5	2	3	3	6		W		
730	729.5	23.5	2	2	3	5		W		
725	724.5	28.5	2	3	5	8		W		
	723.0	30.0								723.0 30.0 Boring Terminated at Elevation 723.0 ft In Residuum

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-5	**STATION** 11+58	**OFFSET** 20 ft RT	**ALIGNMENT** -W1-	**0 HR.** Dry
COLLAR ELEV. 745.0 ft	**TOTAL DEPTH** 7.5 ft	**NORTHING** 610,296	**EASTING** 1,447,135	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Hand Auger	**HAMMER TYPE** Manual	
DRILLER N/A	**START DATE** 03/02/17	**COMP. DATE** 03/02/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
745										GROUND SURFACE	745.0	0.0
										ARTIFICIAL FILL Brown Sandy CLAY (A-6)		
											743.5	1.5
										RESIDUAL Tan Gray Sandy SILT (A-4)		
740												
											737.5	7.5
										Boring Terminated by Hand Auger Refusal at Elevation 737.5 ft In Residuum 1) Topsoil (4 inches) 2) Tested with DCP		

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1				**GROUND WTR (ft)**
BORING NO. W1-6	**STATION** 11+97	**OFFSET** 20 ft RT	**ALIGNMENT** -W1-	**0 HR.** 8.0
COLLAR ELEV. 746.2 ft	**TOTAL DEPTH** 10.4 ft	**NORTHING** 610,258	**EASTING** 1,447,144	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Hand Auger	**HAMMER TYPE** Manual	
DRILLER N/A	**START DATE** 03/02/17	**COMP. DATE** 03/02/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
750											
										GROUND SURFACE	746.2 0.0
										ARTIFICIAL FILL Tan Brown Sandy CLAY (A-6)	745.2 1.0
745										Tan Brown Sandy SILT (A-4)	
											743.2 3.0
										RESIDUAL Tan Gray Sandy SILT (A-4)	
740											
											735.8 10.4
										Boring Terminated at Elevation 735.8 ft In Residuum 1) Topsoil (4 inches) 2) Tested with DCP	

PROJECT: **Gilead Road Design**
Huntersville, North Carolina
S&ME Project No. 6235-15-014

BORING LOG: W1-5

DATE PERFORMED: **3/2/2017**
PERFORMED BY: **NRB / TJH**
NORTHING: **610,296**
EASTING: **1,447,135**

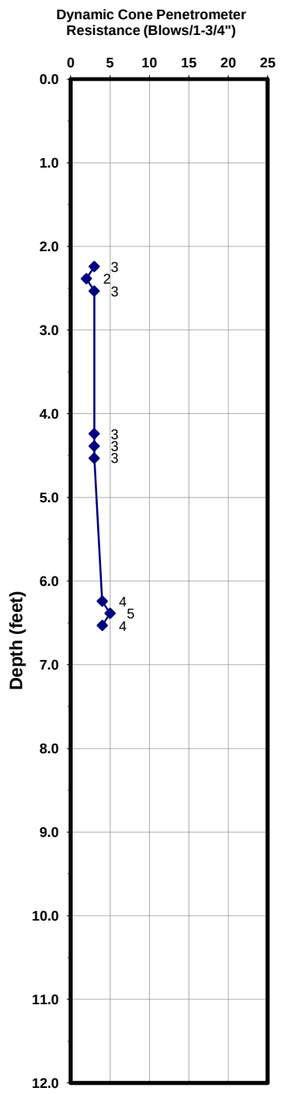
ELEVATION: **745 feet**
BORING DEPTH: **7.5 feet**
WATER LEVEL: **Not Encountered**

NOTES: **Dynamic Cone Penetrometer Testing performed in general accordance with ASTM STP-399.**

HAND AUGER / DYNAMIC CONE PENETROMETER SOUNDING RECORD

DEPTH (FEET)	DESCRIPTION
0 - 0.3	**Topsoil (4 inches)**
0.3 - 1.5	**FILL:** Tan Brown Sandy **CLAY (A-6)**
1.5 - 7.5	**FILL:** Tan Gray Sandy **SILT (A-4)**, trace rock pieces, trace mica

Hand Auger Boring Terminated upon Auger Refusal on Obstruction in Fill at 7.5 Feet. Hand Auger Refusal Encountered in 4 Offset Borings at 1.5, 2.0, 2.5, and 4.0 Feet. No Groundwater Encountered at Boring Termination.



S&ME
9751 Southern Pine Boulevard
Charlotte, North Carolina 28723
Phone: (704) 523-4726 • Fax: (704) 525-3953

PROJECT: **Gilead Road Design**
Huntersville, North Carolina
S&ME Project No. 6235-15-014

BORING LOG: W1-6

DATE PERFORMED: **3/2/2017**
PERFORMED BY: **NRB / TJH**
NORTHING: **610,258**
EASTING: **1,447,144**

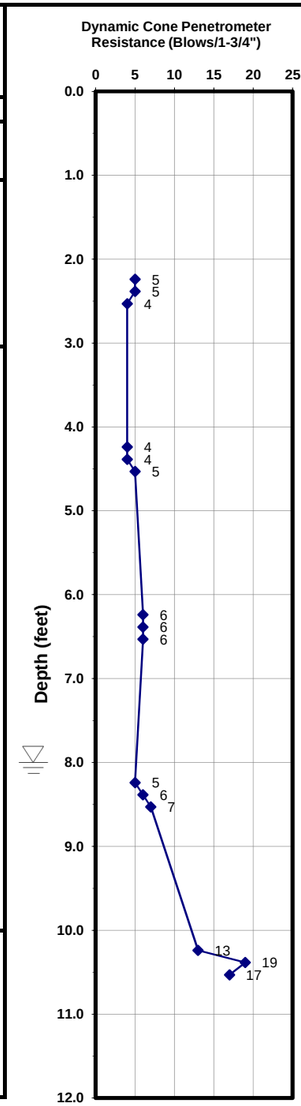
ELEVATION: **746 feet**
BORING DEPTH: **10 feet**
WATER LEVEL: **8.0 feet on 3/2/2017**

NOTES: **Dynamic Cone Penetrometer Testing performed in general accordance with ASTM STP-399.**

HAND AUGER / DYNAMIC CONE PENETROMETER SOUNDING RECORD

DEPTH (FEET)	DESCRIPTION
0 - 0.3	**Topsoil (3 inches)**
0.3 - 1	**FILL:** Brown Sandy **CLAY (A-6)**, trace mica, trace glass fragments
1 - 3	**FILL:** Tan Brown Sandy **SILT (A-4)**, trace mica
3 - 10	**RESIDUUM:** Tan Gray Sandy **SILT (A-4)**, trace mica

Hand Auger Boring Terminated at 10 Feet. Groundwater Encountered at 8.0 feet at Boring Termination on 3/2/2017.



S&ME
9751 Southern Pine Boulevard
Charlotte, North Carolina 28723
Phone: (704) 523-4726 • Fax: (704) 525-3953

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W1			**GROUND WTR (ft)**
BORING NO. W1-7	**STATION** 36+26	**OFFSET** 93 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 759.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 610,229	**EASTING** 1,447,211	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
760										
										759.0 GROUND SURFACE 0.0
	758.0	1.0								758.0 Asphalt (2 inches) over ABC Stone (10 inches) 1.0
			4	4	4	8		M		**RESIDUUM** Red Tan Black Sandy SILT (A-4), Trace Mica
	755.5	3.5								
755			5	5	6	11		M		
	753.0	6.0								
			3	3	3	6		M		
	750.5	8.5								
750			4	5	4	9		M		
										749.0 Boring Terminated at Elevation 749.0 ft In Residuum 10.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-1	**STATION** 10+02	**OFFSET** 4 ft LT	**ALIGNMENT** -W2-	**0 HR.** Dry
COLLAR ELEV. 761.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 610,199	**EASTING** 1,447,207	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
765										
										761.0 GROUND SURFACE 0.0
760	760.0	1.0	4	4	5	9		M		**RESIDUUM** Red Tan Black Sandy SILT (A-4), Trace Mica
	757.5	3.5	6	7	8	15		M		
755	755.0	6.0	3	4	5	9		M		
	752.5	8.5	3	5	6	11		M		
										751.0 10.0 Boring Terminated at Elevation 751.0 ft In Residuum
										1) Topsoil (2 inches)

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-2	**STATION** 10+59	**OFFSET** 26 ft LT	**ALIGNMENT** -W2-	**0 HR.** 32.0
COLLAR ELEV. 760.3 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 610,164	**EASTING** 1,447,215	**24 HR.** 20.0
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
765										
										760.3 GROUND SURFACE 0.0
760	759.3	1.0	3	4	6	10		M		**RESIDUUM** Red Tan Black Silty CLAY (A-7-5(4)), Trace Mica
	756.8	3.5	3	3	3	6		M		
755	754.3	6.0	3	3	4	7		M		
	751.8	8.5	2	3	3	6		M		
750										
	746.8	13.5	2	3	3	6	SS-5	31%		
745										743.3 17.0 Tan Gray Black Sandy SILT (A-4), Trace Mica
	741.8	18.5	2	3	2	5		W		
740										
	736.8	23.5	2	2	3	5		W		
735										
	731.8	28.5	2	2	4	6		W		
730										
	726.8	33.5	2	3	4	7		W		725.3 35.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-2	**STATION** 10+59	**OFFSET** 26 ft LT	**ALIGNMENT** -W2-	**0 HR.** 32.0
COLLAR ELEV. 760.3 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 610,164	**EASTING** 1,447,215	**24 HR.** 20.0
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/23/17	**COMP. DATE** 02/23/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
725						Match Line				Boring Terminated at Elevation 725.3 ft In Residuum 1) Topsoil (2 inches)

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-3	**STATION** 10+91	**OFFSET** 30 ft LT	**ALIGNMENT** -W2-	**0 HR.** 34.2
COLLAR ELEV. 762.0 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 610,134	**EASTING** 1,447,228	**24 HR.** 21.1
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
765										762.0 GROUND SURFACE 0.0
	761.0	1.0	2	3	2	5		28%		**RESIDUUM** Red Brown Silty CLAY (A-7-5(9)), Trace Mica
760	758.5	3.5	6	6	6	12		M		756.5 5.5
	756.0	6.0	3	2	3	5		M		Red Tan Black Sandy SILT (A-4), Trace Mica
755	753.5	8.5	4	4	5	9		M		
750	748.5	13.5	4	3	3	6		M		
745	743.5	18.5	2	4	3	7		W		740.0 22.0
740	738.5	23.5	2	1	3	4		W		Tan Gray Black Sandy SILT (A-4), Trace Mica
735	733.5	28.5	2	3	4	7		W		
730	728.5	33.5	3	3	3	6		W		
725										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-3	**STATION** 10+91	**OFFSET** 30 ft LT	**ALIGNMENT** -W2-	**0 HR.** 34.2
COLLAR ELEV. 762.0 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 610,134	**EASTING** 1,447,228	**24 HR.** 21.1
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
725						Match Line				ELEV. (ft) DEPTH (ft)
	723.5	38.5	5	6	6	12		W		Tan Gray Black Sandy SILT (A-4), Trace Mica *(continued)*
										722.0 40.0
										Boring Terminated at Elevation 722.0 ft In Residuum
										1) Topsoil (2 inches)

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-4	**STATION** 11+62	**OFFSET** 25 ft LT	**ALIGNMENT** -W2-	**0 HR.** 26.2
COLLAR ELEV. 768.0 ft	**TOTAL DEPTH** 45.0 ft	**NORTHING** 610,064	**EASTING** 1,447,240	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/27/17	**COMP. DATE** 02/27/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										
										768.0 GROUND SURFACE 0.0
										767.4 Asphalt (2 inches) over Concrete (5 inches) 0.6
	767.0	1.0	2	2	3	5		M		**ARTIFICIAL FILL** Red Brown Sandy SILT (A-4), Trace Mica
765										765.0 3.0
	764.5	3.5	5	7	6	13		M		Red Tan Sandy SILT (A-4), Trace Organics (Wood Pieces)
										762.5 5.5
	762.0	6.0	2	3	3	6	SS-7	27%		**RESIDUUM** Red Tan Black Clayey SILT (A-5(0)), Trace Mica
760										
	759.5	8.5	3	4	5	9		M		
755										
	754.5	13.5	3	3	3	6		M		
750										
	749.5	18.5	2	2	3	5		M		
745										746.0 22.0
	744.5	23.5	1	2	2	4		W		Tan Gray Sandy SILT (A-4), Trace Mica
740										
	739.5	28.5	2	2	2	4		W		
735										
	734.5	33.5	2	2	3	5		W		
730										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-4	**STATION** 11+62	**OFFSET** 25 ft LT	**ALIGNMENT** -W2-	**0 HR.** 26.2
COLLAR ELEV. 768.0 ft	**TOTAL DEPTH** 45.0 ft	**NORTHING** 610,064	**EASTING** 1,447,240	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/27/17	**COMP. DATE** 02/27/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
730						Match Line				
	729.5	38.5	2	2	3	5		W		Tan Gray Sandy SILT (A-4), Trace Mica *(continued)*
725	724.5	43.5	2	2	4	6		W		723.0 / 45.0 Boring Terminated at Elevation 723.0 ft In Residuum

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-5	**STATION** 12+12	**OFFSET** 21 ft LT	**ALIGNMENT** -W2-	**0 HR.** Dry
COLLAR ELEV. 768.0 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 610,014	**EASTING** 1,447,249	**24 HR.** 23.3
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
770										768.0 / 0.0 GROUND SURFACE
	767.0	1.0	3	2	2	4		M		767.2 / 0.8 Asphalt (4 inches) over ABC Stone (5 inches)
765	764.5	3.5	4	5	4	9		M		**ARTIFICIAL FILL** Red Tan Sandy SILT (A-4), Trace Mica
	762.0	6.0	3	2	3	5		M		765.0 / 3.0 Red Brown Silty CLAY (A-7-5)
760	759.5	8.5	4	5	6	11		M		762.5 / 5.5 **RESIDUUM** Tan Black Sandy SILT (A-4), Trace Mica
755	754.5	13.5	2	3	3	6		M		
750	749.5	18.5	2	2	3	5		M		
745	744.5	23.5	1	2	2	4		W		746.0 / 22.0 Gray Tan Sandy SILT (A-4), Trace Mica
740	739.5	28.5	2	2	2	4		W		
735	734.5	33.5	3	3	4	7		W		
730										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-5	**STATION** 12+12	**OFFSET** 21 ft LT	**ALIGNMENT** -W2-	**0 HR.** Dry
COLLAR ELEV. 768.0 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 610,014	**EASTING** 1,447,249	**24 HR.** 23.3
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION / ELEV. (ft) / DEPTH (ft)
730						Match Line				
	729.5	38.5	3	4	7	11		W		Gray Tan Sandy SILT (A-4), Trace Mica *(continued)*
										728.0 / 40.0 Boring Terminated at Elevation 728.0 ft In Residuum

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-6	**STATION** 12+65	**OFFSET** 20 ft LT	**ALIGNMENT** -W2-	**0 HR.** Dry
COLLAR ELEV. 767.0 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 609,962	**EASTING** 1,447,261	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										767.0 GROUND SURFACE 0.0
	766.0	1.0	2	3	3	6		M		766.2 Asphalt (3 inches) over ABC Stone (6 inches) 0.8
765										**ARTIFICIAL FILL** Red Brown CLAY (A-7-6), Trace Mica
	763.5	3.5	4	5	5	10	SS-8	31%		764.0 3.0 **RESIDUUM** Tan Black Clayey SILT (A-5(2)), Trace Mica
	761.0	6.0	4	3	4	7		M		761.5 5.5 Tan Gray Silty Fine to Coarse SAND (A-2-4)
760	758.5	8.5	2	3	2	5		M		759.0 8.0 Tan Black Sandy SILT (A-4), Trace Mica
755										754.5 12.5 **WEATHERED ROCK** (Metamorphosed Quartz Diorite)
	753.5	13.5	91	9/0.1		100/0.6				
	751.5	15.5	60/0			60/0				751.5 15.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 751.5 ft On Crystalline Rock

1) Refusal at Depth 3.5 feet in Offset Boring.

WBS 42376.1.FR1	**TIP** U-5114	**COUNTY** MECKLENBURG	**GEOLOGIST** N. Bradley	
SITE DESCRIPTION US 21 (Statesville Rd.) and SR 2136 (Gilead Rd.) Intersection Improvements - Retaining Wall W2				**GROUND WTR (ft)**
BORING NO. W2-7	**STATION** 13+17	**OFFSET** 12 ft LT	**ALIGNMENT** -W2-	**0 HR.** Dry
COLLAR ELEV. 767.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 609,931	**EASTING** 1,447,272	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME 45-B		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER J. Little	**START DATE** 02/24/17	**COMP. DATE** 02/24/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										
										767.0 GROUND SURFACE 0.0
	766.0	1.0	2	2	2	4		M		766.1 Asphalt (4 inches) over ABC Stone (7 inches) 0.9 **ARTIFICIAL FILL** Red Brown Silty CLAY (A-7-5), Trace Mica
765										764.0 3.0
	763.5	3.5	4	5	7	12		M		**RESIDUUM** Tan Black Sandy SILT (A-4), Trace Mica
	761.0	6.0	5	6	8	14		M		761.5 5.5 Gray Tan Silty Fine to Coarse SAND (A-2-4)
760										759.0 8.0
	758.5	8.5	4	4	5	9		M		Tan Black Sandy SILT (A-4), Trace Mica
										757.0 10.0
										Boring Terminated at Elevation 757.0 ft In Residuum

PROJECT REFERENCE NO.	SHEET NO.
U-5114	16

SOIL TEST RESULTS

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	84' LT	33+99	3.5-5.0	A-7-5(37)	80	44	7	17	24	51	99	92	75	26.8	-
SS-2	31' LT	10+48	8.5-10.0	A-5(0)	42	4	12	43	36	9	100	88	45	29.1	-
SS-3	28' LT	11+08	3.5-5.0	A-7-5(8)	56	13	12	28	39	21	100	88	60	30.4	-
SS-4	28' LT	11+08	13.5-15.0	A-4(1)	40	5	19	35	43	4	100	82	46	35.8	-
SS-5	26' LT	10+59	13.5-15.0	A-7-5(4)	49	11	14	35	45	5	98	84	50	31.4	-
SS-6	30' LT	10+91	1.0-2.5	A-7-5(9)	50	16	9	32	30	29	100	91	59	28.3	-
SS-7	25' LT	11+62	6.0-7.5	A-5(0)	44	1	12	37	33	18	100	88	51	27.2	-
SS-8	20' LT	12+65	3.5-5.0	A-5(2)	47	5	11	38	44	7	100	88	51	30.9	-

Appendix II

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

S&ME

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W1-1 Sample #: SS-1 Sample Date: 2/23/17
Location: Boreholes Offset: NA Depth: 3.5-5'
Sample Description: A-7-5

Pan #:	T-2	Beaker #:	LL	Group Index		**36**		
Hydrometer Jar #:			88	Assumed Apparent Relative Density		**2.650**		
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural		
Total Sample Wt. Air Dry + tare wt. (g):			182.76	Tare #	Jordi	GP		
Weight of Total Sample Air Dried (g):			182.76	A Tare Wt.	15.93	83.46		
Weight of Air Dried Hydrometer Sample (g):			50.00	B Wet Wt. + A	26.12	267.01		
Total Sample Oven Dried:			177.62	C Dry Wt. + A	25.83	228.23		
Hydrometer Sample Oven Dried (**W**):			48.58	D Water Wt. (B-C)	0.29	38.78		
% Passing #10:			98.8%	E Dry Wt.(C-A)	9.90	144.77		
Correction Factor a (Table 1):			**1.00**	% Moisture (100 x D/E)	2.93%	26.8%		

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	1.1		99.4%
#4	1.7	Soil Mortar	99.0%
#10	2.1	**100.0%**	**98.8%**
#20	0.4	99.3%	98.1%
#40	3.4	93.0%	91.9%
#60	6.9	85.7%	84.7%
#100	9.5	80.4%	79.4%
#200	11.6	76.2%	75.3%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	3/8"		Silt & Clay:	75.3%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	1.2%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	7.0%	< 2.00 mm and > 0.425 mm	Silt:	24.3%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	16.6%	< 0.425 mm and > 0.075 mm	Clay:	51.0%	< 0.002 mm	% passing #200 as whole % #:	75%
Total Sand:	23.5%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	80	Plastic Limit 36		Plastic Index	44	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.3	41.0	5.5		35.5	73.1%	72.2%	10.5	0.01332	0.03048
	5	22.3	40.5	5.5		35.0	72.1%	71.2%	10.6	0.01332	0.01935
	15	22.3	38.0	5.5		32.5	66.9%	66.1%	11.0	0.01332	0.01139
	30	22.4	36.5	5.5		31.0	63.8%	63.1%	11.2	0.01332	0.00814
	60	22.3	35.0	5.5		29.5	60.7%	60.0%	11.5	0.01332	0.00582
	250	22.5	31.5	5.5		26.0	53.5%	52.9%	12.0	0.01325	0.00291
	1440	22.1	29.5	5.5		24.0	49.4%	48.8%	12.4	0.01332	0.00123
						#VALUE!	#VALUE!	48.8%	#VALUE!	#N/A	0.00123

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

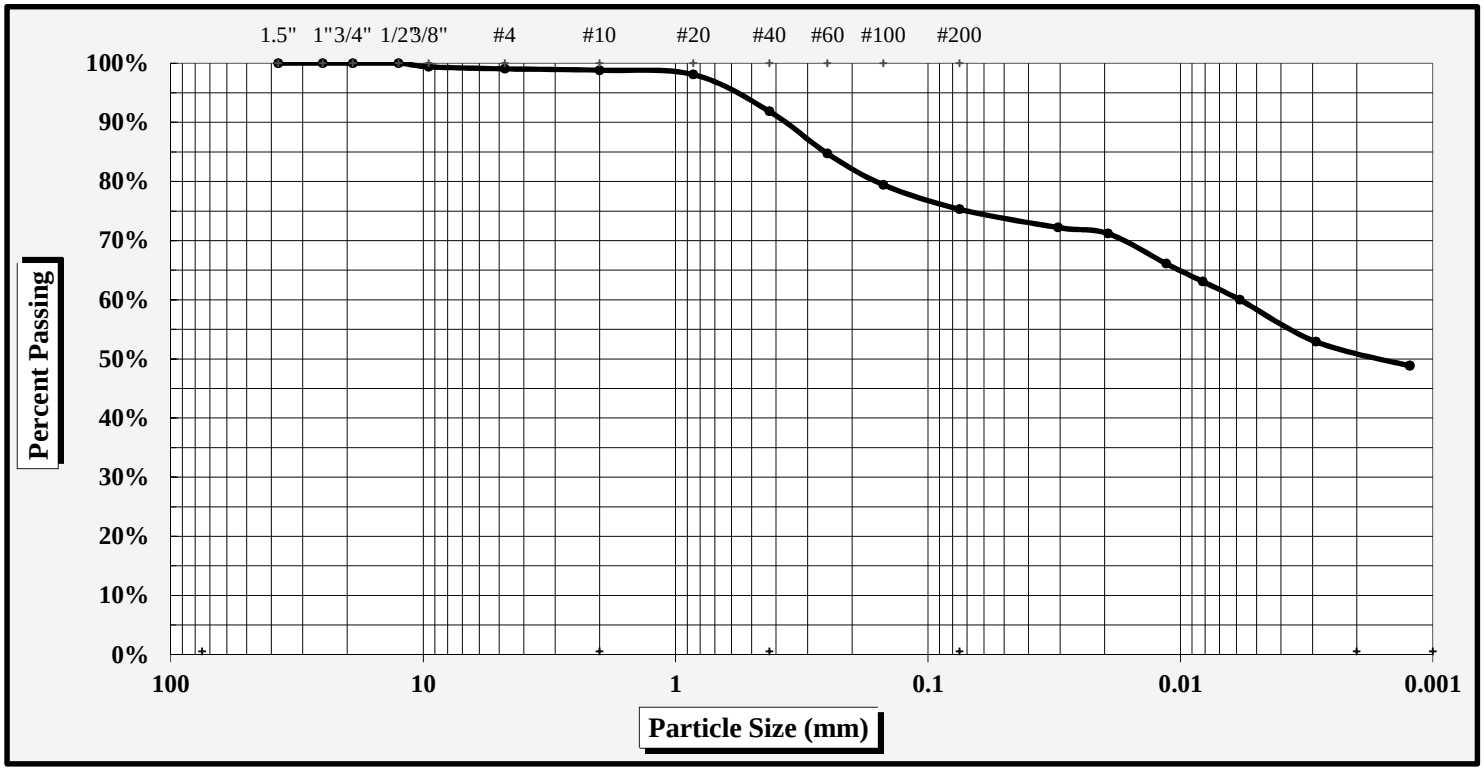
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: NA

Client Address: Mecklenburg County, NC

Boring #:	W1-1	Sample #: SS-1	Sample Date: NA
Location:	Boreholes	Offset: NA	Depth: 3.5-5'
Sample Description:			A-7-5



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	1.2%	Coarse Sand	7.0%	Silt	24%
Maximum Particle Size	3/8"	Fine Sand	16.6%	Clay	51%
Assumed Apparent Relative Density	2.650	Moisture Content	26.8%	Silt & Clay (% Passing #200)	75.3%
Liquid Limit	80	Plastic Limit	36	Plastic Index	44

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

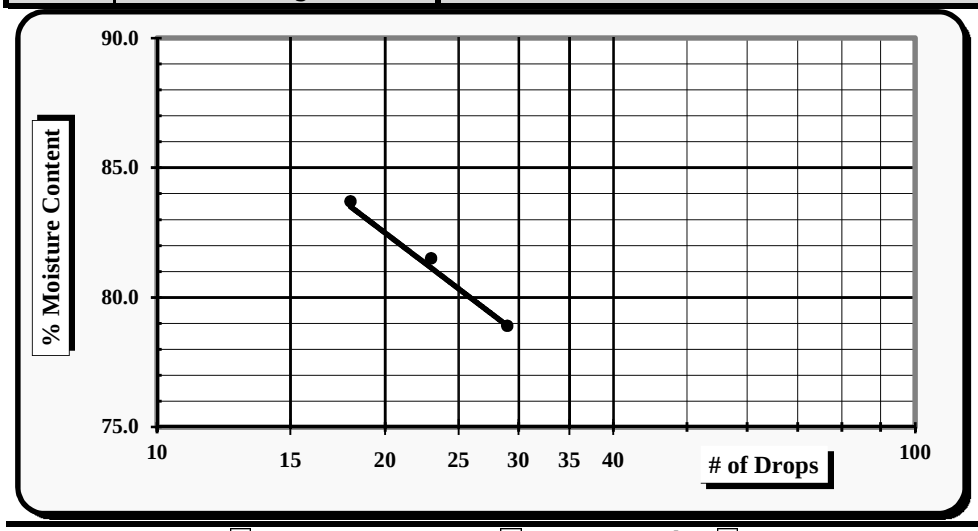
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W1-1	Sample #: SS-1	Sample Date: NA
Location:	Boreholes	Offset: NA	Elevation: 3.5-5'
Sample Description:			A-7-6

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	49	KK	17				52	53	
A	Tare Weight	15.68	16.08	13.96				**15.70**	15.81	
B	Wet Soil Weight + A	26.70	25.99	25.22				24.03	24.09	
C	Dry Soil Weight + A	21.84	21.54	20.09				21.82	21.93	
D	Water Weight (B-C)	4.86	4.45	5.13				2.21	2.16	
E	Dry Soil Weight (C-A)	6.16	5.46	6.13				6.12	6.12	
F	% Moisture (D/E)*100	78.9%	81.5%	83.7%				36.1%	35.3%	
N	# OF DROPS	29	23	18				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**35.7%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**80**
Plastic Limit	**36**
Plastic Index	**44**
Group Symbol	**A-7-6**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

S&ME

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W1-2 Sample #: SS-2 Sample Date: 2/23/17
Location: Boreholes Offset: NA Depth: 8.5-10'
Sample Description: A-5

Pan #:	3	Beaker #:	B
Hydrometer Jar #:			E
Pan Tare Weight (grams):			0.00
Total Sample Wt. Air Dry + tare wt. (g):			186.81
Weight of Total Sample Air Dried (g):			186.81
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			183.53
Hydrometer Sample Oven Dried (**W**):			49.12
% Passing #10:			100.0%
Correction Factor a (Table 1):			**1.00**

Group Index				**0**
Assumed Apparent Relative Density				**2.650**
Moisture Content		Hygroscopic	Natural	
	Tare #	TI	S-9	
A	Tare Wt.	15.91	83.25	
B	Wet Wt. + A	26.16	277.58	
C	Dry Wt. + A	25.98	233.78	
D	Water Wt. (B-C)	0.18	43.80	
E	Dry Wt.(C-A)	10.07	150.53	
% Moisture (100 x D/E)		1.79%	29.1%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	**100.0%**
#20	0.6	98.8%	98.8%
#40	5.8	88.1%	88.1%
#60	15.2	69.0%	69.0%
#100	21.5	56.1%	56.1%
#200	27.1	44.9%	44.9%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	#20		Silt & Clay:	44.9%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	11.9%	< 2.00 mm and > 0.425 mm	Silt:	35.9%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	43.2%	< 0.425 mm and > 0.075 mm	Clay:	9.0%	< 0.002 mm	% passing #200 as whole % #:	**45%**
Total Sand:	55.1%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	42	Plastic Limit 38		Plastic Index	4	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.4	25.0	5.5		19.5	39.7%	39.7%	13.1	0.01332	0.03409
	5	22.4	22.0	5.5		16.5	33.6%	33.6%	13.6	0.01332	0.02196
	15	22.4	18.5	5.5		13.0	26.5%	26.5%	14.2	0.01332	0.01294
	30	22.3	15.0	5.5		9.5	19.3%	19.3%	14.7	0.01332	0.00934
	60	22.5	14.0	5.5		8.5	17.3%	17.3%	14.9	0.01325	0.00660
	250	22.5	11.0	5.5		5.5	11.2%	11.2%	15.4	0.01325	0.00329
	1440	22.1	9.5	5.5		4.0	8.1%	8.1%	15.6	0.01332	0.00139
						#VALUE!	#VALUE!	8.1%	#VALUE!	#N/A	0.00139

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: _____ _____ Technical Responsibility: Rob Kral _____
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

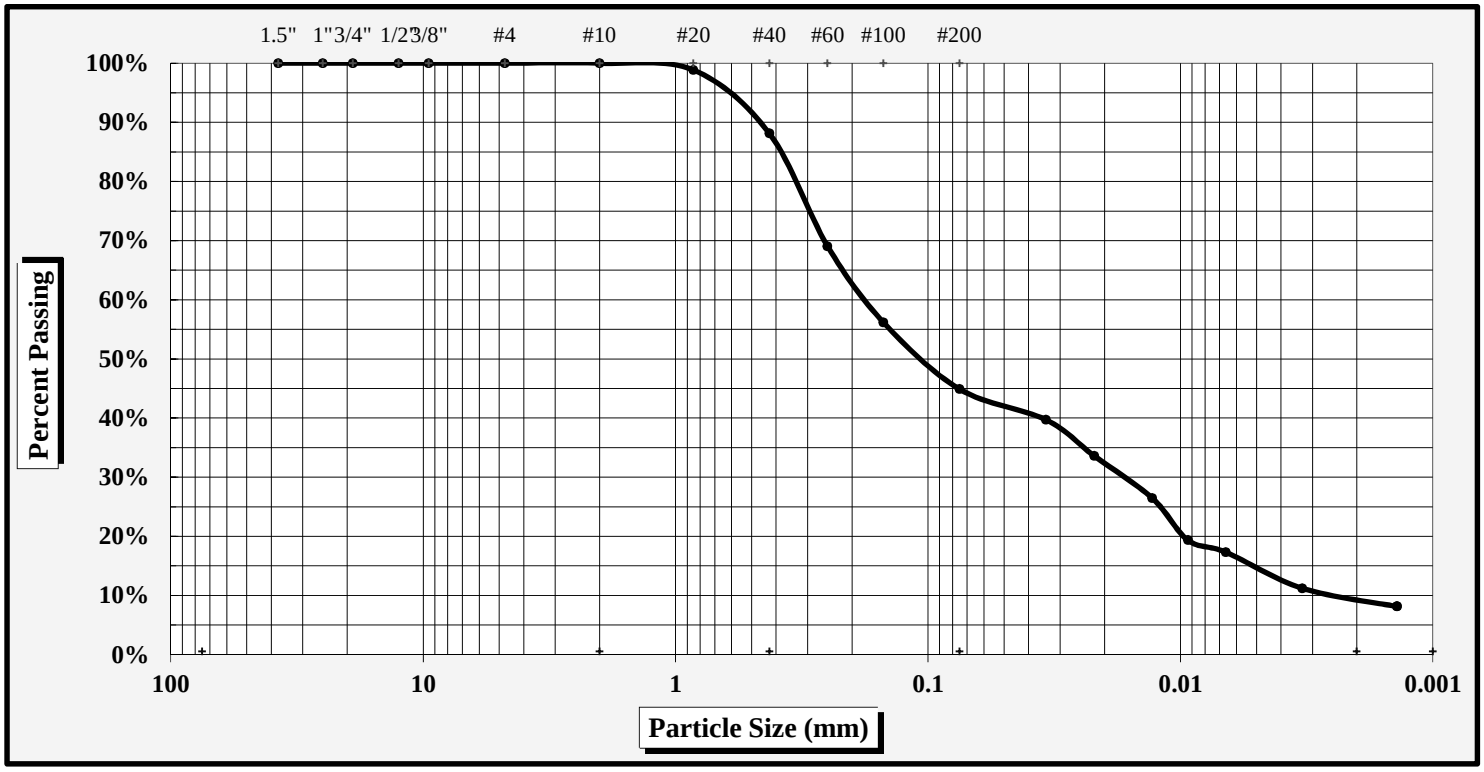
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: STV Engineers, Inc.

Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Boring #:	W1-2	Sample #: SS-2	Sample Date: February 23, 2017
Location:	Boreholes	Offset: NA	Depth: 8.5-10'
Sample Description:			A-5



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.0%	Coarse Sand	11.9%	Silt	36%
Maximum Particle Size	#20	Fine Sand	43.2%	Clay	9%
Assumed Apparent Relative Density	2.650	Moisture Content	29.1%	Silt & Clay (% Passing #200)	44.9%
Liquid Limit	42	Plastic Limit	38	Plastic Index	4

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral

Signature *Position*

Liquid Limit, Plastic Limit, and Plastic Index

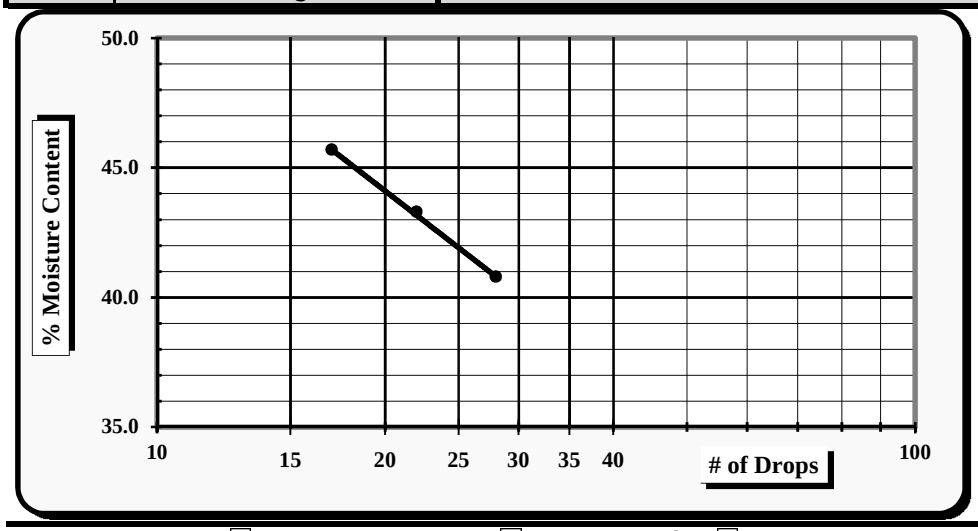
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W1-2	Sample #: SS-2	Sample Date: 2/23/17
Location:	Boreholes	Offset: NA	Elevation: 8.5-10'
Sample Description:			A-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	WN	4	38				VV	P-7	
A	Tare Weight	16.53	13.99	15.82				**15.98**	12.72	
B	Wet Soil Weight + A	31.69	27.42	28.19				24.35	21.13	
C	Dry Soil Weight + A	27.30	23.36	24.31				22.06	18.83	
D	Water Weight (B-C)	4.39	4.06	3.88				2.29	2.30	
E	Dry Soil Weight (C-A)	10.77	9.37	8.49				6.08	6.11	
F	% Moisture (D/E)*100	40.8%	43.3%	45.7%				37.7%	37.6%	
N	# OF DROPS	28	22	17				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**37.7%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**42**
Plastic Limit	**38**
Plastic Index	**4**
Group Symbol	**A-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W1-4 Sample #: SS-3 Sample Date: 2/23/17
Location: Boreholes Offset: NA Depth: 3.5-5'
Sample Description: A-7-5

Pan #:	4	Beaker #:	8		Group Index	**8**		
Hydrometer Jar #:			4		Assumed Apparent Relative Density	**2.650**		
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural	
Total Sample Wt. Air Dry + tare wt. (g):			158.83		Tare #	LF	Jazz	
Weight of Total Sample Air Dried (g):			158.83	A	Tare Wt.	16.85	81.9	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.21	264.02	
Total Sample Oven Dried:			156.22	C	Dry Wt. + A	27.04	221.55	
Hydrometer Sample Oven Dried (**W**):			49.18	D	Water Wt. (B-C)	0.17	42.47	
% Passing #10:			100.0%	E	Dry Wt.(C-A)	10.19	139.65	
Correction Factor a (Table 1):			**1.00**		% Moisture (100 x D/E)	1.67%	30.4%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	**100.0%**
#20	0.4	99.1%	99.1%
#40	5.9	88.1%	88.1%
#60	11.5	76.6%	76.6%
#100	16.4	66.7%	66.7%
#200	19.8	59.8%	59.8%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	#20		Silt & Clay:	59.8%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	11.9%	< 2.00 mm and > 0.425 mm	Silt:	39.3%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	28.2%	< 0.425 mm and > 0.075 mm	Clay:	20.5%	< 0.002 mm	% passing #200 as whole % #:	**60%**
Total Sand:	40.2%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	56	Plastic Limit 43		Plastic Index	13	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.3	34.0	5.5		28.5	58.0%	58.0%	11.6	0.01332	0.03211
	5	22.3	31.5	5.5		26.0	52.9%	52.9%	12.0	0.01332	0.02066
	15	22.0	26.5	5.5		21.0	42.7%	42.7%	12.9	0.01332	0.01233
	30	22.3	22.5	5.5		17.0	34.6%	34.6%	13.5	0.01332	0.00894
	60	22.3	20.5	5.5		15.0	30.5%	30.5%	13.8	0.01332	0.00640
	250	22.5	17.0	5.5		11.5	23.4%	23.4%	14.4	0.01325	0.00318
	1440	22.0	14.5	5.5		9.0	18.3%	18.3%	14.8	0.01332	0.00135
						#VALUE!	#VALUE!	18.3%	#VALUE!	#N/A	0.00135

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

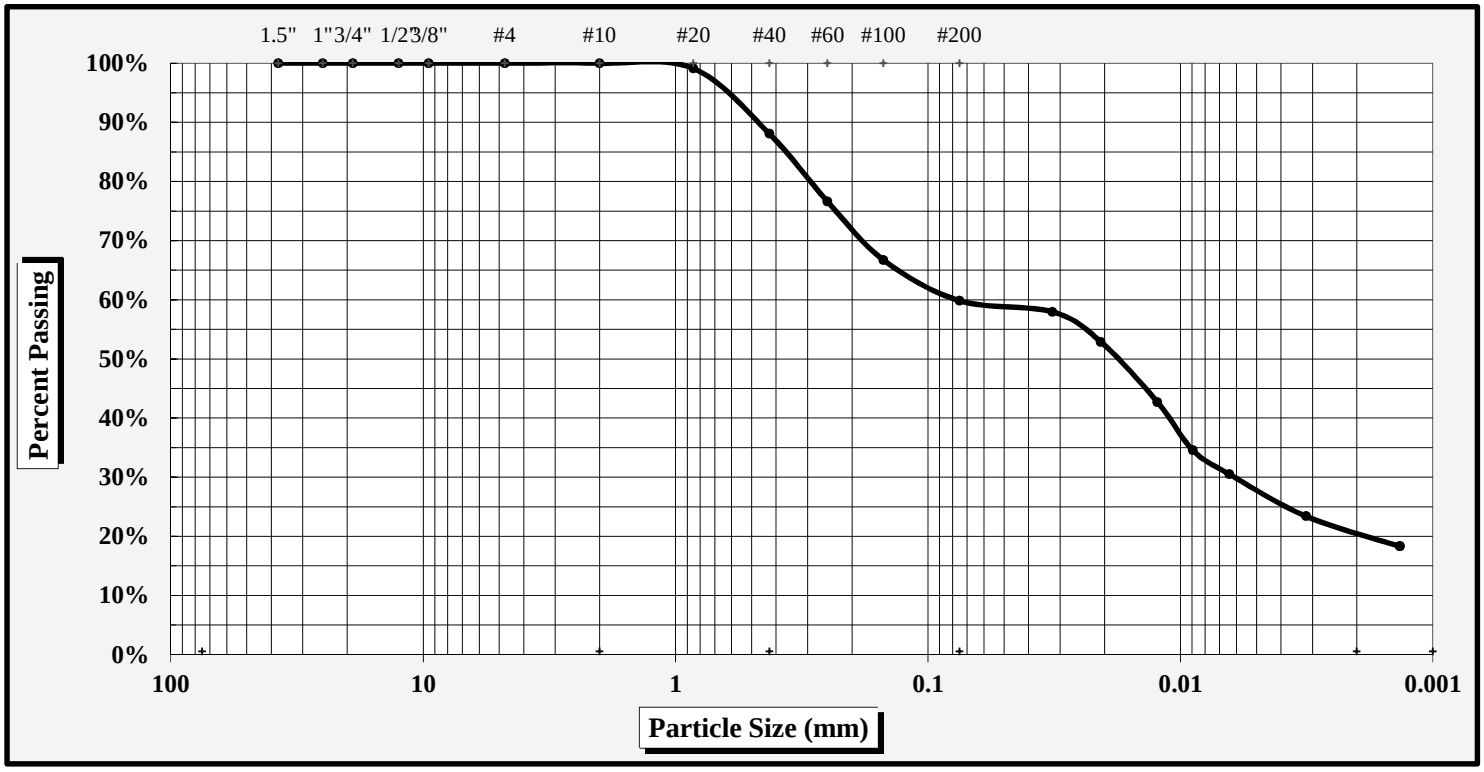
Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

S&ME Project #: **6235-15-014** Report Date: 3/24/17
Project Name: **U-5114 Gilead Road Design**
Client Name: NA
Client Address: Mecklenburg County, NC

Boring #:	W1-4	Sample #: SS-3	Sample Date: NA
Location:	Boreholes	Offset: NA	Depth: 3.5-5'
Sample Description:			A-7-5



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.0%	Coarse Sand	11.9%	Silt	39%
Maximum Particle Size	#20	Fine Sand	28.2%	Clay	21%
Assumed Apparent Relative Density	2.650	Moisture Content	30.4%	Silt & Clay (% Passing #200)	59.8%
Liquid Limit	56	Plastic Limit	43	Plastic Index	13

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils
AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager
Signature *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

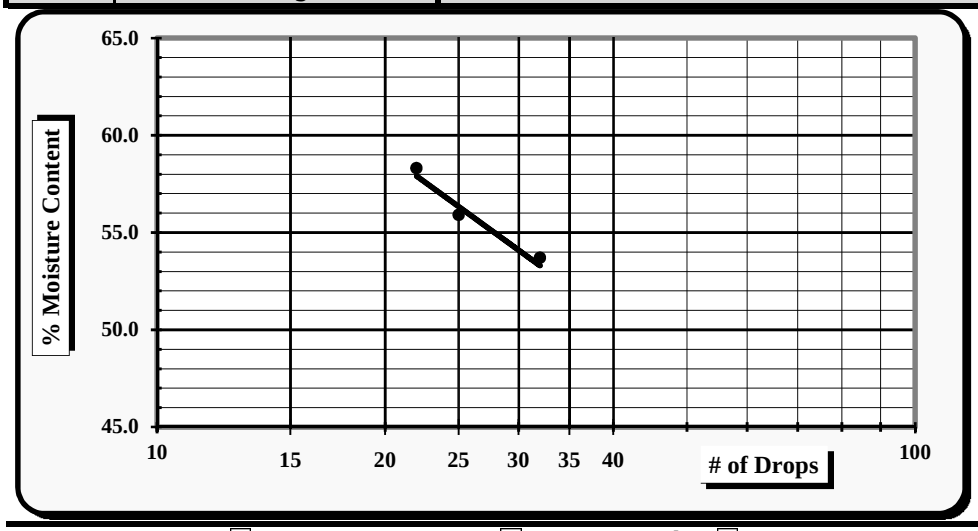
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W1-4	Sample #: SS-3	Sample Date: 2/23/17
Location:	Boreholes	Offset: NA	Elevation: 3.5-5'
Sample Description:			A-7-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	1	P-4	P-4				22	SSS	
A	Tare Weight	13.80	12.36	12.58				**13.95**	16.57	
B	Wet Soil Weight + A	25.25	26.42	24.72				22.69	25.16	
C	Dry Soil Weight + A	21.25	21.38	20.25				20.07	22.58	
D	Water Weight (B-C)	4.00	5.04	4.47				2.62	2.58	
E	Dry Soil Weight (C-A)	7.45	9.02	7.67				6.12	6.01	
F	% Moisture (D/E)*100	53.7%	55.9%	58.3%				42.8%	42.9%	
N	# OF DROPS	32	25	22				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**42.9%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**56**
Plastic Limit	**43**
Plastic Index	**13**
Group Symbol	**A-7-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W1-4 Sample #: SS-4 Sample Date: 2/23/17
Location: Boreholes Offset: NA Depth: 13.5-15'
Sample Description: A-4

Pan #:	5	Beaker #:	PP		Group Index		1		
Hydrometer Jar #:			3		Assumed Apparent Relative Density		2.650		
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Wt. Air Dry + tare wt. (g):			188.79		Tare #	10	T-9		
Weight of Total Sample Air Dried (g):			188.79	A	Tare Wt.	19.97	81.74		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.60	296.35		
Total Sample Oven Dried:			182.27	C	Dry Wt. + A	24.44	239.83		
Hydrometer Sample Oven Dried (**W**):			48.27	D	Water Wt. (B-C)	0.16	56.52		
% Passing #10:			100.0%	E	Dry Wt.(C-A)	4.47	158.09		
Correction Factor a (Table 1):			**1.00**		% Moisture (100 x D/E)	3.58%	35.8%		

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	**100.0%**
#20	0.6	98.7%	98.7%
#40	8.9	81.5%	81.5%
#60	15.8	67.3%	67.3%
#100	21.1	56.2%	56.2%
#200	26.0	46.1%	46.1%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	#20		Silt & Clay:	46.1%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	18.5%	< 2.00 mm and > 0.425 mm	Silt:	42.6%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	35.4%	< 0.425 mm and > 0.075 mm	Clay:	3.5%	< 0.002 mm	% passing #200 as whole % #:	**46%**
Total Sand:	53.9%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	40	Plastic Limit 35		Plastic Index	5	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(^oC)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x $((L/T)^{1/2}$
	2	22.3	27.0	5.5		21.5	44.5%	44.5%	12.8	0.01332	0.03366
	5	22.3	21.0	5.5		15.5	32.1%	32.1%	13.8	0.01332	0.02209
	15	22.3	17.0	5.5		11.5	23.8%	23.8%	14.4	0.01332	0.01305
	30	22.3	14.0	5.5		8.5	17.6%	17.6%	14.9	0.01332	0.00939
	60	22.3	11.5	5.5		6.0	12.4%	12.4%	15.3	0.01332	0.00673
	250	22.5	8.5	5.5		3.0	6.2%	6.2%	15.8	0.01325	0.00333
	1440	21.9	7.0	6.0		1.0	2.1%	2.1%	16.1	0.01340	0.00142
						#VALUE!	#VALUE!	2.1%	#VALUE!	#N/A	0.00142

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

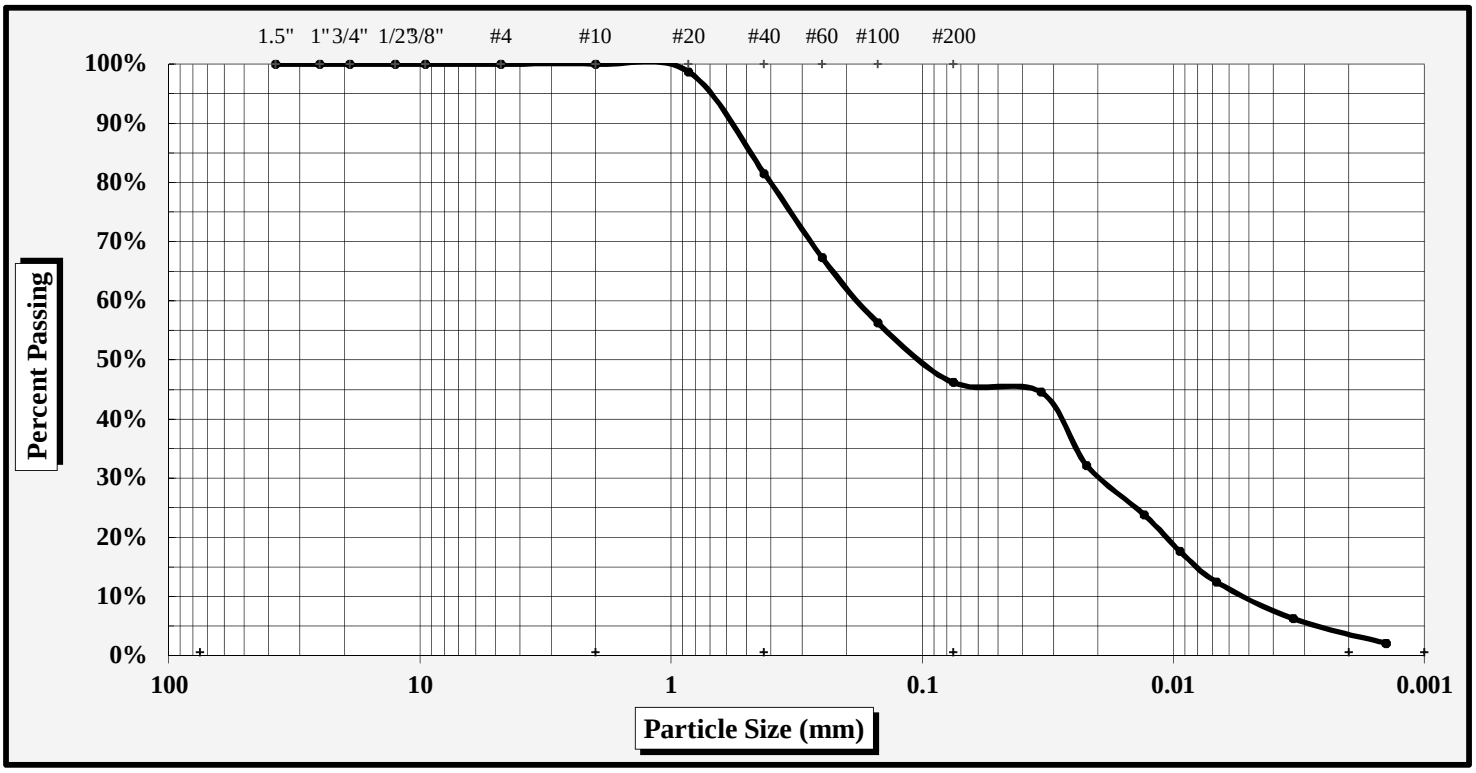
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: STV Engineers, Inc.

Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Boring #:	W1-4	Sample #: SS-4	Sample Date: February 23, 2017
Location:	Boreholes	Offset: NA	Depth: 13.5-15'
Sample Description:			A-4



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.0%	Coarse Sand	18.5%	Silt	43%
Maximum Particle Size	#20	Fine Sand	35.4%	Clay	4%
Assumed Apparent Relative Density	2.650	Moisture Content	35.8%	Silt & Clay (% Passing #200)	46.1%
Liquid Limit	40	Plastic Limit	35	Plastic Index	5

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

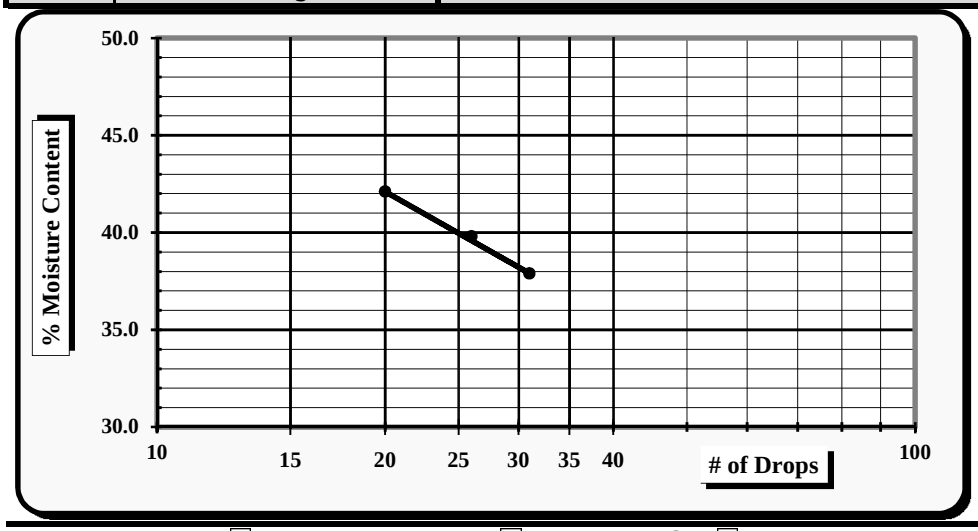
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W1-4	Sample #: SS-4	Sample Date: 2/23/17
Location:	Boreholes	Offset: NA	Elevation: 13.5-15'
Sample Description:			A-4

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	FF	PP	33				TT	8	
A	Tare Weight	16.79	16.15	15.90				**15.91**	13.93	
B	Wet Soil Weight + A	32.57	31.77	29.84				24.40	22.20	
C	Dry Soil Weight + A	28.23	27.32	25.71				22.21	20.09	
D	Water Weight (B-C)	4.34	4.45	4.13				2.19	2.11	
E	Dry Soil Weight (C-A)	11.44	11.17	9.81				6.30	6.16	
F	% Moisture (D/E)*100	37.9%	39.8%	42.1%				34.8%	34.3%	
N	# OF DROPS	31	26	20				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**34.6%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**40**
Plastic Limit	**35**
Plastic Index	**5**
Group Symbol	**A-4**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

S&ME

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W2-2 Sample #: SS-5 Sample Date: 2/23/17
Location: Boreholes Offset: NA Depth: 13.5-15'
Sample Description: A-7-5

Pan #:	2	Beaker #:	M			Group Index	4		
Hydrometer Jar #:			Q			Assumed Apparent Relative Density	2.650		
Pan Tare Weight (grams):			0.00		Moisture Content		Hygroscopic	Natural	
Total Sample Wt. Air Dry + tare wt. (g):			168.55			Tare #	L	T-1	
Weight of Total Sample Air Dried (g):			168.55	A		Tare Wt.	16.93	83.78	
Weight of Air Dried Hydrometer Sample (g):			50.00	B		Wet Wt. + A	27.56	271.76	
Total Sample Oven Dried:			166.21	C		Dry Wt. + A	27.41	226.79	
Hydrometer Sample Oven Dried (**W**):			49.29	D		Water Wt. (B-C)	0.15	44.97	
% Passing #10:			98.3%	E		Dry Wt.(C-A)	10.48	143.01	
Correction Factor a (Table 1):			**1.00**			% Moisture (100 x D/E)	1.43%	31.4%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.5	Soil Mortar	99.7%
#10	2.8	**100.0%**	**98.3%**
#20	1.8	96.4%	94.8%
#40	7.0	85.8%	84.3%
#60	13.2	73.2%	72.0%
#100	18.8	61.9%	60.8%
#200	24.5	50.4%	49.5%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	#4		Silt & Clay:	49.5%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	1.7%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	14.0%	< 2.00 mm and > 0.425 mm	Silt:	44.5%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	34.8%	< 0.425 mm and > 0.075 mm	Clay:	5.0%	< 0.002 mm	% passing #200 as whole % #:	**50%**
Total Sand:	48.8%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	49	Plastic Limit 38		Plastic Index	11	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
				Control Cylinder	Composite Correction		P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10			D = K x ((L/T)$^{1/2}$
Clock	T (Min.)	(^{o}C)	Reading			R			L	K	
	2	22.3	26.5	5.5		21.0	42.6%	41.9%	12.9	0.01332	0.03376
	5	22.3	21.5	5.5		16.0	32.5%	31.9%	13.7	0.01332	0.02203
	15	22.4	16.0	5.5		10.5	21.3%	20.9%	14.6	0.01332	0.01313
	30	22.4	13.0	5.5		7.5	15.2%	15.0%	15.1	0.01332	0.00944
	60	22.3	11.5	5.5		6.0	12.2%	12.0%	15.3	0.01332	0.00673
	250	22.5	9.5	5.5		4.0	8.1%	8.0%	15.6	0.01325	0.00331
	1440	22.1	7.0	5.5		1.5	3.0%	3.0%	16.0	0.01332	0.00141
						#VALUE!	#VALUE!	3.0%	#VALUE!	#N/A	0.00141

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

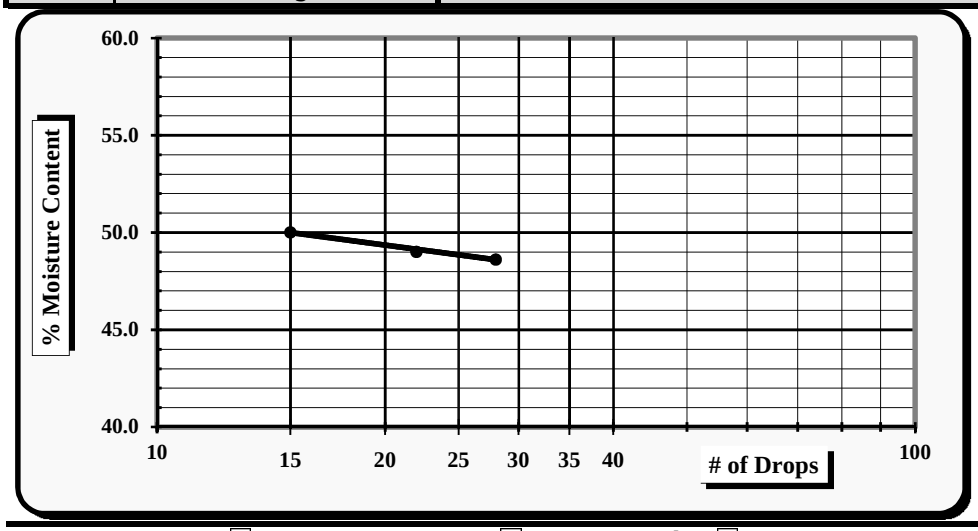
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W2-2	Sample #: SS-5	Sample Date: 2/23/17
Location:	Boreholes	Offset: NA	Elevation: 13.5-15'
Sample Description:			A-7-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	P-13	25	9				40	51	
A	Tare Weight	12.42	14.31	13.89				**15.80**	15.73	
B	Wet Soil Weight + A	25.60	25.10	26.67				23.85	23.87	
C	Dry Soil Weight + A	21.29	21.55	22.41				21.65	21.63	
D	Water Weight (B-C)	4.31	3.55	4.26				2.20	2.24	
E	Dry Soil Weight (C-A)	8.87	7.24	8.52				5.85	5.90	
F	% Moisture (D/E)*100	48.6%	49.0%	50.0%				37.6%	38.0%	
N	# OF DROPS	28	22	15				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**37.8%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**49**
Plastic Limit	**38**
Plastic Index	**11**
Group Symbol	**A-7-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Particle Size Analysis of Soils

AASHTO T 88

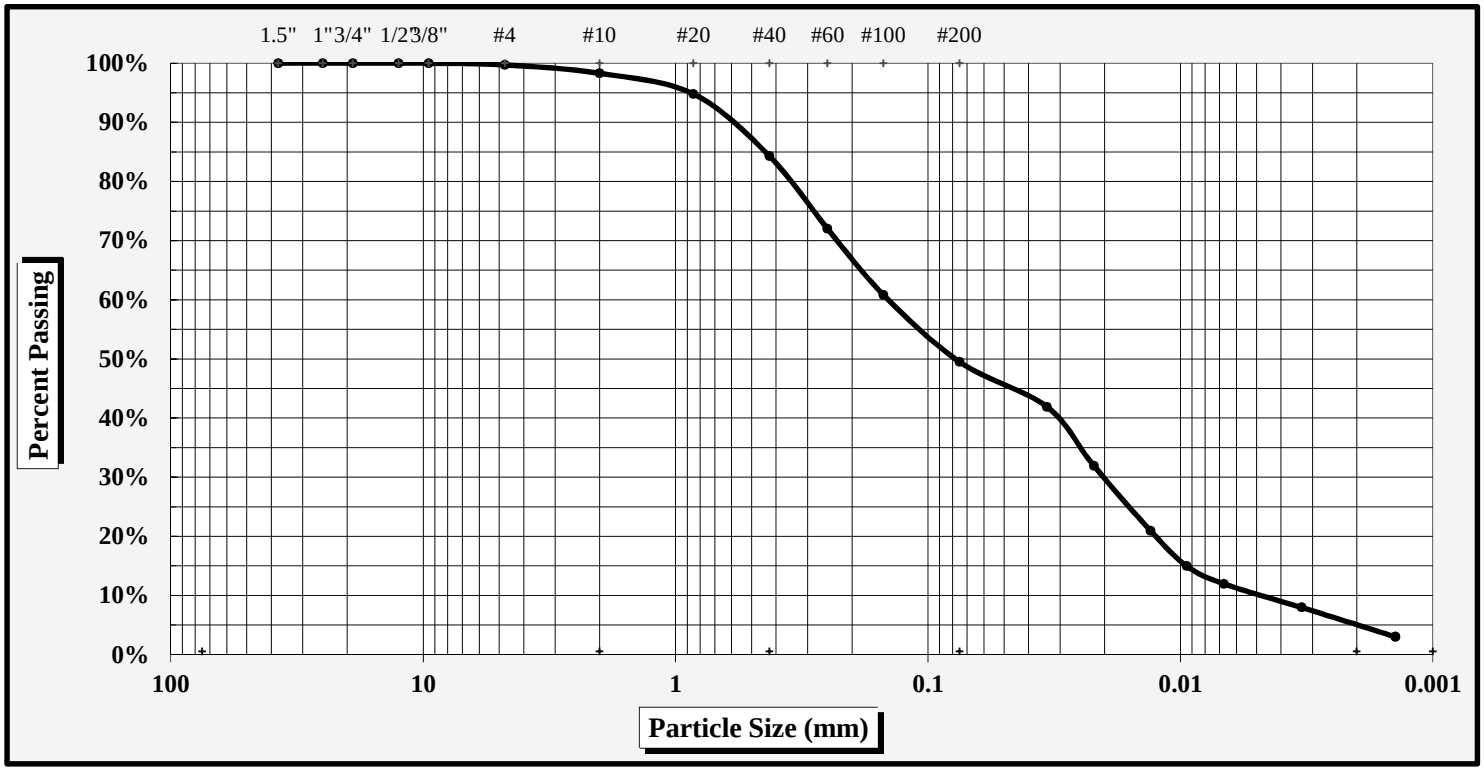
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: STV Engineers, Inc.

Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Boring #:	W2-2	Sample #: SS-5	Sample Date: February 23, 2017
Location:	Boreholes	Offset: NA	Depth: 13.5-15'
Sample Description:			A-7-5



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	1.7%	Coarse Sand	14.0%	Silt	45%
Maximum Particle Size	#4	Fine Sand	34.8%	Clay	5%
Assumed Apparent Relative Density	2.650	Moisture Content	31.4%	Silt & Clay (% Passing #200)	49.5%
Liquid Limit	49	Plastic Limit	38	Plastic Index	11

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W2-3 Sample #: SS-6 Sample Date: 2/24/17
Location: Boreholes Offset: NA Depth: 1-2.5'
Sample Description: A-7-5

Pan #:	6	Beaker #:	D		Group Index		**9**		
Hydrometer Jar #:			17		Assumed Apparent Relative Density		**2.650**		
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Wt. Air Dry + tare wt. (g):			189.65		Tare #	39	S-4		
Weight of Total Sample Air Dried (g):			189.65	A	Tare Wt.	13.96	80.56		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.18	270.23		
Total Sample Oven Dried:			187.05	C	Dry Wt. + A	24.04	228.36		
Hydrometer Sample Oven Dried (**W**):			49.32	D	Water Wt. (B-C)	0.14	41.87		
% Passing #10:			100.0%	E	Dry Wt.(C-A)	10.08	147.80		
Correction Factor a (Table 1):			**1.00**		% Moisture (100 x D/E)	1.39%	28.3%		

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	**100.0%**
#20	0.2	99.5%	99.5%
#40	4.5	91.0%	91.0%
#60	11.4	76.8%	76.8%
#100	16.2	67.1%	67.1%
#200	20.3	58.9%	58.9%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Silt & Clay:	58.9%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	9.0%	< 2.00 mm and > 0.425 mm	Silt:	30.4%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	32.0%	< 0.425 mm and > 0.075 mm	Clay:	28.5%	< 0.002 mm	% passing #200 as whole % #:	**59%**
Total Sand:	41.1%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	50	Plastic Limit 34		Plastic Index	16	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.3	32.0	5.5		26.5	53.7%	53.7%	11.9	0.01332	0.03256
	5	22.3	30.5	5.5		25.0	50.7%	50.7%	12.2	0.01332	0.02080
	15	22.3	26.5	5.5		21.0	42.6%	42.6%	12.9	0.01332	0.01233
	30	22.4	24.5	5.5		19.0	38.5%	38.5%	13.2	0.01332	0.00883
	60	22.3	22.5	5.5		17.0	34.5%	34.5%	13.5	0.01332	0.00632
	250	22.5	20.0	5.5		14.5	29.4%	29.4%	13.9	0.01325	0.00313
	1440	22.0	19.0	5.5		13.5	27.4%	27.4%	14.1	0.01332	0.00132
						#VALUE!	#VALUE!	27.4%	#VALUE!	#N/A	0.00132

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

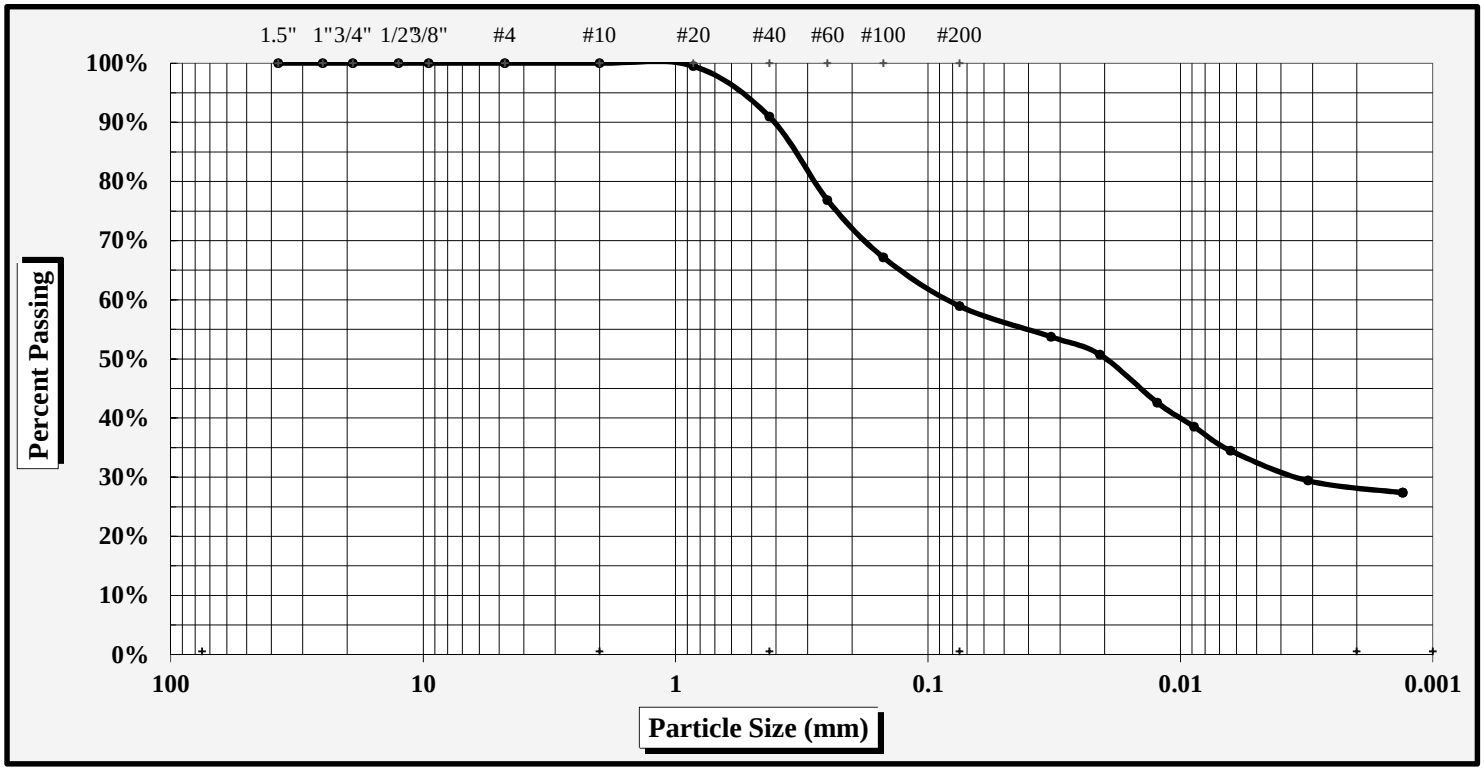
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: STV Engineers, Inc.

Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Boring #:	W2-3	Sample #: SS-6	Sample Date: February 24, 2017
Location:	Boreholes	Offset: NA	Depth: 1-2.5'
Sample Description:			A-7-5



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.0%	Coarse Sand	9.0%	Silt	30%
Maximum Particle Size	0	Fine Sand	32.0%	Clay	29%
Assumed Apparent Relative Density	2.650	Moisture Content	28.3%	Silt & Clay (% Passing #200)	58.9%
Liquid Limit	50	Plastic Limit	34	Plastic Index	16

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

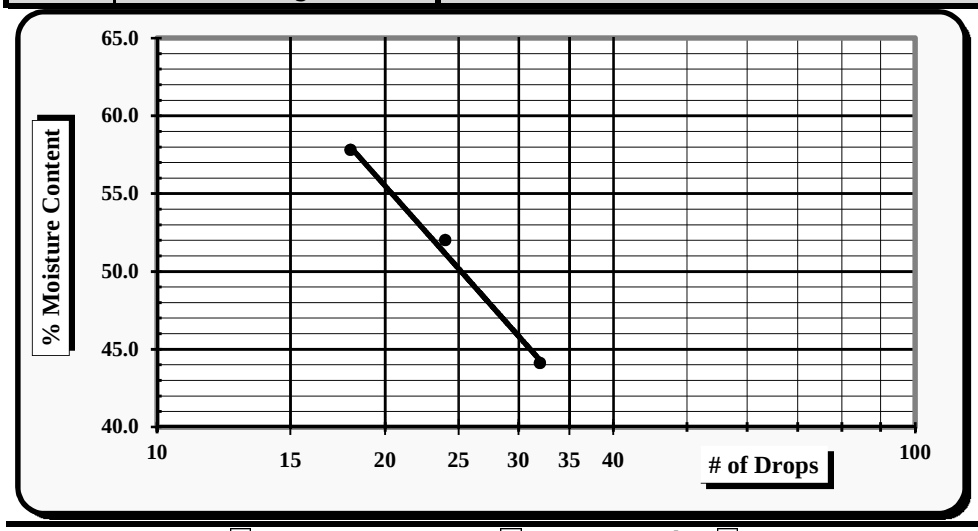
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W2-3	Sample #: SS-6	Sample Date: 2/24/17
Location:	Boreholes	Offset: NA	Elevation: 1-2.5'
Sample Description:			A-7-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	5	10	FGD				EE	NN	
A	Tare Weight	15.72	13.88	15.99				**16.88**	15.28	
B	Wet Soil Weight + A	29.27	25.07	26.31				24.97	23.80	
C	Dry Soil Weight + A	25.12	21.24	22.53				22.91	21.64	
D	Water Weight (B-C)	4.15	3.83	3.78				2.06	2.16	
E	Dry Soil Weight (C-A)	9.40	7.36	6.54				6.03	6.36	
F	% Moisture (D/E)*100	44.1%	52.0%	57.8%				34.2%	34.0%	
N	# OF DROPS	32	24	18				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**34.1%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**50**
Plastic Limit	**34**
Plastic Index	**16**
Group Symbol	**A-7-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W2-4 Sample #: SS-7 Sample Date: 2/27/17
Location: Boreholes Offset: NA Depth: 6-7.5'
Sample Description: A-5

Pan #:	T-5	Beaker #:	27			Group Index	**0**		
Hydrometer Jar #:			6			Assumed Apparent Relative Density	**2.650**		
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Wt. Air Dry + tare wt. (g):			153.36		Tare #	44	S-2		
Weight of Total Sample Air Dried (g):			153.36	A	Tare Wt.	15.66	81.97		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.40	232.69		
Total Sample Oven Dried:			151.50	C	Dry Wt. + A	26.27	200.45		
Hydrometer Sample Oven Dried (**W**):			49.39	D	Water Wt. (B-C)	0.13	32.24		
% Passing #10:			100.0%	E	Dry Wt.(C-A)	10.61	118.48		
Correction Factor a (Table 1):			**1.00**		% Moisture (100 x D/E)	1.23%	27.2%		

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	**100.0%**
#20	0.7	98.6%	98.6%
#40	5.8	88.2%	88.2%
#60	12.9	73.8%	73.8%
#100	19.7	60.1%	60.1%
#200	24.3	50.9%	50.9%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Silt & Clay:	50.9%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	11.8%	< 2.00 mm and > 0.425 mm	Silt:	33.4%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	37.3%	< 0.425 mm and > 0.075 mm	Clay:	17.5%	< 0.002 mm	% passing #200 as whole % #:	**51%**
Total Sand:	49.1%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	44	Plastic Limit 43		Plastic Index	1	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.3	28.0	5.5		22.5	45.6%	45.6%	12.6	0.01332	0.03344
	5	22.3	25.0	5.5		19.5	39.5%	39.5%	13.1	0.01332	0.02156
	15	22.3	21.5	5.5		16.0	32.4%	32.4%	13.7	0.01332	0.01272
	30	22.3	19.5	5.5		14.0	28.3%	28.3%	14.0	0.01332	0.00910
	60	22.4	18.0	5.5		12.5	25.3%	25.3%	14.2	0.01332	0.00649
	250	22.5	15.5	5.5		10.0	20.2%	20.2%	14.7	0.01325	0.00321
	1440	21.8	14.0	6.0		8.0	16.2%	16.2%	15.0	0.01340	0.00137
						#VALUE!	#VALUE!	16.2%	#VALUE!	#N/A	0.00137

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

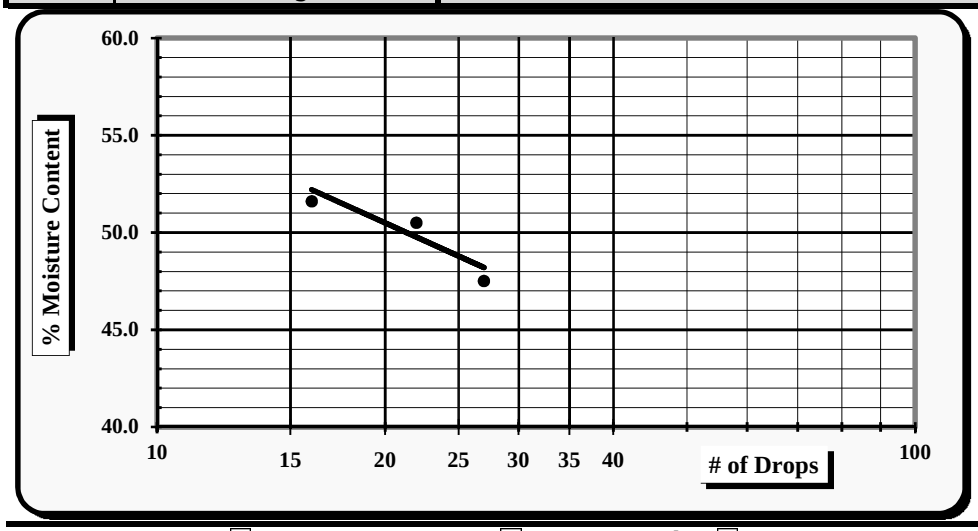
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W2-4	Sample #: SS-7	Sample Date: 2/27/17
Location:	Boreholes	Offset: NA	Elevation: 6-7.5'
Sample Description:			A-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	18	19	jordi				56	12	
A	Tare Weight	15.74	15.83	15.87				**15.68**	14.20	
B	Wet Soil Weight + A	25.62	28.94	29.30				24.53	23.36	
C	Dry Soil Weight + A	22.44	24.54	24.73				21.89	20.62	
D	Water Weight (B-C)	3.18	4.40	4.57				2.64	2.74	
E	Dry Soil Weight (C-A)	6.70	8.71	8.86				6.21	6.42	
F	% Moisture (D/E)*100	47.5%	50.5%	51.6%				42.5%	42.7%	
N	# OF DROPS	27	22	16				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**42.6%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**44**
Plastic Limit	**43**
Plastic Index	**1**
Group Symbol	**A-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Particle Size Analysis of Soils

AASHTO T 88

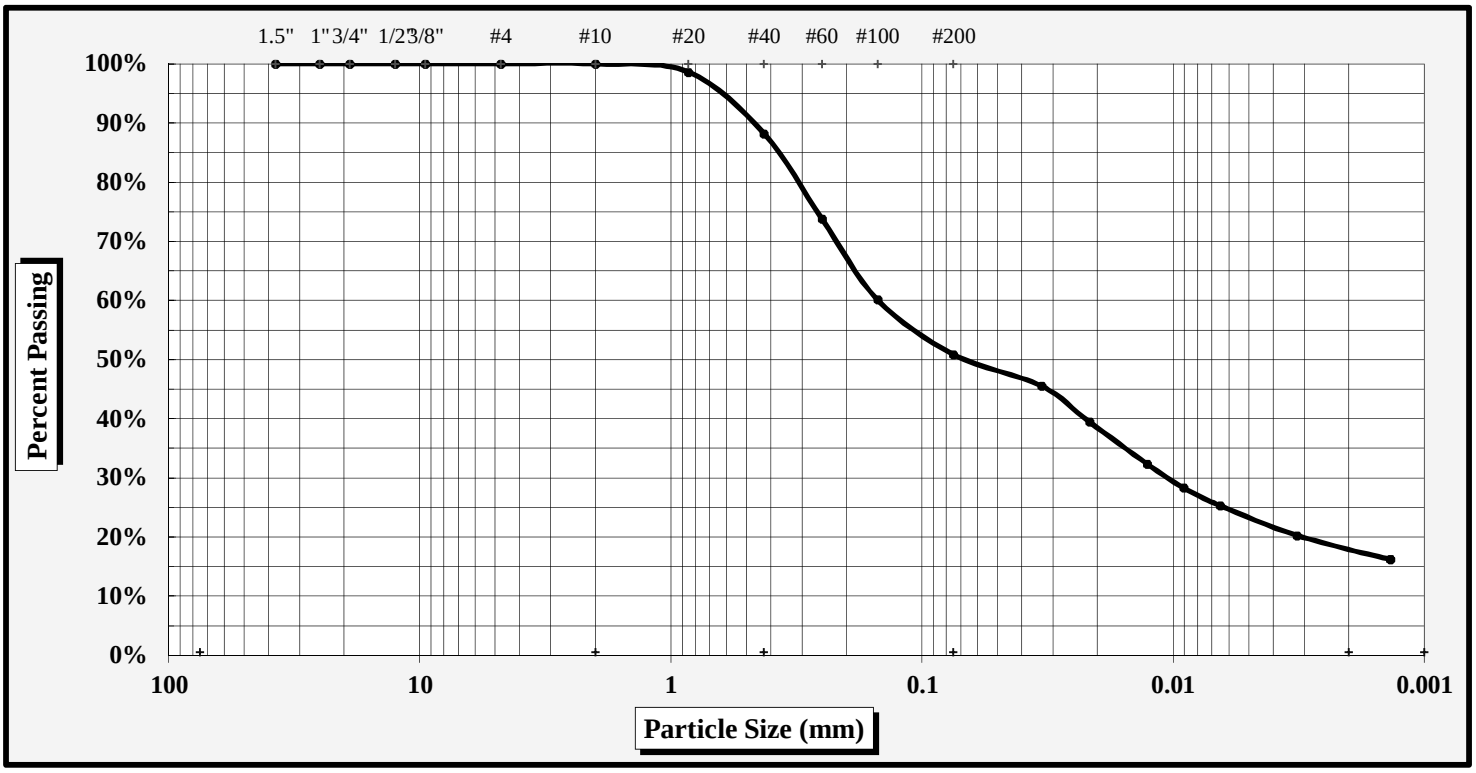
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: NA

Client Address: Mecklenburg County, NC

Boring #:	W2-4	Sample #: SS-7		Sample Date: NA	
Location:	Boreholes	Offset: NA		Depth: 6-7.5'	
Sample Description:				A-5	



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.0%	Coarse Sand	11.8%	Silt	33%
Maximum Particle Size	0	Fine Sand	37.3%	Clay	18%
Assumed Apparent Relative Density	2.650	Moisture Content	27.2%	Silt & Clay (% Passing #200)	50.9%
Liquid Limit	44	Plastic Limit	43	Plastic Index	1

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Laboratory Record Version 4.2

Particle Size Analysis of Soils

AASHTO T 88

S&ME

Project #: **6235-15-014**
Project Name: U-5114 Gilead Road Design
Client Name: STV Engineers, Inc.
Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Report Date: 3/24/17

Boring #: W2-6 Sample #: SS-8 Sample Date: 2/24/17
Location: Boreholes Offset: NA Depth: 3.5-5'
Sample Description: A-5

Pan #:	7	Beaker #:	DD
Hydrometer Jar #:			8
Pan Tare Weight (grams):			0.00
Total Sample Wt. Air Dry + tare wt. (g):			167.87
Weight of Total Sample Air Dried (g):			167.87
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			165.13
Hydrometer Sample Oven Dried (**W**):			49.18
% Passing #10:			99.8%
Correction Factor a (Table 1):			**1.00**

Group Index			**2**	
Assumed Apparent Relative Density			**2.650**	
Moisture Content		Hygroscopic	Natural	
	Tare #	16	T-4	
A	Tare Wt.	15.7	82.46	
B	Wet Wt. + A	26.10	310.19	
C	Dry Wt. + A	25.93	256.43	
D	Water Wt. (B-C)	0.17	53.76	
E	Dry Wt.(C-A)	10.23	173.97	
% Moisture (100 x D/E)		1.66%	30.9%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.4	**100.0%**	**99.8%**
#20	0.7	98.6%	98.4%
#40	5.6	88.6%	88.4%
#60	13.4	72.9%	72.7%
#100	18.9	61.7%	61.5%
#200	24.2	50.7%	50.6%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:	#10		Silt & Clay:	50.6%	< 0.075	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.2%	< 75 mm and > 4.75 mm			< 0.02	Dispersion Time:	1 min.
Coarse Sand:	11.4%	< 2.00 mm and > 0.425 mm	Silt:	43.6%	< 0.075 and > 0.002 mm	Sodium Hexametaphosphate:	40 g./ Liter
Fine Sand:	37.8%	< 0.425 mm and > 0.075 mm	Clay:	7.0%	< 0.002 mm	% passing #200 as whole % #:	**51%**
Total Sand:	49.2%	< 4.74 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐
Liquid Limit	47	Plastic Limit 42		Plastic Index	5	Hydrometer:	151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(°C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
	2	22.3	28.0	5.5		22.5	45.7%	45.6%	12.6	0.01332	0.03344
	5	22.3	24.0	5.5		18.5	37.6%	37.5%	13.3	0.01332	0.02169
	15	22.3	20.0	5.5		14.5	29.5%	29.4%	13.9	0.01332	0.01283
	30	22.3	16.5	5.5		11.0	22.4%	22.3%	14.5	0.01332	0.00926
	60	22.3	14.0	5.5		8.5	17.3%	17.2%	14.9	0.01332	0.00664
	250	22.5	10.5	5.5		5.0	10.2%	10.1%	15.5	0.01325	0.00330
	1440	21.8	8.0	6.0		2.0	4.1%	4.1%	16.0	0.01340	0.00141
						#VALUE!	#VALUE!	4.1%	#VALUE!	#N/A	0.00141

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils ASTM D 854: Specific Gravity of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technician Name: Karen Warner _____ Technical Responsibility: Rob Kral Project Manager
Certification # *Position*

Particle Size Analysis of Soils

AASHTO T 88

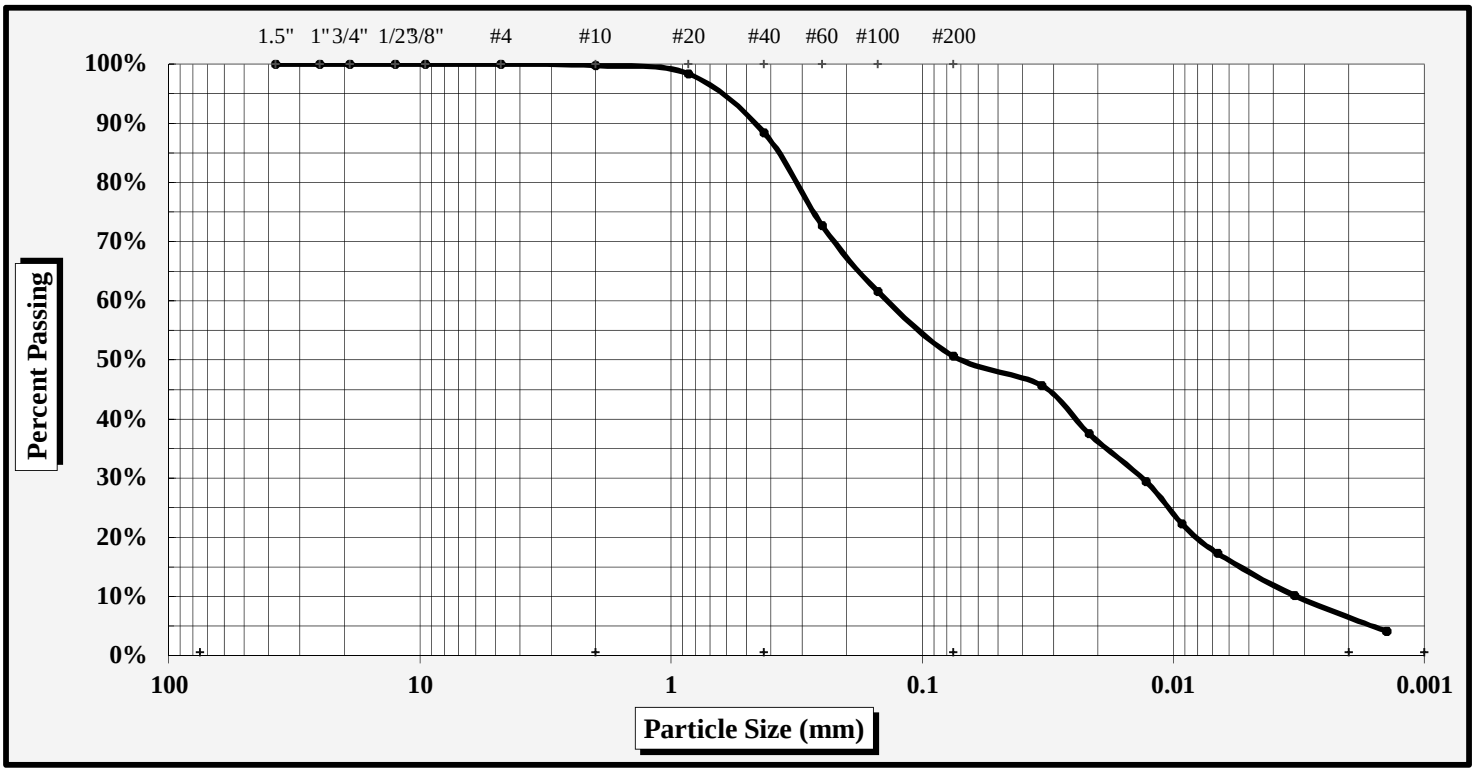
S&ME Project #: **6235-15-014** Report Date: 3/24/17

Project Name: **U-5114 Gilead Road Design**

Client Name: STV Engineers, Inc.

Client Address: 900 W. Trade Street, Suite 715, Charlotte, NC 28202

Boring #:	W2-6	Sample #: SS-8		Sample Date: February 24, 2017	
Location:	Boreholes	Offset: NA		Depth: 3.5-5'	
Sample Description:				A-5	



As Defined by AASHTO		Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.075 and > 0.002 mm
Coarse Sand	< 2.00 mm and > 0.425 mm	Clay	< 0.002 mm

Gravel	0.2%	Coarse Sand	11.4%	Silt	44%
Maximum Particle Size	#10	Fine Sand	37.8%	Clay	7%
Assumed Apparent Relative Density	2.650	Moisture Content	30.9%	Silt & Clay (% Passing #200)	50.6%
Liquid Limit	47	Plastic Limit	42	Plastic Index	5

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

Technical Responsibility: Rob Kral _____ Project Manager

Signature *Position*

Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

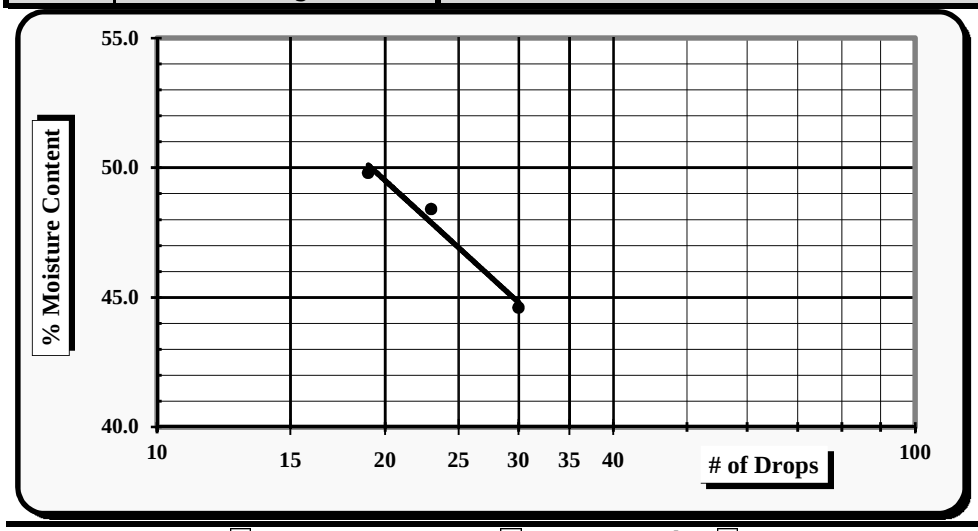
Another code *ASTM D 4318* ☐ *AASHTO T 89* ☒ *AASHTO T 90* ☒ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**6235-15-014**	Report Date:	3/24/17
Project Name:	U-5114 Gilead Road Design	Test Date(s)	3/5/17 to 3/24/17
Client Name:	STV Engineers, Inc.		
Client Address:	900 W. Trade Street, Suite 715, Charlotte, NC 28202		
Boring #:	W2-6	Sample #: SS-8	Sample Date: 2/24/17
Location:	Boreholes	Offset: NA	Elevation: 3.5-5'
Sample Description:			A-5

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20233	9/25/2016	Grooving tool	30283	1/25/2017
LL Apparatus	30336	2/1/2217	Grooving tool		
Oven	22151	2/8/2017	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	QQ	BB	34				RR	37	
A	Tare Weight	16.88	16.20	14.00				**15.26**	15.90	
B	Wet Soil Weight + A	31.54	31.00	29.62				24.43	24.48	
C	Dry Soil Weight + A	27.02	26.17	24.43				21.72	21.93	
D	Water Weight (B-C)	4.52	4.83	5.19				2.71	2.55	
E	Dry Soil Weight (C-A)	10.14	9.97	10.43				6.46	6.03	
F	% Moisture (D/E)*100	44.6%	48.4%	49.8%				42.0%	42.3%	
N	# OF DROPS	30	23	19				*Moisture Contents determined by AASHTO T 245*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**42.2%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**47**
Plastic Limit	**42**
Plastic Index	**5**
Group Symbol	**A-5**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

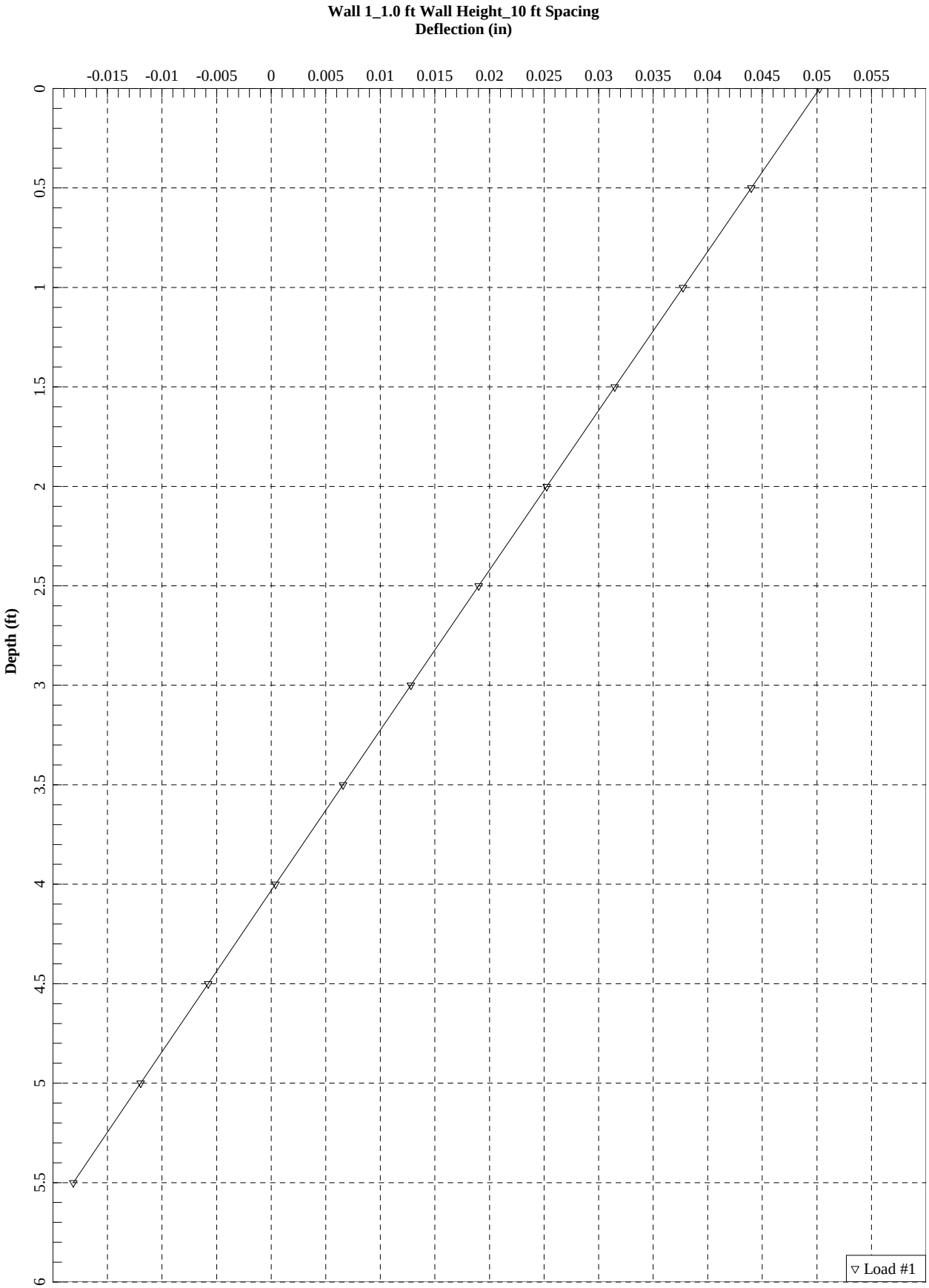
Notes / Deviations / References:

AASHTO T90: Determining the Plastic Limit & Plastic Index of Soils *AASHTO T89: Determining the Liquid Limit of Soils*

Karen Warner	3/24/2017	Rob Kral	3/28/2017
Technician Name	*Date*	*Technical Responsibility*	*Date*

Appendix III

Retaining Wall -W1-


Wall 1_1.0 ft Wall Height_10 ft Spacing
Deflection (in)
-0.015
-0.01
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
0.055
Depth (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 1 - H = 1.0' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 10
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 12.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	10	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.120E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	12.0	0.7	26.0	0.064	T	0.00
2	175.2	0.7	26.0	0.064	T	12.00
3	412.8	0.7	26.0	0.064	T	187.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.120E+02	0.250E+01
0.187E+03	0.137E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	6.00	0.00	8.00	0.00	10.55	0.24

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.814E+02
0.100E+01	0.000E+00
0.200E+01	0.000E+00
0.300E+01	0.000E+00
0.400E+01	0.000E+00
0.500E+01	0.000E+00
0.600E+01	0.000E+00
0.700E+01	0.000E+00
0.800E+01	0.106E+01
0.900E+01	0.404E+01
0.100E+02	0.703E+01
0.110E+02	0.100E+02
0.120E+02	0.130E+02

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 12.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
12.0000	0.6366D-01
187.2000	0.6366D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
12.00	0.6944D+00	26.000	-----
72.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y	P
IN	LBS/IN
0.000E+00	-0.101E+01
0.130E-01	-0.861E+00
0.259E-01	-0.712E+00
0.389E-01	-0.563E+00
0.518E-01	-0.414E+00
0.648E-01	-0.265E+00
0.777E-01	-0.116E+00
0.907E-01	0.329E-01
0.104E+00	0.182E+00
0.117E+00	0.331E+00
0.130E+00	0.480E+00
0.143E+00	0.629E+00
0.155E+00	0.778E+00
0.350E+00	0.301E+01
0.968E+01	0.189E+02
0.190E+02	0.189E+02
0.283E+02	0.189E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
12.10	9.33	26.0	0.637E-01	1.90	1.38	0.308E+02	0.280E+02

Y	P
IN	LBS/IN
0.000E+00	0.101E+01
0.130E-01	0.190E+02
0.259E-01	0.371E+02
0.389E-01	0.551E+02
0.518E-01	0.588E+02
0.648E-01	0.610E+02
0.777E-01	0.629E+02
0.907E-01	0.645E+02
0.104E+00	0.659E+02
0.117E+00	0.672E+02
0.130E+00	0.684E+02
0.143E+00	0.695E+02
0.155E+00	0.705E+02
0.350E+00	0.852E+02
0.968E+01	0.852E+02
0.190E+02	0.852E+02
0.283E+02	0.852E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
15.00	9.33	26.0	0.637E-01	1.70	1.22		0.336E+02	0.385E+02

Y IN	P LBS/IN
0.000E+00	-0.101E+01
0.130E-01	0.213E+02
0.259E-01	0.437E+02
0.389E-01	0.616E+02
0.518E-01	0.649E+02
0.648E-01	0.677E+02
0.777E-01	0.700E+02
0.907E-01	0.720E+02
0.104E+00	0.738E+02
0.117E+00	0.754E+02
0.130E+00	0.769E+02
0.143E+00	0.783E+02
0.155E+00	0.796E+02
0.350E+00	0.979E+02
0.968E+01	0.979E+02
0.190E+02	0.979E+02
0.283E+02	0.979E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
27.00	9.33	26.0	0.637E-01	1.10	0.74		0.448E+02	0.968E+02

Y IN	P LBS/IN
0.000E+00	0.101E+01
0.130E-01	0.412E+02
0.259E-01	0.775E+02
0.389E-01	0.852E+02
0.518E-01	0.911E+02
0.648E-01	0.959E+02
0.777E-01	0.100E+03
0.907E-01	0.104E+03
0.104E+00	0.107E+03
0.117E+00	0.110E+03
0.130E+00	0.113E+03
0.143E+00	0.115E+03
0.155E+00	0.118E+03

0.350E+00	0.152E+03
0.968E+01	0.152E+03
0.190E+02	0.152E+03
0.283E+02	0.152E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
30.00	9.33	26.0	0.637E-01	1.03	0.67	0.477E+02	0.115E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.101E+01
0.130E-01	0.437E+02
0.259E-01	0.773E+02
0.389E-01	0.860E+02
0.518E-01	0.928E+02
0.648E-01	0.984E+02
0.777E-01	0.103E+03
0.907E-01	0.108E+03
0.104E+00	0.111E+03
0.117E+00	0.115E+03
0.130E+00	0.118E+03
0.143E+00	0.121E+03
0.155E+00	0.124E+03
0.350E+00	0.165E+03
0.968E+01	0.165E+03
0.190E+02	0.165E+03
0.283E+02	0.165E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
42.00	9.33	26.0	0.637E-01	0.89	0.51	0.583E+02	0.204E+03	

Y	P
IN	LBS/IN
0.000E+00	0.101E+01
0.130E-01	0.636E+02
0.259E-01	0.845E+02
0.389E-01	0.982E+02
0.518E-01	0.109E+03
0.648E-01	0.119E+03
0.777E-01	0.127E+03
0.907E-01	0.135E+03

0.104E+00	0.141E+03
0.117E+00	0.148E+03
0.130E+00	0.154E+03
0.143E+00	0.159E+03
0.155E+00	0.164E+03
0.350E+00	0.241E+03
0.968E+01	0.241E+03
0.190E+02	0.241E+03
0.283E+02	0.241E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
45.00	9.33	26.0	0.637E-01	0.88	0.51		0.583E+02	0.230E+03

Y	P
IN	LBS/IN
0.000E+00	-0.101E+01
0.130E-01	0.638E+02
0.259E-01	0.844E+02
0.389E-01	0.994E+02
0.518E-01	0.112E+03
0.648E-01	0.122E+03
0.777E-01	0.131E+03
0.907E-01	0.140E+03
0.104E+00	0.148E+03
0.117E+00	0.155E+03
0.130E+00	0.161E+03
0.143E+00	0.168E+03
0.155E+00	0.174E+03
0.350E+00	0.261E+03
0.968E+01	0.261E+03
0.190E+02	0.261E+03
0.283E+02	0.261E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
57.00	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.350E+03

Y	P
IN	LBS/IN
0.000E+00	0.101E+01
0.130E-01	0.761E+02
0.259E-01	0.104E+03

0.389E-01	0.125E+03
0.518E-01	0.142E+03
0.648E-01	0.157E+03
0.777E-01	0.171E+03
0.907E-01	0.183E+03
0.104E+00	0.195E+03
0.117E+00	0.205E+03
0.130E+00	0.216E+03
0.143E+00	0.225E+03
0.155E+00	0.234E+03
0.350E+00	0.367E+03
0.968E+01	0.367E+03
0.190E+02	0.367E+03
0.283E+02	0.367E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
59.90	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.382E+03

Y	P
IN	LBS/IN
0.000E+00	-0.101E+01
0.130E-01	0.774E+02
0.259E-01	0.107E+03
0.389E-01	0.130E+03
0.518E-01	0.148E+03
0.648E-01	0.165E+03
0.777E-01	0.180E+03
0.907E-01	0.193E+03
0.104E+00	0.205E+03
0.117E+00	0.217E+03
0.130E+00	0.228E+03
0.143E+00	0.238E+03
0.155E+00	0.248E+03
0.350E+00	0.394E+03
0.968E+01	0.394E+03
0.190E+02	0.394E+03
0.283E+02	0.394E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
71.90	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.532E+03

Y	P
IN	LBS/IN
0.000E+00	0.101E+01
0.130E-01	0.949E+02
0.259E-01	0.134E+03
0.389E-01	0.163E+03
0.518E-01	0.189E+03
0.648E-01	0.211E+03
0.777E-01	0.231E+03
0.907E-01	0.249E+03
0.104E+00	0.266E+03
0.117E+00	0.282E+03
0.130E+00	0.297E+03
0.143E+00	0.312E+03
0.155E+00	0.325E+03
0.350E+00	0.527E+03
0.968E+01	0.527E+03
0.190E+02	0.527E+03
0.283E+02	0.527E+03

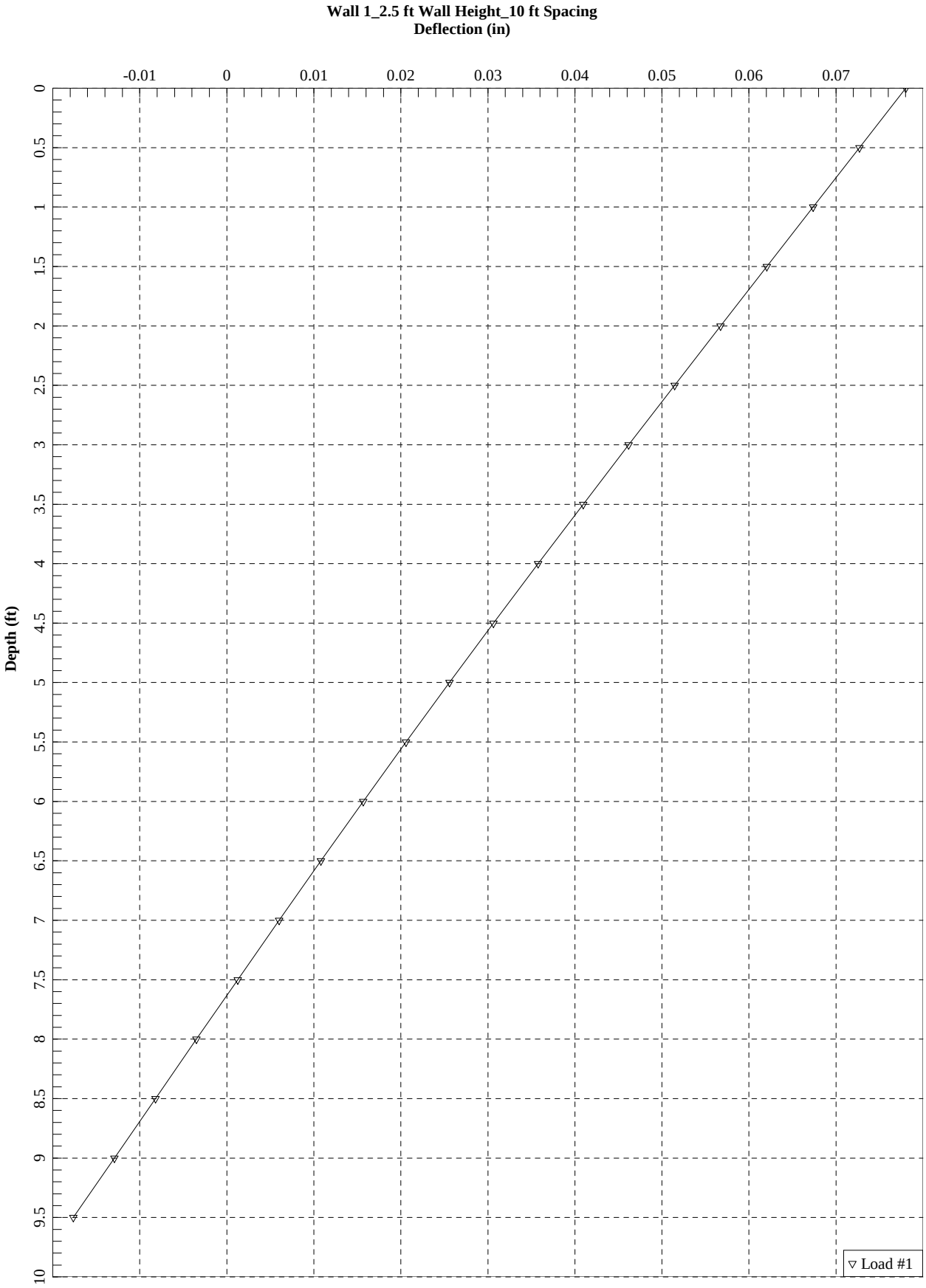
P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

U-5114 Wall No. 1 - H = 1.0' & SPC = 10.0'

RESULTS -- ITERATION 4

STA	I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
		IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0		0.000E+00	0.503E-01	-0.104E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.440E-01	-0.104E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.377E-01	-0.104E-02	0.360E+04	0.340E+03	0.795E+02	0.211E+11
3		0.180E+02	0.315E-01	-0.104E-02	0.588E+04	0.329E+03	-0.100E+03	0.211E+11
4		0.240E+02	0.252E-01	-0.104E-02	0.755E+04	0.195E+03	-0.169E+03	0.211E+11
5		0.300E+02	0.190E-01	-0.104E-02	0.822E+04	0.153E+02	-0.190E+03	0.211E+11
6		0.360E+02	0.128E-01	-0.103E-02	0.774E+04	-0.176E+03	-0.192E+03	0.211E+11
7		0.420E+02	0.660E-02	-0.103E-02	0.611E+04	-0.337E+03	-0.130E+03	0.211E+11
8		0.480E+02	0.407E-03	-0.103E-02	0.369E+04	-0.404E+03	-0.359E+01	0.211E+11
9		0.540E+02	-0.578E-02	-0.103E-02	0.126E+04	-0.308E+03	0.195E+03	0.211E+11
10		0.600E+02	-0.120E-01	-0.103E-02	0.102E-08	-0.105E+03	0.210E+03	0.106E+11

END OF ANALYSIS


Wall 1_2.5 ft Wall Height_10 ft Spacing
Deflection (in)
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Depth (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 1 - H = 2.5' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 18
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 30.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	18	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.300E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	30.0	0.7	26.0	0.064	T	0.00
2	157.2	0.7	26.0	0.064	T	30.00
3	412.8	0.7	26.0	0.064	T	187.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.300E+02	0.365E+01
0.187E+03	0.137E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	15.00	0.00	20.00	0.00	22.55	6.21

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.814E+02
0.100E+01	0.000E+00
0.200E+01	0.000E+00
0.300E+01	0.000E+00
0.400E+01	0.000E+00
0.500E+01	0.000E+00
0.600E+01	0.000E+00
0.700E+01	0.000E+00
0.800E+01	0.106E+01
0.900E+01	0.404E+01
0.100E+02	0.703E+01
0.110E+02	0.100E+02
0.120E+02	0.130E+02
0.130E+02	0.160E+02
0.140E+02	0.190E+02
0.150E+02	0.220E+02
0.160E+02	0.250E+02
0.170E+02	0.280E+02
0.180E+02	0.308E+02
0.190E+02	0.338E+02
0.200E+02	0.368E+02
0.210E+02	0.398E+02
0.220E+02	0.428E+02
0.230E+02	0.458E+02
0.240E+02	0.488E+02
0.250E+02	0.517E+02
0.260E+02	0.547E+02
0.270E+02	0.577E+02
0.280E+02	0.607E+02
0.290E+02	0.637E+02
0.300E+02	0.667E+02

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 30.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN WEIGHT,LBS/IN**3

30.0000 0.6366D-01
187.2000 0.6366D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
30.00	0.6944D+00	26.000	-----
120.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
0.10	9.33	26.0	0.637E-01	2.82	2.13		0.195E+02	0.130E+00

Y IN	P LBS/IN
0.000E+00	-0.518E+01
0.130E-01	-0.504E+01
0.259E-01	-0.489E+01
0.389E-01	-0.474E+01
0.518E-01	-0.459E+01
0.648E-01	-0.444E+01
0.777E-01	-0.429E+01
0.907E-01	-0.414E+01
0.104E+00	-0.399E+01
0.117E+00	-0.384E+01
0.130E+00	-0.369E+01
0.143E+00	-0.355E+01
0.155E+00	-0.340E+01
0.350E+00	-0.116E+01
0.968E+01	0.147E+02
0.190E+02	0.147E+02
0.283E+02	0.147E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
30.10	9.33	26.0	0.637E-01	1.02	0.67		0.478E+02	0.116E+03

Y IN	P LBS/IN

0.000E+00	0.518E+01
0.130E-01	0.500E+02
0.259E-01	0.835E+02
0.389E-01	0.923E+02
0.518E-01	0.991E+02
0.648E-01	0.105E+03
0.777E-01	0.110E+03
0.907E-01	0.114E+03
0.104E+00	0.118E+03
0.117E+00	0.121E+03
0.130E+00	0.125E+03
0.143E+00	0.128E+03
0.155E+00	0.130E+03
0.350E+00	0.172E+03
0.968E+01	0.172E+03
0.190E+02	0.172E+03
0.283E+02	0.172E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
22.50	9.33	26.0	0.637E-01		1.27	0.89	0.406E+02	0.720E+02

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.283E+02
0.259E-01	0.619E+02
0.389E-01	0.734E+02
0.518E-01	0.783E+02
0.648E-01	0.822E+02
0.777E-01	0.856E+02
0.907E-01	0.886E+02
0.104E+00	0.913E+02
0.117E+00	0.937E+02
0.130E+00	0.959E+02
0.143E+00	0.979E+02
0.155E+00	0.998E+02
0.350E+00	0.127E+03
0.968E+01	0.127E+03
0.190E+02	0.127E+03
0.283E+02	0.127E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
52.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.302E+03	

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.756E+02
0.259E-01	0.101E+03
0.389E-01	0.119E+03
0.518E-01	0.134E+03
0.648E-01	0.148E+03
0.777E-01	0.160E+03
0.907E-01	0.170E+03
0.104E+00	0.180E+03
0.117E+00	0.190E+03
0.130E+00	0.198E+03
0.143E+00	0.207E+03
0.155E+00	0.214E+03
0.350E+00	0.329E+03
0.968E+01	0.329E+03
0.190E+02	0.329E+03
0.283E+02	0.329E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
45.00	9.33	26.0	0.637E-01	0.88	0.51	0.583E+02	0.230E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.596E+02
0.259E-01	0.803E+02
0.389E-01	0.953E+02
0.518E-01	0.107E+03
0.648E-01	0.118E+03
0.777E-01	0.127E+03
0.907E-01	0.136E+03
0.104E+00	0.143E+03
0.117E+00	0.150E+03
0.130E+00	0.157E+03
0.143E+00	0.163E+03
0.155E+00	0.169E+03
0.350E+00	0.256E+03
0.968E+01	0.256E+03
0.190E+02	0.256E+03
0.283E+02	0.256E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
75.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.575E+03

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.104E+03
0.259E-01	0.145E+03
0.389E-01	0.177E+03
0.518E-01	0.204E+03
0.648E-01	0.227E+03
0.777E-01	0.249E+03
0.907E-01	0.268E+03
0.104E+00	0.287E+03
0.117E+00	0.304E+03
0.130E+00	0.320E+03
0.143E+00	0.336E+03
0.155E+00	0.351E+03
0.350E+00	0.569E+03
0.968E+01	0.569E+03
0.190E+02	0.569E+03
0.283E+02	0.569E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
67.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.474E+03

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.827E+02
0.259E-01	0.118E+03
0.389E-01	0.145E+03
0.518E-01	0.168E+03
0.648E-01	0.188E+03
0.777E-01	0.205E+03
0.907E-01	0.222E+03
0.104E+00	0.237E+03
0.117E+00	0.252E+03
0.130E+00	0.265E+03
0.143E+00	0.278E+03
0.155E+00	0.290E+03
0.350E+00	0.470E+03
0.968E+01	0.470E+03

0.190E+02	0.470E+03
0.283E+02	0.470E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
97.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.934E+03

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.142E+03
0.259E-01	0.205E+03
0.389E-01	0.253E+03
0.518E-01	0.295E+03
0.648E-01	0.332E+03
0.777E-01	0.366E+03
0.907E-01	0.398E+03
0.104E+00	0.427E+03
0.117E+00	0.455E+03
0.130E+00	0.481E+03
0.143E+00	0.506E+03
0.155E+00	0.530E+03
0.350E+00	0.885E+03
0.968E+01	0.885E+03
0.190E+02	0.885E+03
0.283E+02	0.885E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
89.90	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.803E+03

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.118E+03
0.259E-01	0.172E+03
0.389E-01	0.215E+03
0.518E-01	0.251E+03
0.648E-01	0.284E+03
0.777E-01	0.313E+03
0.907E-01	0.340E+03
0.104E+00	0.365E+03
0.117E+00	0.389E+03

0.130E+00	0.412E+03
0.143E+00	0.434E+03
0.155E+00	0.454E+03
0.350E+00	0.760E+03
0.968E+01	0.760E+03
0.190E+02	0.760E+03
0.283E+02	0.760E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
119.90	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.126E+04	

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.178E+03
0.259E-01	0.259E+03
0.389E-01	0.323E+03
0.518E-01	0.379E+03
0.648E-01	0.428E+03
0.777E-01	0.473E+03
0.907E-01	0.515E+03
0.104E+00	0.554E+03
0.117E+00	0.591E+03
0.130E+00	0.627E+03
0.143E+00	0.661E+03
0.155E+00	0.693E+03
0.350E+00	0.117E+04
0.968E+01	0.117E+04
0.190E+02	0.117E+04
0.283E+02	0.117E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

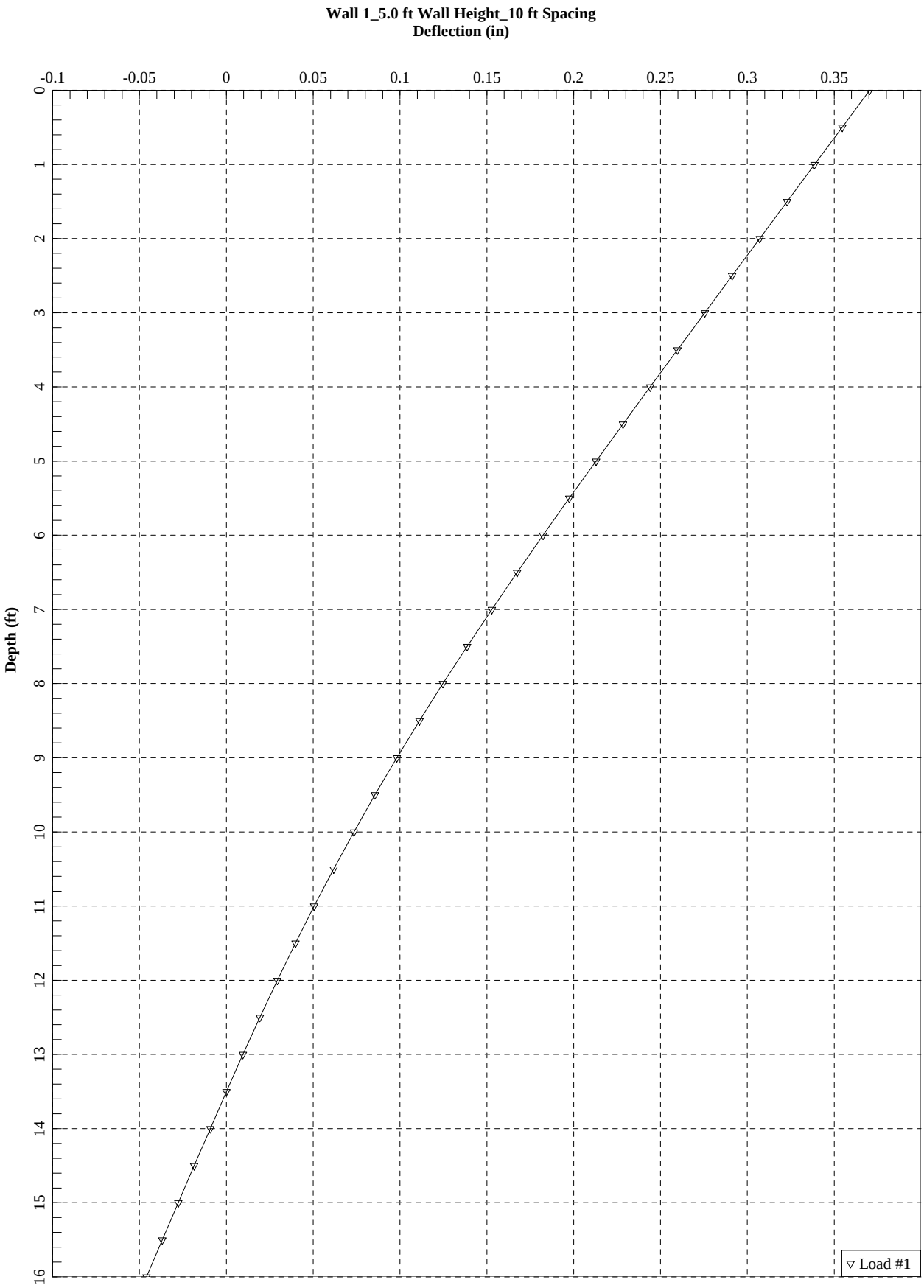
U-5114 Wall No. 1 - H = 2.5' & SPC = 10.0'

RESULTS -- ITERATION 5

STA I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
	IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0	0.000E+00	0.780E-01	-0.888E-03	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1	0.600E+01	0.727E-01	-0.888E-03	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2	0.120E+02	0.674E-01	-0.887E-03	0.360E+04	0.339E+03	0.778E+02	0.211E+11
3	0.180E+02	0.621E-01	-0.886E-03	0.587E+04	0.470E+03	0.185E+03	0.211E+11
4	0.240E+02	0.567E-01	-0.884E-03	0.924E+04	0.709E+03	0.293E+03	0.211E+11
5	0.300E+02	0.514E-01	-0.880E-03	0.144E+05	0.106E+04	0.414E+03	0.211E+11

6	0.360E+02	0.462E-01	-0.875E-03	0.220E+05	0.122E+04	-0.933E+02	0.211E+11
7	0.420E+02	0.409E-01	-0.868E-03	0.291E+05	0.107E+04	-0.208E+03	0.211E+11
8	0.480E+02	0.358E-01	-0.859E-03	0.349E+05	0.813E+03	-0.311E+03	0.211E+11
9	0.540E+02	0.306E-01	-0.848E-03	0.388E+05	0.459E+03	-0.397E+03	0.211E+11
10	0.600E+02	0.256E-01	-0.837E-03	0.404E+05	0.638E+02	-0.395E+03	0.211E+11
11	0.660E+02	0.206E-01	-0.826E-03	0.396E+05	-0.313E+03	-0.360E+03	0.211E+11
12	0.720E+02	0.157E-01	-0.815E-03	0.366E+05	-0.663E+03	-0.340E+03	0.211E+11
13	0.780E+02	0.108E-01	-0.805E-03	0.316E+05	-0.980E+03	-0.292E+03	0.211E+11
14	0.840E+02	0.601E-02	-0.797E-03	0.249E+05	-0.121E+04	-0.170E+03	0.211E+11
15	0.900E+02	0.125E-02	-0.791E-03	0.171E+05	-0.130E+04	-0.152E+02	0.211E+11
16	0.960E+02	-0.348E-02	-0.788E-03	0.922E+04	-0.119E+04	0.251E+03	0.211E+11
17	0.102E+03	-0.820E-02	-0.786E-03	0.286E+04	-0.768E+03	0.583E+03	0.211E+11
18	0.108E+03	-0.129E-01	-0.785E-03	-0.102E-08	-0.238E+03	0.477E+03	0.106E+11

END OF ANALYSIS


Wall 1_5.0 ft Wall Height_10 ft Spacing
Deflection (in)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 1 - H = 5.0' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 31
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 60.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	31	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.600E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	60.0	0.7	26.0	0.064	T	0.00
2	127.2	0.7	26.0	0.064	T	60.00
3	412.8	0.7	26.0	0.064	T	187.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.600E+02	0.556E+01
0.187E+03	0.137E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	30.00	0.00	40.00	0.00	42.55	34.07

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.814E+02
0.600E+01	0.000E+00
0.120E+02	0.130E+02
0.180E+02	0.308E+02
0.240E+02	0.488E+02
0.300E+02	0.667E+02
0.360E+02	0.846E+02
0.420E+02	0.102E+03
0.480E+02	0.120E+03
0.540E+02	0.138E+03
0.600E+02	0.156E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 60.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
60.0000	0.6366D-01
187.2000	0.6366D-01
187.2000	0.2766D-01
198.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
60.00	0.6944D+00	26.000	-----
198.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	-0.120E+02
0.259E-01	-0.118E+02
0.389E-01	-0.117E+02
0.518E-01	-0.115E+02
0.648E-01	-0.114E+02
0.777E-01	-0.112E+02
0.907E-01	-0.111E+02
0.104E+00	-0.109E+02
0.117E+00	-0.108E+02
0.130E+00	-0.107E+02
0.143E+00	-0.105E+02
0.155E+00	-0.104E+02
0.350E+00	-0.812E+01
0.968E+01	0.776E+01
0.190E+02	0.776E+01
0.283E+02	0.776E+01

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
60.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.384E+03

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.907E+02
0.259E-01	0.121E+03
0.389E-01	0.143E+03
0.518E-01	0.162E+03
0.648E-01	0.179E+03
0.777E-01	0.193E+03
0.907E-01	0.207E+03
0.104E+00	0.219E+03
0.117E+00	0.231E+03
0.130E+00	0.242E+03
0.143E+00	0.253E+03
0.155E+00	0.263E+03
0.350E+00	0.409E+03
0.968E+01	0.409E+03
0.190E+02	0.409E+03
0.283E+02	0.409E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
34.50	9.33	26.0	0.637E-01	0.95	0.58		0.519E+02	0.146E+03

Y IN	P LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.393E+02
0.259E-01	0.666E+02
0.389E-01	0.771E+02
0.518E-01	0.854E+02
0.648E-01	0.924E+02
0.777E-01	0.984E+02
0.907E-01	0.104E+03
0.104E+00	0.109E+03
0.117E+00	0.113E+03
0.130E+00	0.117E+03
0.143E+00	0.121E+03
0.155E+00	0.125E+03
0.350E+00	0.178E+03
0.968E+01	0.178E+03
0.190E+02	0.178E+03
0.283E+02	0.178E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
94.50	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.881E+03

Y IN	P LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.143E+03
0.259E-01	0.203E+03
0.389E-01	0.249E+03
0.518E-01	0.289E+03
0.648E-01	0.324E+03
0.777E-01	0.356E+03
0.907E-01	0.386E+03
0.104E+00	0.413E+03
0.117E+00	0.439E+03
0.130E+00	0.464E+03
0.143E+00	0.488E+03
0.155E+00	0.511E+03

0.350E+00	0.845E+03
0.968E+01	0.845E+03
0.190E+02	0.845E+03
0.283E+02	0.845E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
69.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.494E+03

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.777E+02
0.259E-01	0.114E+03
0.389E-01	0.142E+03
0.518E-01	0.166E+03
0.648E-01	0.186E+03
0.777E-01	0.205E+03
0.907E-01	0.222E+03
0.104E+00	0.238E+03
0.117E+00	0.253E+03
0.130E+00	0.267E+03
0.143E+00	0.280E+03
0.155E+00	0.293E+03
0.350E+00	0.480E+03
0.968E+01	0.480E+03
0.190E+02	0.480E+03
0.283E+02	0.480E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
129.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.136E+04

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.195E+03
0.259E-01	0.282E+03
0.389E-01	0.351E+03
0.518E-01	0.410E+03
0.648E-01	0.463E+03
0.777E-01	0.511E+03
0.907E-01	0.556E+03

0.104E+00	0.599E+03
0.117E+00	0.639E+03
0.130E+00	0.677E+03
0.143E+00	0.713E+03
0.155E+00	0.748E+03
0.350E+00	0.126E+04
0.968E+01	0.126E+04
0.190E+02	0.126E+04
0.283E+02	0.126E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
103.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.104E+04

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.137E+03
0.259E-01	0.206E+03
0.389E-01	0.260E+03
0.518E-01	0.306E+03
0.648E-01	0.347E+03
0.777E-01	0.385E+03
0.907E-01	0.420E+03
0.104E+00	0.453E+03
0.117E+00	0.484E+03
0.130E+00	0.513E+03
0.143E+00	0.541E+03
0.155E+00	0.568E+03
0.350E+00	0.965E+03
0.968E+01	0.965E+03
0.190E+02	0.965E+03
0.283E+02	0.965E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
163.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.172E+04

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.235E+03
0.259E-01	0.343E+03

0.389E-01	0.429E+03
0.518E-01	0.503E+03
0.648E-01	0.569E+03
0.777E-01	0.630E+03
0.907E-01	0.687E+03
0.104E+00	0.740E+03
0.117E+00	0.791E+03
0.130E+00	0.839E+03
0.143E+00	0.885E+03
0.155E+00	0.929E+03
0.350E+00	0.158E+04
0.968E+01	0.158E+04
0.190E+02	0.158E+04
0.283E+02	0.158E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
137.90	9.33	26.0	0.609E-01		0.88	0.50	0.583E+02	0.139E+04

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.174E+03
0.259E-01	0.263E+03
0.389E-01	0.333E+03
0.518E-01	0.393E+03
0.648E-01	0.447E+03
0.777E-01	0.497E+03
0.907E-01	0.543E+03
0.104E+00	0.586E+03
0.117E+00	0.627E+03
0.130E+00	0.666E+03
0.143E+00	0.703E+03
0.155E+00	0.739E+03
0.350E+00	0.127E+04
0.968E+01	0.127E+04
0.190E+02	0.127E+04
0.283E+02	0.127E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
197.90	9.33	26.0	0.609E-01		0.88	0.50	0.583E+02	0.199E+04

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.265E+03
0.259E-01	0.388E+03
0.389E-01	0.487E+03
0.518E-01	0.572E+03
0.648E-01	0.649E+03
0.777E-01	0.719E+03
0.907E-01	0.784E+03
0.104E+00	0.846E+03
0.117E+00	0.904E+03
0.130E+00	0.960E+03
0.143E+00	0.101E+04
0.155E+00	0.106E+04
0.350E+00	0.182E+04
0.968E+01	0.182E+04
0.190E+02	0.182E+04
0.283E+02	0.182E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

U-5114 Wall No. 1 - H = 5.0' & SPC = 10.0'

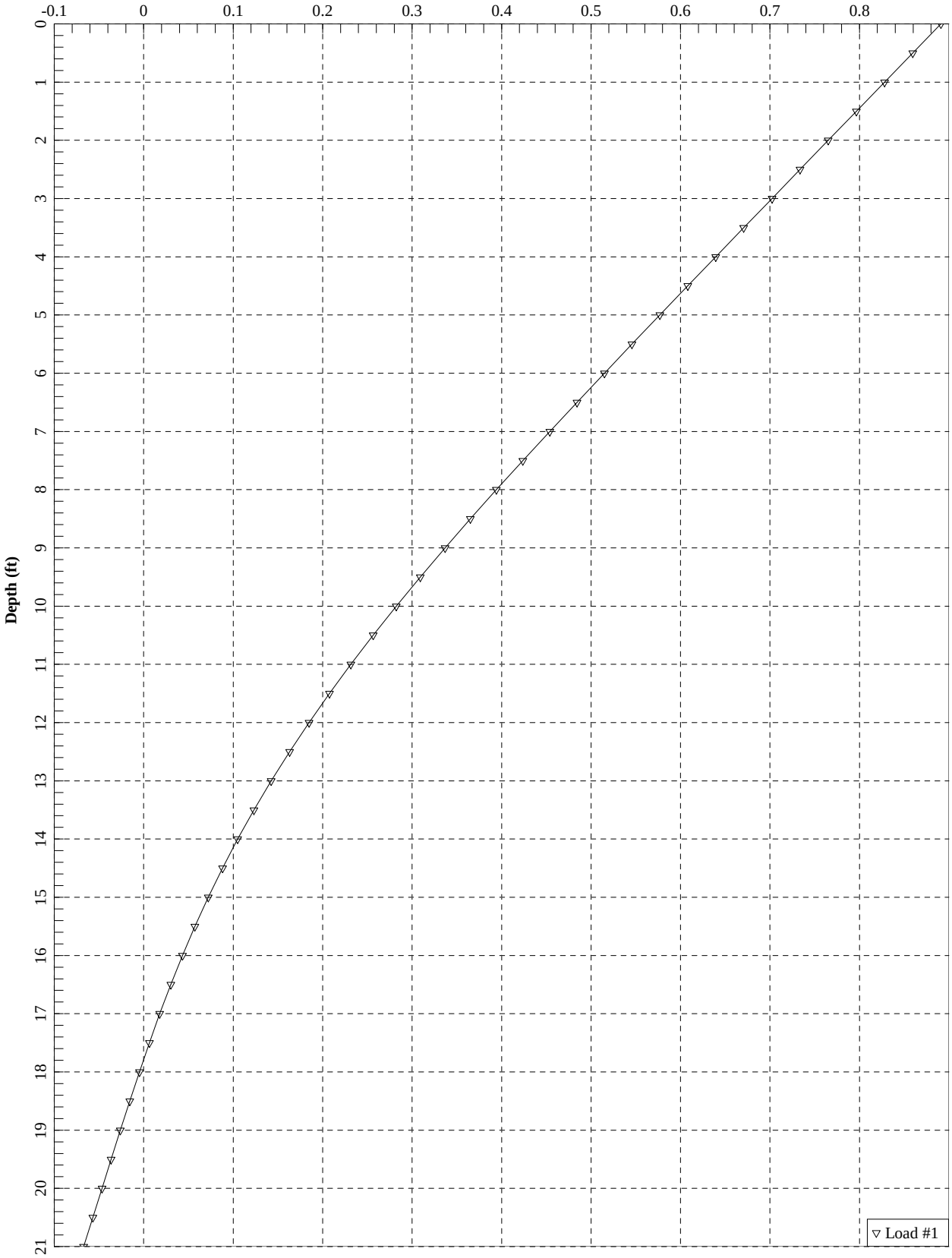
RESULTS -- ITERATION 6

STA	I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
		IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0		0.000E+00	0.370E+00	-0.264E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.355E+00	-0.264E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.339E+00	-0.264E-02	0.360E+04	0.339E+03	0.778E+02	0.211E+11
3		0.180E+02	0.323E+00	-0.264E-02	0.587E+04	0.470E+03	0.185E+03	0.211E+11
4		0.240E+02	0.307E+00	-0.264E-02	0.924E+04	0.709E+03	0.293E+03	0.211E+11
5		0.300E+02	0.291E+00	-0.263E-02	0.144E+05	0.106E+04	0.400E+03	0.211E+11
6		0.360E+02	0.275E+00	-0.263E-02	0.219E+05	0.151E+04	0.508E+03	0.211E+11
7		0.420E+02	0.260E+00	-0.262E-02	0.325E+05	0.207E+04	0.615E+03	0.211E+11
8		0.480E+02	0.244E+00	-0.261E-02	0.468E+05	0.274E+04	0.720E+03	0.211E+11
9		0.540E+02	0.228E+00	-0.259E-02	0.654E+05	0.351E+04	0.828E+03	0.211E+11
10		0.600E+02	0.213E+00	-0.257E-02	0.889E+05	0.441E+04	0.965E+03	0.211E+11
11		0.660E+02	0.198E+00	-0.254E-02	0.118E+06	0.485E+04	-0.870E+02	0.211E+11
12		0.720E+02	0.182E+00	-0.250E-02	0.147E+06	0.469E+04	-0.225E+03	0.211E+11
13		0.780E+02	0.167E+00	-0.246E-02	0.175E+06	0.440E+04	-0.354E+03	0.211E+11
14		0.840E+02	0.153E+00	-0.241E-02	0.200E+06	0.399E+04	-0.476E+03	0.211E+11
15		0.900E+02	0.139E+00	-0.235E-02	0.222E+06	0.346E+04	-0.588E+03	0.211E+11
16		0.960E+02	0.125E+00	-0.228E-02	0.241E+06	0.282E+04	-0.692E+03	0.211E+11
17		0.102E+03	0.111E+00	-0.221E-02	0.256E+06	0.207E+04	-0.802E+03	0.211E+11
18		0.108E+03	0.982E-01	-0.214E-02	0.266E+06	0.122E+04	-0.889E+03	0.211E+11
19		0.114E+03	0.856E-01	-0.206E-02	0.271E+06	0.302E+03	-0.951E+03	0.211E+11
20		0.120E+03	0.735E-01	-0.198E-02	0.270E+06	-0.668E+03	-0.988E+03	0.211E+11
21		0.126E+03	0.618E-01	-0.191E-02	0.263E+06	-0.166E+04	-0.998E+03	0.211E+11
22		0.132E+03	0.506E-01	-0.183E-02	0.250E+06	-0.265E+04	-0.983E+03	0.211E+11
23		0.138E+03	0.398E-01	-0.177E-02	0.231E+06	-0.364E+04	-0.101E+04	0.211E+11

24	0.144E+03	0.294E-01	-0.170E-02	0.206E+06	-0.463E+04	-0.967E+03	0.211E+11
25	0.150E+03	0.194E-01	-0.165E-02	0.176E+06	-0.554E+04	-0.845E+03	0.211E+11
26	0.156E+03	0.961E-02	-0.161E-02	0.140E+06	-0.623E+04	-0.536E+03	0.211E+11
27	0.162E+03	0.944E-04	-0.157E-02	0.101E+06	-0.646E+04	0.661E+02	0.211E+11
28	0.168E+03	-0.925E-02	-0.155E-02	0.622E+05	-0.591E+04	0.105E+04	0.211E+11
29	0.174E+03	-0.185E-01	-0.153E-02	0.299E+05	-0.450E+04	0.176E+04	0.211E+11
30	0.180E+03	-0.277E-01	-0.153E-02	0.815E+04	-0.249E+04	0.227E+04	0.211E+11
31	0.186E+03	-0.368E-01	-0.153E-02	0.000E+00	-0.679E+03	0.136E+04	0.106E+11

END OF ANALYSIS

Wall 1_7.5 ft Wall Height_8.5 ft Spacing
Deflection (in)



PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES
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U-5114 Wall No. 1 - H = 7.5' & SPC = 8.5'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 41
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 90.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	41	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.900E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.102E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	90.0	0.7	26.0	0.064	T	0.00
2	97.2	0.7	26.0	0.064	T	90.00
3	412.8	0.7	26.0	0.064	T	187.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.900E+02	0.747E+01
0.187E+03	0.137E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	45.00	0.00	60.00	0.00	62.55	84.29

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.692E+02
0.600E+01	0.000E+00
0.120E+02	0.110E+02
0.180E+02	0.262E+02
0.240E+02	0.415E+02
0.300E+02	0.567E+02
0.360E+02	0.719E+02
0.420E+02	0.871E+02
0.480E+02	0.102E+03
0.540E+02	0.117E+03
0.600E+02	0.133E+03
0.660E+02	0.148E+03
0.720E+02	0.163E+03
0.780E+02	0.178E+03
0.840E+02	0.194E+03
0.900E+02	0.209E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 90.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
90.0000	0.6366D-01
187.2000	0.6366D-01
187.2000	0.2766D-01
258.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
90.00	0.6944D+00	26.000	-----
258.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
0.10	9.33	26.0	0.637E-01		2.82	2.13	0.195E+02	0.130E+00

Y IN	P LBS/IN
0.000E+00	-0.191E+02
0.130E-01	-0.189E+02
0.259E-01	-0.188E+02
0.389E-01	-0.187E+02
0.518E-01	-0.185E+02
0.648E-01	-0.184E+02
0.777E-01	-0.182E+02
0.907E-01	-0.181E+02
0.104E+00	-0.179E+02
0.117E+00	-0.178E+02
0.130E+00	-0.176E+02
0.143E+00	-0.175E+02
0.155E+00	-0.173E+02
0.350E+00	-0.151E+02
0.968E+01	0.799E+00
0.190E+02	0.799E+00
0.283E+02	0.799E+00

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
90.10	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.806E+03

Y IN	P LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.142E+03
0.259E-01	0.197E+03
0.389E-01	0.240E+03
0.518E-01	0.276E+03
0.648E-01	0.309E+03
0.777E-01	0.338E+03
0.907E-01	0.366E+03
0.104E+00	0.391E+03
0.117E+00	0.415E+03
0.130E+00	0.438E+03
0.143E+00	0.460E+03
0.155E+00	0.480E+03

0.350E+00	0.787E+03
0.968E+01	0.787E+03
0.190E+02	0.787E+03
0.283E+02	0.787E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
42.00	9.33	26.0	0.637E-01		0.89	0.51	0.583E+02	0.204E+03

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.435E+02
0.259E-01	0.644E+02
0.389E-01	0.781E+02
0.518E-01	0.892E+02
0.648E-01	0.986E+02
0.777E-01	0.107E+03
0.907E-01	0.114E+03
0.104E+00	0.121E+03
0.117E+00	0.128E+03
0.130E+00	0.134E+03
0.143E+00	0.139E+03
0.155E+00	0.144E+03
0.350E+00	0.221E+03
0.968E+01	0.221E+03
0.190E+02	0.221E+03
0.283E+02	0.221E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
132.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.139E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.206E+03
0.259E-01	0.294E+03
0.389E-01	0.365E+03
0.518E-01	0.425E+03
0.648E-01	0.479E+03
0.777E-01	0.529E+03
0.907E-01	0.575E+03

0.104E+00	0.618E+03
0.117E+00	0.659E+03
0.130E+00	0.698E+03
0.143E+00	0.735E+03
0.155E+00	0.771E+03
0.350E+00	0.130E+04
0.968E+01	0.130E+04
0.190E+02	0.130E+04
0.283E+02	0.130E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
84.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.708E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.936E+02
0.259E-01	0.143E+03
0.389E-01	0.181E+03
0.518E-01	0.213E+03
0.648E-01	0.242E+03
0.777E-01	0.268E+03
0.907E-01	0.292E+03
0.104E+00	0.315E+03
0.117E+00	0.336E+03
0.130E+00	0.356E+03
0.143E+00	0.375E+03
0.155E+00	0.393E+03
0.350E+00	0.662E+03
0.968E+01	0.662E+03
0.190E+02	0.662E+03
0.283E+02	0.662E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
174.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.183E+04	

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.254E+03
0.259E-01	0.368E+03

0.389E-01	0.459E+03
0.518E-01	0.538E+03
0.648E-01	0.609E+03
0.777E-01	0.673E+03
0.907E-01	0.734E+03
0.104E+00	0.790E+03
0.117E+00	0.844E+03
0.130E+00	0.895E+03
0.143E+00	0.944E+03
0.155E+00	0.991E+03
0.350E+00	0.169E+04
0.968E+01	0.169E+04
0.190E+02	0.169E+04
0.283E+02	0.169E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
126.00	9.33	26.0	0.554E-01		0.88	0.50	0.583E+02	0.115E+04

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.142E+03
0.259E-01	0.217E+03
0.389E-01	0.276E+03
0.518E-01	0.327E+03
0.648E-01	0.372E+03
0.777E-01	0.414E+03
0.907E-01	0.452E+03
0.104E+00	0.488E+03
0.117E+00	0.522E+03
0.130E+00	0.555E+03
0.143E+00	0.586E+03
0.155E+00	0.615E+03
0.350E+00	0.105E+04
0.968E+01	0.105E+04
0.190E+02	0.105E+04
0.283E+02	0.105E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
216.00	9.33	26.0	0.554E-01		0.88	0.50	0.583E+02	0.198E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.270E+03
0.259E-01	0.393E+03
0.389E-01	0.491E+03
0.518E-01	0.576E+03
0.648E-01	0.652E+03
0.777E-01	0.722E+03
0.907E-01	0.787E+03
0.104E+00	0.848E+03
0.117E+00	0.906E+03
0.130E+00	0.961E+03
0.143E+00	0.101E+04
0.155E+00	0.107E+04
0.350E+00	0.182E+04
0.968E+01	0.182E+04
0.190E+02	0.182E+04
0.283E+02	0.182E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
167.90	9.33	26.0	0.485E-01	0.88	0.50	0.583E+02	0.134E+04	

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.163E+03
0.259E-01	0.249E+03
0.389E-01	0.317E+03
0.518E-01	0.376E+03
0.648E-01	0.428E+03
0.777E-01	0.476E+03
0.907E-01	0.521E+03
0.104E+00	0.563E+03
0.117E+00	0.603E+03
0.130E+00	0.640E+03
0.143E+00	0.676E+03
0.155E+00	0.711E+03
0.350E+00	0.122E+04
0.968E+01	0.122E+04
0.190E+02	0.122E+04
0.283E+02	0.122E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
257.90	9.33	26.0	0.485E-01	0.88	0.50	0.583E+02	0.206E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.280E+03
0.259E-01	0.408E+03
0.389E-01	0.510E+03
0.518E-01	0.599E+03
0.648E-01	0.678E+03
0.777E-01	0.751E+03
0.907E-01	0.819E+03
0.104E+00	0.883E+03
0.117E+00	0.943E+03
0.130E+00	0.100E+04
0.143E+00	0.106E+04
0.155E+00	0.111E+04
0.350E+00	0.189E+04
0.968E+01	0.189E+04
0.190E+02	0.189E+04
0.283E+02	0.189E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

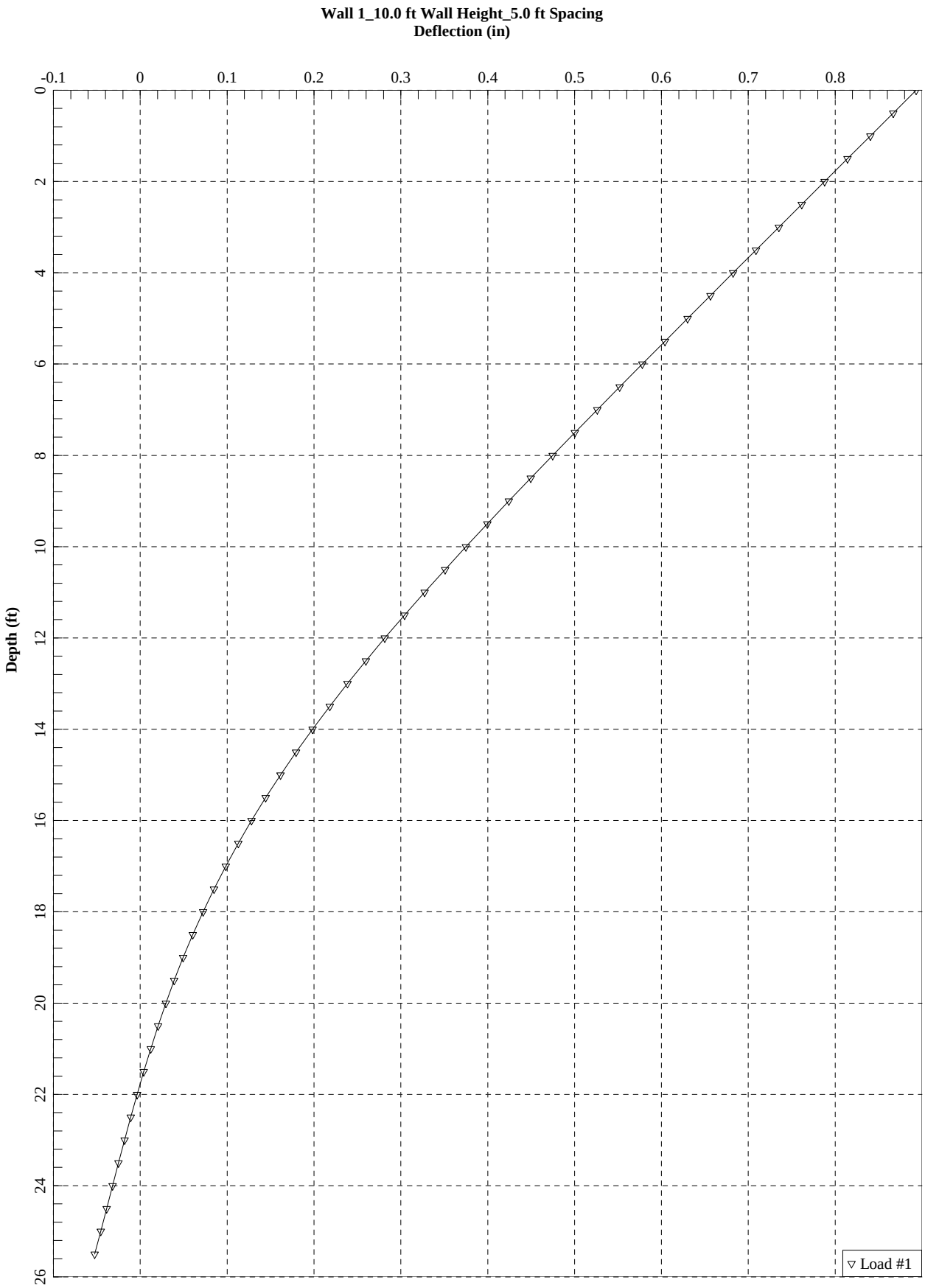
U-5114 Wall No. 1 - H = 7.5' & SPC = 8.5'

RESULTS -- ITERATION 7

STA	I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
		IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0		0.000E+00	0.891E+00	-0.525E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.860E+00	-0.525E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.828E+00	-0.525E-02	0.360E+04	0.333E+03	0.661E+02	0.211E+11
3		0.180E+02	0.797E+00	-0.525E-02	0.580E+04	0.445E+03	0.157E+03	0.211E+11
4		0.240E+02	0.765E+00	-0.525E-02	0.894E+04	0.648E+03	0.249E+03	0.211E+11
5		0.300E+02	0.734E+00	-0.525E-02	0.136E+05	0.943E+03	0.340E+03	0.211E+11
6		0.360E+02	0.702E+00	-0.524E-02	0.202E+05	0.133E+04	0.431E+03	0.211E+11
7		0.420E+02	0.671E+00	-0.523E-02	0.295E+05	0.181E+04	0.523E+03	0.211E+11
8		0.480E+02	0.639E+00	-0.522E-02	0.419E+05	0.237E+04	0.612E+03	0.211E+11
9		0.540E+02	0.608E+00	-0.521E-02	0.580E+05	0.303E+04	0.704E+03	0.211E+11
10		0.600E+02	0.577E+00	-0.519E-02	0.783E+05	0.378E+04	0.796E+03	0.211E+11
11		0.660E+02	0.546E+00	-0.516E-02	0.103E+06	0.462E+04	0.887E+03	0.211E+11
12		0.720E+02	0.515E+00	-0.513E-02	0.134E+06	0.556E+04	0.979E+03	0.211E+11
13		0.780E+02	0.484E+00	-0.509E-02	0.170E+06	0.658E+04	0.107E+04	0.211E+11
14		0.840E+02	0.454E+00	-0.503E-02	0.213E+06	0.770E+04	0.116E+04	0.211E+11
15		0.900E+02	0.424E+00	-0.497E-02	0.262E+06	0.893E+04	0.130E+04	0.211E+11
16		0.960E+02	0.394E+00	-0.488E-02	0.320E+06	0.952E+04	-0.112E+03	0.211E+11
17		0.102E+03	0.365E+00	-0.478E-02	0.377E+06	0.931E+04	-0.314E+03	0.211E+11
18		0.108E+03	0.337E+00	-0.467E-02	0.432E+06	0.890E+04	-0.503E+03	0.211E+11

19	0.114E+03	0.309E+00	-0.454E-02	0.483E+06	0.832E+04	-0.662E+03	0.211E+11
20	0.120E+03	0.282E+00	-0.440E-02	0.531E+06	0.758E+04	-0.805E+03	0.211E+11
21	0.126E+03	0.256E+00	-0.424E-02	0.574E+06	0.671E+04	-0.933E+03	0.211E+11
22	0.132E+03	0.231E+00	-0.407E-02	0.612E+06	0.573E+04	-0.105E+04	0.211E+11
23	0.138E+03	0.208E+00	-0.389E-02	0.643E+06	0.458E+04	-0.125E+04	0.211E+11
24	0.144E+03	0.185E+00	-0.371E-02	0.667E+06	0.325E+04	-0.141E+04	0.211E+11
25	0.150E+03	0.163E+00	-0.351E-02	0.682E+06	0.177E+04	-0.154E+04	0.211E+11
26	0.156E+03	0.143E+00	-0.332E-02	0.688E+06	0.181E+03	-0.164E+04	0.211E+11
27	0.162E+03	0.123E+00	-0.313E-02	0.684E+06	-0.149E+04	-0.171E+04	0.211E+11
28	0.168E+03	0.105E+00	-0.293E-02	0.670E+06	-0.321E+04	-0.173E+04	0.211E+11
29	0.174E+03	0.880E-01	-0.275E-02	0.646E+06	-0.494E+04	-0.172E+04	0.211E+11
30	0.180E+03	0.721E-01	-0.257E-02	0.611E+06	-0.663E+04	-0.166E+04	0.211E+11
31	0.186E+03	0.572E-01	-0.240E-02	0.566E+06	-0.824E+04	-0.156E+04	0.211E+11
32	0.192E+03	0.433E-01	-0.225E-02	0.512E+06	-0.972E+04	-0.141E+04	0.211E+11
33	0.198E+03	0.302E-01	-0.211E-02	0.450E+06	-0.110E+05	-0.121E+04	0.211E+11
34	0.204E+03	0.180E-01	-0.199E-02	0.380E+06	-0.121E+05	-0.925E+03	0.211E+11
35	0.210E+03	0.632E-02	-0.190E-02	0.304E+06	-0.127E+05	-0.335E+03	0.211E+11
36	0.216E+03	-0.480E-02	-0.182E-02	0.227E+06	-0.126E+05	0.671E+03	0.211E+11
37	0.222E+03	-0.155E-01	-0.177E-02	0.154E+06	-0.113E+05	0.177E+04	0.211E+11
38	0.228E+03	-0.260E-01	-0.173E-02	0.908E+05	-0.926E+04	0.239E+04	0.211E+11
39	0.234E+03	-0.363E-01	-0.171E-02	0.424E+05	-0.663E+04	0.288E+04	0.211E+11
40	0.240E+03	-0.466E-01	-0.171E-02	0.112E+05	-0.353E+04	0.332E+04	0.211E+11
41	0.246E+03	-0.568E-01	-0.170E-02	0.000E+00	-0.934E+03	0.187E+04	0.106E+11

END OF ANALYSIS


Wall 1_10.0 ft Wall Height_5.0 ft Spacing
Deflection (in)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 1 - H = 10.0' & SPC = 5.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 50
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 120.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	50	0	0.354E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.177E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.120E+03 IN
WIDTH FOR EARTH PRESSURE, WA = 0.600E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	120.0	0.7	26.0	0.064	T	0.00
2	67.2	0.7	26.0	0.064	T	120.00
3	412.8	0.7	26.0	0.064	T	187.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.120E+03	0.937E+01
0.187E+03	0.137E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	60.00	0.00	80.00	0.00	82.55	156.89

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.407E+02
0.600E+01	0.000E+00
0.120E+02	0.648E+01
0.180E+02	0.154E+02
0.240E+02	0.244E+02
0.300E+02	0.334E+02
0.360E+02	0.423E+02
0.420E+02	0.512E+02
0.480E+02	0.600E+02
0.540E+02	0.690E+02
0.600E+02	0.780E+02
0.660E+02	0.870E+02
0.720E+02	0.960E+02
0.780E+02	0.105E+03
0.840E+02	0.114E+03
0.900E+02	0.123E+03
0.960E+02	0.132E+03
0.102E+03	0.141E+03
0.108E+03	0.149E+03
0.114E+03	0.158E+03
0.120E+03	0.167E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 120.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
120.0000	0.6366D-01
187.2000	0.6366D-01
187.2000	0.2766D-01
312.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50

120.00	0.6944D+00	26.000	-----
312.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	-0.259E+02
0.259E-01	-0.258E+02
0.389E-01	-0.256E+02
0.518E-01	-0.255E+02
0.648E-01	-0.253E+02
0.777E-01	-0.252E+02
0.907E-01	-0.250E+02
0.104E+00	-0.249E+02
0.117E+00	-0.247E+02
0.130E+00	-0.246E+02
0.143E+00	-0.244E+02
0.155E+00	-0.243E+02
0.350E+00	-0.220E+02
0.968E+01	-0.616E+01
0.190E+02	-0.616E+01
0.283E+02	-0.616E+01

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
120.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.126E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.199E+03
0.259E-01	0.280E+03
0.389E-01	0.345E+03
0.518E-01	0.400E+03
0.648E-01	0.449E+03
0.777E-01	0.495E+03
0.907E-01	0.537E+03

0.104E+00	0.576E+03
0.117E+00	0.613E+03
0.130E+00	0.649E+03
0.143E+00	0.683E+03
0.155E+00	0.715E+03
0.350E+00	0.119E+04
0.968E+01	0.119E+04
0.190E+02	0.119E+04
0.283E+02	0.119E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
48.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.258E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.401E+02
0.259E-01	0.624E+02
0.389E-01	0.787E+02
0.518E-01	0.921E+02
0.648E-01	0.104E+03
0.777E-01	0.114E+03
0.907E-01	0.123E+03
0.104E+00	0.132E+03
0.117E+00	0.140E+03
0.130E+00	0.147E+03
0.143E+00	0.154E+03
0.155E+00	0.161E+03
0.350E+00	0.259E+03
0.968E+01	0.259E+03
0.190E+02	0.259E+03
0.283E+02	0.259E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
168.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.176E+04	

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.254E+03
0.259E-01	0.365E+03

0.389E-01	0.453E+03
0.518E-01	0.529E+03
0.648E-01	0.597E+03
0.777E-01	0.660E+03
0.907E-01	0.718E+03
0.104E+00	0.773E+03
0.117E+00	0.824E+03
0.130E+00	0.874E+03
0.143E+00	0.921E+03
0.155E+00	0.967E+03
0.350E+00	0.164E+04
0.968E+01	0.164E+04
0.190E+02	0.164E+04
0.283E+02	0.164E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
96.00	9.33	26.0	0.529E-01	0.88	0.50	0.583E+02	0.753E+03

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.915E+02
0.259E-01	0.143E+03
0.389E-01	0.184E+03
0.518E-01	0.218E+03
0.648E-01	0.248E+03
0.777E-01	0.276E+03
0.907E-01	0.301E+03
0.104E+00	0.325E+03
0.117E+00	0.348E+03
0.130E+00	0.369E+03
0.143E+00	0.389E+03
0.155E+00	0.409E+03
0.350E+00	0.695E+03
0.968E+01	0.695E+03
0.190E+02	0.695E+03
0.283E+02	0.695E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
216.00	9.33	26.0	0.529E-01	0.88	0.50	0.583E+02	0.188E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.267E+03
0.259E-01	0.385E+03
0.389E-01	0.478E+03
0.518E-01	0.559E+03
0.648E-01	0.632E+03
0.777E-01	0.699E+03
0.907E-01	0.761E+03
0.104E+00	0.819E+03
0.117E+00	0.875E+03
0.130E+00	0.927E+03
0.143E+00	0.978E+03
0.155E+00	0.103E+04
0.350E+00	0.174E+04
0.968E+01	0.174E+04
0.190E+02	0.174E+04
0.283E+02	0.174E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
144.00	9.33	26.0	0.445E-01		0.88	0.50	0.583E+02	0.106E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.124E+03
0.259E-01	0.194E+03
0.389E-01	0.249E+03
0.518E-01	0.295E+03
0.648E-01	0.337E+03
0.777E-01	0.375E+03
0.907E-01	0.411E+03
0.104E+00	0.444E+03
0.117E+00	0.475E+03
0.130E+00	0.505E+03
0.143E+00	0.533E+03
0.155E+00	0.560E+03
0.350E+00	0.962E+03
0.968E+01	0.962E+03
0.190E+02	0.962E+03
0.283E+02	0.962E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
264.00	9.33	26.0	0.445E-01	0.88	0.50	0.583E+02	0.194E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.273E+03
0.259E-01	0.394E+03
0.389E-01	0.490E+03
0.518E-01	0.573E+03
0.648E-01	0.648E+03
0.777E-01	0.716E+03
0.907E-01	0.780E+03
0.104E+00	0.840E+03
0.117E+00	0.897E+03
0.130E+00	0.951E+03
0.143E+00	0.100E+04
0.155E+00	0.105E+04
0.350E+00	0.179E+04
0.968E+01	0.179E+04
0.190E+02	0.179E+04
0.283E+02	0.179E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
191.90	9.33	26.0	0.403E-01	0.88	0.50	0.583E+02	0.128E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.148E+03
0.259E-01	0.230E+03
0.389E-01	0.295E+03
0.518E-01	0.351E+03
0.648E-01	0.401E+03
0.777E-01	0.447E+03
0.907E-01	0.489E+03
0.104E+00	0.529E+03
0.117E+00	0.567E+03
0.130E+00	0.603E+03
0.143E+00	0.637E+03
0.155E+00	0.670E+03
0.350E+00	0.115E+04
0.968E+01	0.115E+04
0.190E+02	0.115E+04
0.283E+02	0.115E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA AVG LBS/IN**3	A	B	Puc	Puí
311.90	9.33	26.0	0.403E-01	0.88	0.50	0.583E+02	0.207E+04

Y IN	P LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.288E+03
0.259E-01	0.416E+03
0.389E-01	0.519E+03
0.518E-01	0.608E+03
0.648E-01	0.687E+03
0.777E-01	0.760E+03
0.907E-01	0.829E+03
0.104E+00	0.893E+03
0.117E+00	0.954E+03
0.130E+00	0.101E+04
0.143E+00	0.107E+04
0.155E+00	0.112E+04
0.350E+00	0.191E+04
0.968E+01	0.191E+04
0.190E+02	0.191E+04
0.283E+02	0.191E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

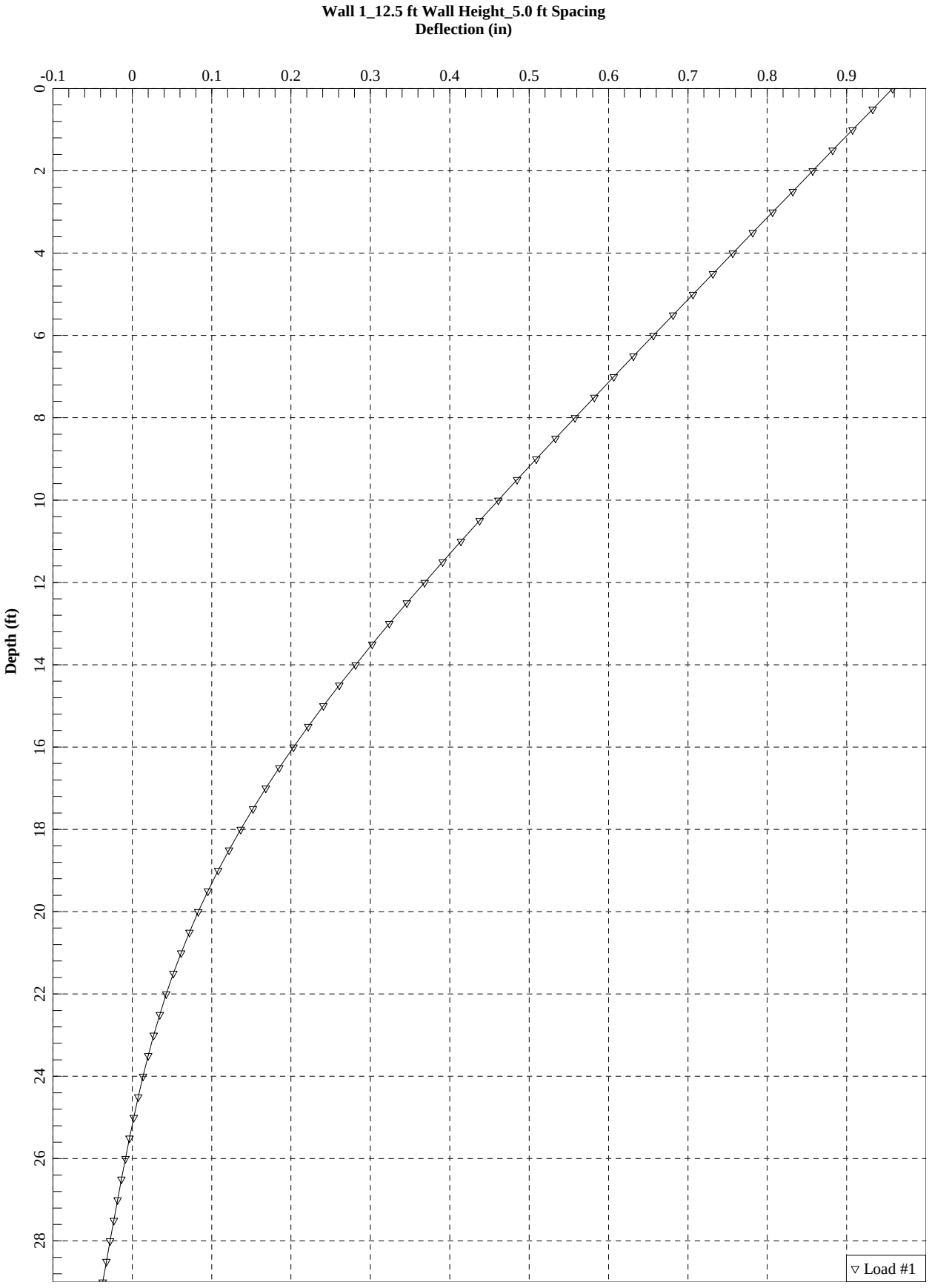
U-5114 Wall No. 1 - H = 10.0' & SPC = 5.0'

RESULTS -- ITERATION 7

STA I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0	0.000E+00	0.893E+00	-0.439E-02	0.000E+00	0.150E+03	0.300E+03	0.177E+11
1	0.600E+01	0.867E+00	-0.439E-02	0.180E+04	0.300E+03	-0.364E-07	0.354E+11
2	0.120E+02	0.840E+00	-0.439E-02	0.360E+04	0.319E+03	0.389E+02	0.354E+11
3	0.180E+02	0.814E+00	-0.439E-02	0.563E+04	0.385E+03	0.925E+02	0.354E+11
4	0.240E+02	0.788E+00	-0.439E-02	0.822E+04	0.505E+03	0.147E+03	0.354E+11
5	0.300E+02	0.762E+00	-0.439E-02	0.117E+05	0.678E+03	0.200E+03	0.354E+11
6	0.360E+02	0.735E+00	-0.438E-02	0.164E+05	0.905E+03	0.254E+03	0.354E+11
7	0.420E+02	0.709E+00	-0.438E-02	0.225E+05	0.119E+04	0.307E+03	0.354E+11
8	0.480E+02	0.683E+00	-0.438E-02	0.306E+05	0.152E+04	0.360E+03	0.354E+11
9	0.540E+02	0.656E+00	-0.437E-02	0.408E+05	0.191E+04	0.414E+03	0.354E+11
10	0.600E+02	0.630E+00	-0.436E-02	0.535E+05	0.235E+04	0.468E+03	0.354E+11
11	0.660E+02	0.604E+00	-0.435E-02	0.689E+05	0.284E+04	0.522E+03	0.354E+11
12	0.720E+02	0.578E+00	-0.434E-02	0.876E+05	0.339E+04	0.576E+03	0.354E+11
13	0.780E+02	0.552E+00	-0.432E-02	0.110E+06	0.399E+04	0.630E+03	0.354E+11

14	0.840E+02	0.526E+00	-0.430E-02	0.136E+06	0.465E+04	0.684E+03	0.354E+11
15	0.900E+02	0.500E+00	-0.427E-02	0.165E+06	0.536E+04	0.738E+03	0.354E+11
16	0.960E+02	0.475E+00	-0.424E-02	0.200E+06	0.613E+04	0.792E+03	0.354E+11
17	0.102E+03	0.449E+00	-0.421E-02	0.239E+06	0.695E+04	0.846E+03	0.354E+11
18	0.108E+03	0.424E+00	-0.416E-02	0.283E+06	0.782E+04	0.896E+03	0.354E+11
19	0.114E+03	0.400E+00	-0.411E-02	0.333E+06	0.874E+04	0.950E+03	0.354E+11
20	0.120E+03	0.375E+00	-0.405E-02	0.388E+06	0.975E+04	0.107E+04	0.354E+11
21	0.126E+03	0.351E+00	-0.398E-02	0.450E+06	0.102E+05	-0.788E+02	0.354E+11
22	0.132E+03	0.327E+00	-0.390E-02	0.511E+06	0.101E+05	-0.271E+03	0.354E+11
23	0.138E+03	0.304E+00	-0.380E-02	0.571E+06	0.971E+04	-0.446E+03	0.354E+11
24	0.144E+03	0.282E+00	-0.370E-02	0.628E+06	0.919E+04	-0.606E+03	0.354E+11
25	0.150E+03	0.260E+00	-0.359E-02	0.681E+06	0.851E+04	-0.749E+03	0.354E+11
26	0.156E+03	0.239E+00	-0.347E-02	0.730E+06	0.770E+04	-0.878E+03	0.354E+11
27	0.162E+03	0.218E+00	-0.335E-02	0.773E+06	0.676E+04	-0.994E+03	0.354E+11
28	0.168E+03	0.198E+00	-0.321E-02	0.811E+06	0.571E+04	-0.110E+04	0.354E+11
29	0.174E+03	0.180E+00	-0.307E-02	0.842E+06	0.454E+04	-0.124E+04	0.354E+11
30	0.180E+03	0.162E+00	-0.293E-02	0.865E+06	0.324E+04	-0.137E+04	0.354E+11
31	0.186E+03	0.144E+00	-0.278E-02	0.881E+06	0.182E+04	-0.146E+04	0.354E+11
32	0.192E+03	0.128E+00	-0.263E-02	0.887E+06	0.326E+03	-0.154E+04	0.354E+11
33	0.198E+03	0.113E+00	-0.248E-02	0.885E+06	-0.124E+04	-0.159E+04	0.354E+11
34	0.204E+03	0.985E-01	-0.233E-02	0.872E+06	-0.283E+04	-0.161E+04	0.354E+11
35	0.210E+03	0.849E-01	-0.218E-02	0.851E+06	-0.444E+04	-0.161E+04	0.354E+11
36	0.216E+03	0.723E-01	-0.204E-02	0.819E+06	-0.604E+04	-0.159E+04	0.354E+11
37	0.222E+03	0.604E-01	-0.191E-02	0.778E+06	-0.758E+04	-0.149E+04	0.354E+11
38	0.228E+03	0.494E-01	-0.178E-02	0.728E+06	-0.902E+04	-0.138E+04	0.354E+11
39	0.234E+03	0.391E-01	-0.166E-02	0.670E+06	-0.103E+05	-0.125E+04	0.354E+11
40	0.240E+03	0.295E-01	-0.155E-02	0.604E+06	-0.115E+05	-0.109E+04	0.354E+11
41	0.246E+03	0.205E-01	-0.146E-02	0.532E+06	-0.125E+05	-0.891E+03	0.354E+11
42	0.252E+03	0.120E-01	-0.137E-02	0.454E+06	-0.133E+05	-0.632E+03	0.354E+11
43	0.258E+03	0.404E-02	-0.130E-02	0.373E+06	-0.136E+05	-0.116E+03	0.354E+11
44	0.264E+03	-0.358E-02	-0.125E-02	0.290E+06	-0.134E+05	0.565E+03	0.354E+11
45	0.270E+03	-0.109E-01	-0.120E-02	0.212E+06	-0.124E+05	0.141E+04	0.354E+11
46	0.276E+03	-0.180E-01	-0.117E-02	0.141E+06	-0.107E+05	0.195E+04	0.354E+11
47	0.282E+03	-0.250E-01	-0.115E-02	0.828E+05	-0.859E+04	0.236E+04	0.354E+11
48	0.288E+03	-0.319E-01	-0.114E-02	0.383E+05	-0.606E+04	0.270E+04	0.354E+11
49	0.294E+03	-0.387E-01	-0.114E-02	0.100E+05	-0.319E+04	0.304E+04	0.354E+11
50	0.300E+03	-0.455E-01	-0.114E-02	0.341E-08	-0.835E+03	0.167E+04	0.177E+11

END OF ANALYSIS


Wall 1_12.5 ft Wall Height_5.0 ft Spacing
Deflection (in)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 1 - H = 12.5' & SPC = 5.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 57
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 150.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	57	0	0.354E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.177E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.150E+03 IN
WIDTH FOR EARTH PRESSURE, WA = 0.600E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.187E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.187E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	66.0	0.7	30.0	0.069	T	0.00
2	66.0	2.3	26.0	0.064	T	66.00
3	18.0	0.7	26.0	0.064	T	132.00
4	37.2	0.7	26.0	0.064	T	150.00
5	16.8	0.7	26.0	0.064	T	187.20
6	396.0	0.7	26.0	0.064	T	204.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.660E+02	0.632E+01
0.132E+03	0.105E+02
0.150E+03	0.117E+02
0.187E+03	0.140E+02
0.204E+03	0.145E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.333E+00	0.300E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01
4	0.390E+00	0.256E+01
5	0.390E+00	0.256E+01
6	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	33.00	0.00	44.00	0.00	47.21	36.76
2	0.00	99.00	0.00	110.00	0.00	114.74	33.34
3	73.94	141.00	4.03	144.00	-15.62	0.00	0.00

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.347E+02
0.600E+01	0.000E+00
0.120E+02	0.328E+01
0.180E+02	0.116E+02
0.240E+02	0.199E+02
0.300E+02	0.283E+02
0.360E+02	0.366E+02
0.420E+02	0.449E+02
0.480E+02	0.533E+02
0.540E+02	0.618E+02
0.600E+02	0.702E+02
0.660E+02	0.780E+02
0.720E+02	0.000E+00
0.780E+02	0.000E+00
0.840E+02	0.566E+01
0.900E+02	0.146E+02
0.960E+02	0.236E+02
0.102E+03	0.325E+02
0.108E+03	0.415E+02
0.114E+03	0.504E+02
0.120E+03	0.593E+02
0.126E+03	0.684E+02
0.132E+03	0.774E+02
0.138E+03	0.203E+03
0.144E+03	0.212E+03
0.150E+03	0.221E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 150.00 IN

2 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

LAYER 2
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
150.0000	0.6366D-01
187.2000	0.6366D-01
187.2000	0.2766D-01
600.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
150.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
354.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
0.10	9.33	26.0	0.637E-01	2.82	2.13		0.195E+02	0.130E+00

Y IN	P LBS/IN
0.000E+00	-0.344E+02
0.130E-01	-0.343E+02
0.259E-01	-0.341E+02
0.389E-01	-0.340E+02
0.518E-01	-0.338E+02
0.648E-01	-0.337E+02
0.777E-01	-0.335E+02
0.907E-01	-0.334E+02
0.104E+00	-0.332E+02
0.117E+00	-0.331E+02
0.130E+00	-0.329E+02
0.143E+00	-0.328E+02
0.155E+00	-0.326E+02
0.350E+00	-0.304E+02
0.968E+01	-0.145E+02
0.190E+02	-0.145E+02
0.283E+02	-0.145E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
150.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.158E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.242E+03
0.259E-01	0.341E+03
0.389E-01	0.421E+03
0.518E-01	0.489E+03
0.648E-01	0.550E+03
0.777E-01	0.606E+03
0.907E-01	0.658E+03
0.104E+00	0.707E+03
0.117E+00	0.754E+03
0.130E+00	0.798E+03
0.143E+00	0.840E+03
0.155E+00	0.881E+03
0.350E+00	0.148E+04
0.968E+01	0.148E+04
0.190E+02	0.148E+04
0.283E+02	0.148E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
13.50	9.33	26.0	0.637E-01	1.80	1.30	0.321E+02	0.329E+02

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	-0.143E+02
0.259E-01	0.583E+01
0.389E-01	0.243E+02
0.518E-01	0.273E+02
0.648E-01	0.298E+02
0.777E-01	0.319E+02
0.907E-01	0.337E+02
0.104E+00	0.353E+02
0.117E+00	0.368E+02
0.130E+00	0.381E+02
0.143E+00	0.393E+02

0.155E+00	0.405E+02
0.350E+00	0.568E+02
0.968E+01	0.568E+02
0.190E+02	0.568E+02
0.283E+02	0.568E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
163.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.172E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.257E+03
0.259E-01	0.365E+03
0.389E-01	0.451E+03
0.518E-01	0.525E+03
0.648E-01	0.592E+03
0.777E-01	0.652E+03
0.907E-01	0.709E+03
0.104E+00	0.762E+03
0.117E+00	0.813E+03
0.130E+00	0.861E+03
0.143E+00	0.907E+03
0.155E+00	0.952E+03
0.350E+00	0.160E+04
0.968E+01	0.160E+04
0.190E+02	0.160E+04
0.283E+02	0.160E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
27.00	9.33	26.0	0.637E-01		1.10	0.74	0.448E+02	0.968E+02

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.583E+01
0.259E-01	0.421E+02
0.389E-01	0.498E+02
0.518E-01	0.557E+02
0.648E-01	0.605E+02
0.777E-01	0.647E+02

0.907E-01	0.683E+02
0.104E+00	0.716E+02
0.117E+00	0.746E+02
0.130E+00	0.773E+02
0.143E+00	0.799E+02
0.155E+00	0.822E+02
0.350E+00	0.116E+03
0.968E+01	0.116E+03
0.190E+02	0.116E+03
0.283E+02	0.116E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
177.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.186E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.273E+03
0.259E-01	0.389E+03
0.389E-01	0.481E+03
0.518E-01	0.561E+03
0.648E-01	0.633E+03
0.777E-01	0.699E+03
0.907E-01	0.760E+03
0.104E+00	0.818E+03
0.117E+00	0.872E+03
0.130E+00	0.925E+03
0.143E+00	0.974E+03
0.155E+00	0.102E+04
0.350E+00	0.173E+04
0.968E+01	0.173E+04
0.190E+02	0.173E+04
0.283E+02	0.173E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
40.50	9.33	26.0	0.607E-01	0.89	0.52	0.564E+02	0.183E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.259E+02

0.259E-01	0.450E+02
0.389E-01	0.575E+02
0.518E-01	0.675E+02
0.648E-01	0.761E+02
0.777E-01	0.836E+02
0.907E-01	0.903E+02
0.104E+00	0.964E+02
0.117E+00	0.102E+03
0.130E+00	0.107E+03
0.143E+00	0.112E+03
0.155E+00	0.117E+03
0.350E+00	0.185E+03
0.968E+01	0.185E+03
0.190E+02	0.185E+03
0.283E+02	0.185E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
190.50	9.33	26.0	0.607E-01		0.88	0.50	0.583E+02	0.191E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.278E+03
0.259E-01	0.397E+03
0.389E-01	0.492E+03
0.518E-01	0.574E+03
0.648E-01	0.648E+03
0.777E-01	0.715E+03
0.907E-01	0.778E+03
0.104E+00	0.837E+03
0.117E+00	0.893E+03
0.130E+00	0.947E+03
0.143E+00	0.998E+03
0.155E+00	0.105E+04
0.350E+00	0.177E+04
0.968E+01	0.177E+04
0.190E+02	0.177E+04
0.283E+02	0.177E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
53.90	9.33	26.0	0.525E-01		0.88	0.50	0.583E+02	0.261E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.320E+02
0.259E-01	0.545E+02
0.389E-01	0.710E+02
0.518E-01	0.846E+02
0.648E-01	0.963E+02
0.777E-01	0.107E+03
0.907E-01	0.116E+03
0.104E+00	0.125E+03
0.117E+00	0.133E+03
0.130E+00	0.140E+03
0.143E+00	0.148E+03
0.155E+00	0.154E+03
0.350E+00	0.254E+03
0.968E+01	0.254E+03
0.190E+02	0.254E+03
0.283E+02	0.254E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
203.90	9.33	26.0	0.525E-01	0.88	0.50	0.583E+02	0.177E+04	

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.263E+03
0.259E-01	0.373E+03
0.389E-01	0.461E+03
0.518E-01	0.538E+03
0.648E-01	0.606E+03
0.777E-01	0.669E+03
0.907E-01	0.727E+03
0.104E+00	0.782E+03
0.117E+00	0.834E+03
0.130E+00	0.883E+03
0.143E+00	0.930E+03
0.155E+00	0.976E+03
0.350E+00	0.165E+04
0.968E+01	0.165E+04
0.190E+02	0.165E+04
0.283E+02	0.165E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
54.10	9.33	26.0	0.524E-01	0.88	0.50	0.583E+02	0.276E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.335E+02
0.259E-01	0.569E+02
0.389E-01	0.742E+02
0.518E-01	0.884E+02
0.648E-01	0.101E+03
0.777E-01	0.112E+03
0.907E-01	0.122E+03
0.104E+00	0.131E+03
0.117E+00	0.139E+03
0.130E+00	0.147E+03
0.143E+00	0.155E+03
0.155E+00	0.162E+03
0.350E+00	0.267E+03
0.968E+01	0.267E+03
0.190E+02	0.267E+03
0.283E+02	0.267E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
204.10	9.33	26.0	0.524E-01	0.88	0.50	0.583E+02	0.178E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.264E+03
0.259E-01	0.375E+03
0.389E-01	0.464E+03
0.518E-01	0.541E+03
0.648E-01	0.610E+03
0.777E-01	0.673E+03
0.907E-01	0.731E+03
0.104E+00	0.787E+03
0.117E+00	0.839E+03
0.130E+00	0.889E+03
0.143E+00	0.936E+03
0.155E+00	0.982E+03
0.350E+00	0.166E+04
0.968E+01	0.166E+04
0.190E+02	0.166E+04
0.283E+02	0.166E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
91.50	9.33	26.0	0.423E-01	0.88	0.50		0.583E+02	0.569E+03

Y IN	P LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.635E+02
0.259E-01	0.104E+03
0.389E-01	0.136E+03
0.518E-01	0.163E+03
0.648E-01	0.186E+03
0.777E-01	0.207E+03
0.907E-01	0.227E+03
0.104E+00	0.245E+03
0.117E+00	0.262E+03
0.130E+00	0.278E+03
0.143E+00	0.294E+03
0.155E+00	0.309E+03
0.350E+00	0.525E+03
0.968E+01	0.525E+03
0.190E+02	0.525E+03
0.283E+02	0.525E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
241.50	9.33	26.0	0.423E-01	0.88	0.50		0.583E+02	0.170E+04

Y IN	P LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.255E+03
0.259E-01	0.362E+03
0.389E-01	0.446E+03
0.518E-01	0.520E+03
0.648E-01	0.585E+03
0.777E-01	0.646E+03
0.907E-01	0.702E+03
0.104E+00	0.754E+03
0.117E+00	0.804E+03
0.130E+00	0.852E+03
0.143E+00	0.897E+03

0.155E+00	0.941E+03
0.350E+00	0.159E+04
0.968E+01	0.159E+04
0.190E+02	0.159E+04
0.283E+02	0.159E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
129.00	9.33	26.0	0.380E-01		0.88	0.50	0.583E+02	0.820E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.904E+02
0.259E-01	0.146E+03
0.389E-01	0.189E+03
0.518E-01	0.227E+03
0.648E-01	0.259E+03
0.777E-01	0.289E+03
0.907E-01	0.317E+03
0.104E+00	0.343E+03
0.117E+00	0.367E+03
0.130E+00	0.391E+03
0.143E+00	0.413E+03
0.155E+00	0.434E+03
0.350E+00	0.745E+03
0.968E+01	0.745E+03
0.190E+02	0.745E+03
0.283E+02	0.745E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
279.00	9.33	26.0	0.380E-01		0.88	0.50	0.583E+02	0.176E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.262E+03
0.259E-01	0.372E+03
0.389E-01	0.460E+03
0.518E-01	0.536E+03
0.648E-01	0.604E+03
0.777E-01	0.667E+03

0.907E-01	0.725E+03
0.104E+00	0.780E+03
0.117E+00	0.831E+03
0.130E+00	0.881E+03
0.143E+00	0.928E+03
0.155E+00	0.973E+03
0.350E+00	0.164E+04
0.968E+01	0.164E+04
0.190E+02	0.164E+04
0.283E+02	0.164E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
166.50	9.33	26.0	0.357E-01	0.88	0.50	0.583E+02	0.990E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.109E+03
0.259E-01	0.174E+03
0.389E-01	0.226E+03
0.518E-01	0.270E+03
0.648E-01	0.309E+03
0.777E-01	0.345E+03
0.907E-01	0.378E+03
0.104E+00	0.410E+03
0.117E+00	0.439E+03
0.130E+00	0.467E+03
0.143E+00	0.494E+03
0.155E+00	0.519E+03
0.350E+00	0.896E+03
0.968E+01	0.896E+03
0.190E+02	0.896E+03
0.283E+02	0.896E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
316.50	9.33	26.0	0.357E-01	0.88	0.50	0.583E+02	0.187E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.274E+03

0.259E-01	0.391E+03
0.389E-01	0.485E+03
0.518E-01	0.565E+03
0.648E-01	0.637E+03
0.777E-01	0.704E+03
0.907E-01	0.766E+03
0.104E+00	0.824E+03
0.117E+00	0.879E+03
0.130E+00	0.931E+03
0.143E+00	0.981E+03
0.155E+00	0.103E+04
0.350E+00	0.174E+04
0.968E+01	0.174E+04
0.190E+02	0.174E+04
0.283E+02	0.174E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
203.90	9.33	26.0	0.342E-01		0.88	0.50	0.583E+02	0.116E+04

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.130E-01	0.127E+03
0.259E-01	0.203E+03
0.389E-01	0.263E+03
0.518E-01	0.314E+03
0.648E-01	0.359E+03
0.777E-01	0.401E+03
0.907E-01	0.440E+03
0.104E+00	0.476E+03
0.117E+00	0.510E+03
0.130E+00	0.543E+03
0.143E+00	0.574E+03
0.155E+00	0.604E+03
0.350E+00	0.105E+04
0.968E+01	0.105E+04
0.190E+02	0.105E+04
0.283E+02	0.105E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
353.90	9.33	26.0	0.342E-01		0.88	0.50	0.583E+02	0.201E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.130E-01	0.289E+03
0.259E-01	0.414E+03
0.389E-01	0.513E+03
0.518E-01	0.599E+03
0.648E-01	0.677E+03
0.777E-01	0.748E+03
0.907E-01	0.814E+03
0.104E+00	0.876E+03
0.117E+00	0.935E+03
0.130E+00	0.991E+03
0.143E+00	0.104E+04
0.155E+00	0.110E+04
0.350E+00	0.186E+04
0.968E+01	0.186E+04
0.190E+02	0.186E+04
0.283E+02	0.186E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

U-5114 Wall No. 1 - H = 12.5' & SPC = 5.0'

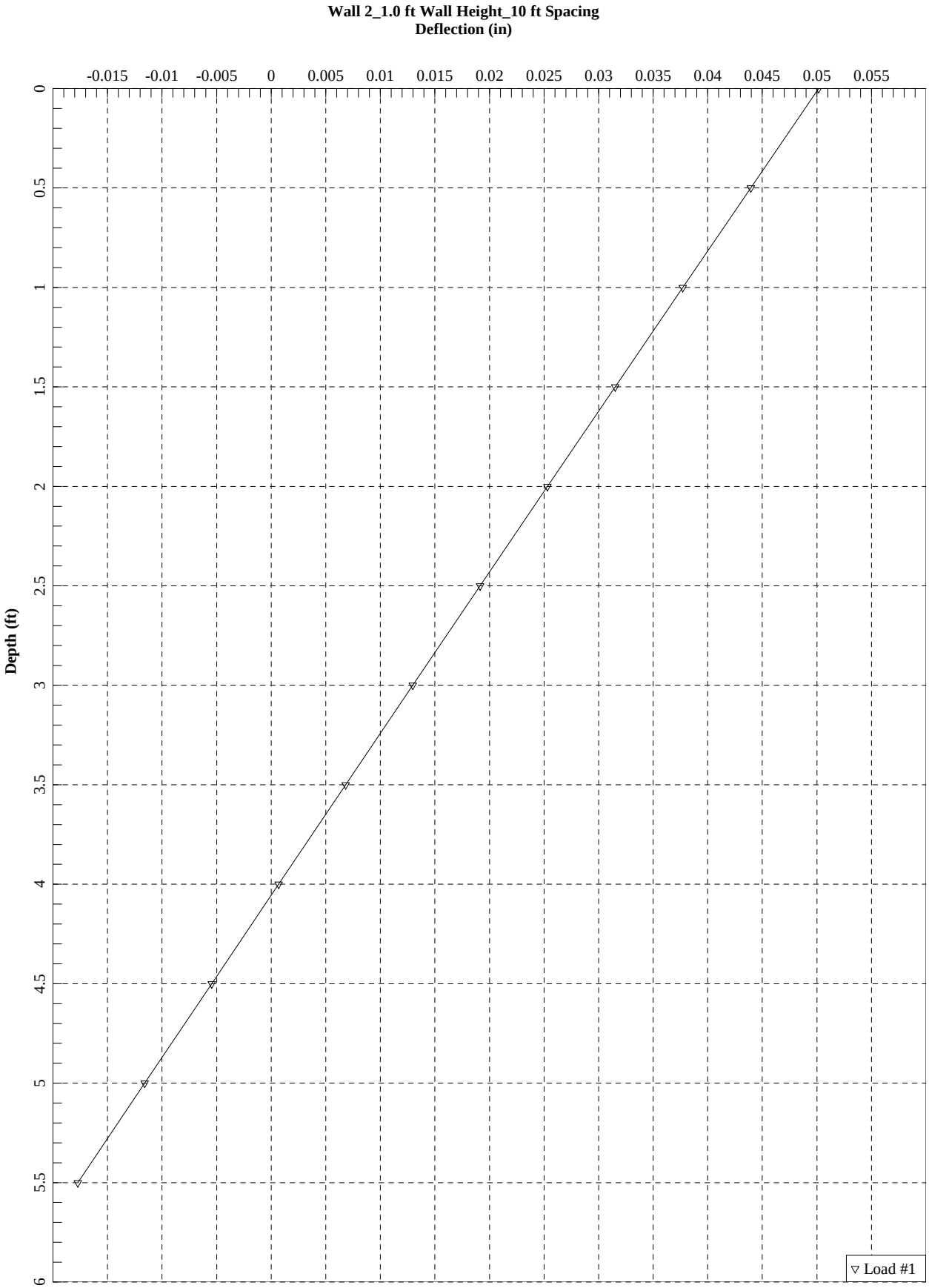
RESULTS -- ITERATION 7

STA	I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
		IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0		0.000E+00	0.958E+00	-0.420E-02	0.000E+00	0.150E+03	0.300E+03	0.177E+11
1		0.600E+01	0.933E+00	-0.420E-02	0.180E+04	0.300E+03	-0.364E-07	0.354E+11
2		0.120E+02	0.907E+00	-0.420E-02	0.360E+04	0.310E+03	0.197E+02	0.354E+11
3		0.180E+02	0.882E+00	-0.420E-02	0.552E+04	0.354E+03	0.695E+02	0.354E+11
4		0.240E+02	0.857E+00	-0.420E-02	0.785E+04	0.449E+03	0.120E+03	0.354E+11
5		0.300E+02	0.832E+00	-0.419E-02	0.109E+05	0.593E+03	0.170E+03	0.354E+11
6		0.360E+02	0.807E+00	-0.419E-02	0.150E+05	0.788E+03	0.220E+03	0.354E+11
7		0.420E+02	0.782E+00	-0.419E-02	0.204E+05	0.103E+04	0.270E+03	0.354E+11
8		0.480E+02	0.757E+00	-0.419E-02	0.274E+05	0.133E+04	0.320E+03	0.354E+11
9		0.540E+02	0.731E+00	-0.418E-02	0.363E+05	0.167E+04	0.371E+03	0.354E+11
10		0.600E+02	0.706E+00	-0.417E-02	0.474E+05	0.207E+04	0.421E+03	0.354E+11
11		0.660E+02	0.681E+00	-0.416E-02	0.611E+05	0.251E+04	0.468E+03	0.354E+11
12		0.720E+02	0.656E+00	-0.415E-02	0.776E+05	0.275E+04	0.243E-11	0.354E+11
13		0.780E+02	0.632E+00	-0.414E-02	0.941E+05	0.275E+04	-0.243E-11	0.354E+11
14		0.840E+02	0.607E+00	-0.412E-02	0.111E+06	0.276E+04	0.339E+02	0.354E+11
15		0.900E+02	0.582E+00	-0.410E-02	0.127E+06	0.282E+04	0.875E+02	0.354E+11
16		0.960E+02	0.558E+00	-0.408E-02	0.144E+06	0.294E+04	0.141E+03	0.354E+11
17		0.102E+03	0.533E+00	-0.405E-02	0.163E+06	0.311E+04	0.195E+03	0.354E+11
18		0.108E+03	0.509E+00	-0.402E-02	0.182E+06	0.333E+04	0.249E+03	0.354E+11
19		0.114E+03	0.485E+00	-0.399E-02	0.202E+06	0.361E+04	0.302E+03	0.354E+11
20		0.120E+03	0.461E+00	-0.395E-02	0.225E+06	0.393E+04	0.356E+03	0.354E+11
21		0.126E+03	0.437E+00	-0.391E-02	0.250E+06	0.432E+04	0.410E+03	0.354E+11
22		0.132E+03	0.414E+00	-0.387E-02	0.277E+06	0.475E+04	0.464E+03	0.354E+11

23	0.138E+03	0.391E+00	-0.382E-02	0.307E+06	0.560E+04	0.122E+04	0.354E+11
24	0.144E+03	0.368E+00	-0.376E-02	0.344E+06	0.684E+04	0.127E+04	0.354E+11
25	0.150E+03	0.346E+00	-0.370E-02	0.389E+06	0.819E+04	0.142E+04	0.354E+11
26	0.156E+03	0.324E+00	-0.363E-02	0.442E+06	0.887E+04	-0.718E+02	0.354E+11
27	0.162E+03	0.302E+00	-0.355E-02	0.495E+06	0.867E+04	-0.317E+03	0.354E+11
28	0.168E+03	0.281E+00	-0.346E-02	0.546E+06	0.831E+04	-0.412E+03	0.354E+11
29	0.174E+03	0.261E+00	-0.337E-02	0.595E+06	0.785E+04	-0.501E+03	0.354E+11
30	0.180E+03	0.241E+00	-0.326E-02	0.641E+06	0.731E+04	-0.583E+03	0.354E+11
31	0.186E+03	0.222E+00	-0.315E-02	0.683E+06	0.667E+04	-0.702E+03	0.354E+11
32	0.192E+03	0.203E+00	-0.303E-02	0.721E+06	0.591E+04	-0.803E+03	0.354E+11
33	0.198E+03	0.185E+00	-0.290E-02	0.754E+06	0.507E+04	-0.891E+03	0.354E+11
34	0.204E+03	0.168E+00	-0.277E-02	0.781E+06	0.414E+04	-0.965E+03	0.354E+11
35	0.210E+03	0.152E+00	-0.264E-02	0.803E+06	0.312E+04	-0.107E+04	0.354E+11
36	0.216E+03	0.137E+00	-0.250E-02	0.819E+06	0.201E+04	-0.115E+04	0.354E+11
37	0.222E+03	0.122E+00	-0.236E-02	0.827E+06	0.835E+03	-0.121E+04	0.354E+11
38	0.228E+03	0.108E+00	-0.222E-02	0.829E+06	-0.400E+03	-0.126E+04	0.354E+11
39	0.234E+03	0.953E-01	-0.208E-02	0.823E+06	-0.167E+04	-0.129E+04	0.354E+11
40	0.240E+03	0.832E-01	-0.194E-02	0.809E+06	-0.296E+04	-0.129E+04	0.354E+11
41	0.246E+03	0.720E-01	-0.181E-02	0.787E+06	-0.423E+04	-0.125E+04	0.354E+11
42	0.252E+03	0.615E-01	-0.168E-02	0.758E+06	-0.546E+04	-0.120E+04	0.354E+11
43	0.258E+03	0.518E-01	-0.155E-02	0.722E+06	-0.663E+04	-0.114E+04	0.354E+11
44	0.264E+03	0.429E-01	-0.143E-02	0.678E+06	-0.773E+04	-0.106E+04	0.354E+11
45	0.270E+03	0.346E-01	-0.132E-02	0.629E+06	-0.875E+04	-0.964E+03	0.354E+11
46	0.276E+03	0.270E-01	-0.122E-02	0.573E+06	-0.966E+04	-0.861E+03	0.354E+11
47	0.282E+03	0.200E-01	-0.113E-02	0.513E+06	-0.105E+05	-0.723E+03	0.354E+11
48	0.288E+03	0.135E-01	-0.105E-02	0.448E+06	-0.111E+05	-0.573E+03	0.354E+11
49	0.294E+03	0.740E-02	-0.977E-03	0.380E+06	-0.115E+05	-0.241E+03	0.354E+11
50	0.300E+03	0.173E-02	-0.919E-03	0.310E+06	-0.116E+05	0.995E+02	0.354E+11
51	0.306E+03	-0.363E-02	-0.872E-03	0.241E+06	-0.112E+05	0.601E+03	0.354E+11
52	0.312E+03	-0.874E-02	-0.837E-03	0.175E+06	-0.103E+05	0.116E+04	0.354E+11
53	0.318E+03	-0.137E-01	-0.812E-03	0.117E+06	-0.892E+04	0.168E+04	0.354E+11
54	0.324E+03	-0.185E-01	-0.796E-03	0.682E+05	-0.710E+04	0.196E+04	0.354E+11
55	0.330E+03	-0.232E-01	-0.788E-03	0.315E+05	-0.500E+04	0.224E+04	0.354E+11
56	0.336E+03	-0.279E-01	-0.785E-03	0.822E+04	-0.262E+04	0.251E+04	0.354E+11
57	0.342E+03	-0.326E-01	-0.784E-03	-0.341E-08	-0.685E+03	0.137E+04	0.177E+11

END OF ANALYSIS

Retaining Wall -W2-


Wall 2_1.0 ft Wall Height_10 ft Spacing
Deflection (in)
-0.015
-0.01
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
0.055
Depth (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 2 - H=1.0' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 10
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 12.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	10	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.120E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.186E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.186E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	12.0	0.7	24.0	0.064	T	0.00
2	24.0	0.7	24.0	0.064	T	12.00
3	30.0	1.4	28.0	0.067	T	36.00
4	30.0	0.0	28.0	0.067	T	66.00
5	90.0	1.4	28.0	0.067	T	96.00
6	414.0	1.4	28.0	0.067	T	186.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.120E+02	0.250E+01
0.360E+02	0.403E+01
0.660E+02	0.602E+01
0.960E+02	0.802E+01
0.186E+03	0.140E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.422E+00	0.237E+01
2	0.422E+00	0.237E+01
3	0.361E+00	0.277E+01
4	0.361E+00	0.277E+01
5	0.361E+00	0.277E+01
6	0.361E+00	0.277E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	6.00	0.00	8.00	0.00	10.11	0.43

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.878E+02
0.100E+01	0.000E+00
0.200E+01	0.000E+00
0.300E+01	0.000E+00
0.400E+01	0.000E+00
0.500E+01	0.000E+00
0.600E+01	0.000E+00
0.700E+01	0.217E+01
0.800E+01	0.540E+01
0.900E+01	0.862E+01
0.100E+02	0.118E+02
0.110E+02	0.151E+02
0.120E+02	0.182E+02

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 12.00 IN

3 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

LAYER 2
THE SOIL IS A SILT

LAYER 3
THE SOIL IS A SAND

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
8 POINTS

X,IN	WEIGHT,LBS/IN**3
12.0000	0.6366D-01
36.0000	0.6366D-01
36.0000	0.6655D-01

66.0000	0.6655D-01
66.0000	0.6655D-01
96.0000	0.6655D-01
96.0000	0.6655D-01
186.0000	0.6655D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
6 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
12.00	0.6944D+00	24.000	-----
36.00	0.6944D+00	24.000	-----
36.00	0.1389D+01	28.000	-----
66.00	0.1389D+01	28.000	-----
66.00	0.0000D+00	28.000	-----
72.00	0.0000D+00	28.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	24.0	0.637E-01	2.82	2.13	0.195E+02	0.116E+00

Y	P
IN	LBS/IN
0.000E+00	-0.142E+01
0.130E-01	-0.129E+01
0.259E-01	-0.115E+01
0.389E-01	-0.101E+01
0.518E-01	-0.877E+00
0.648E-01	-0.741E+00
0.777E-01	-0.605E+00
0.907E-01	-0.469E+00
0.104E+00	-0.333E+00
0.117E+00	-0.197E+00
0.130E+00	-0.610E-01
0.143E+00	0.751E-01
0.155E+00	0.211E+00
0.350E+00	0.225E+01
0.968E+01	0.184E+02
0.190E+02	0.184E+02
0.283E+02	0.184E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
12.10	9.33	24.0	0.637E-01	1.90	1.38	0.308E+02	0.244E+02

Y	P
IN	LBS/IN
0.000E+00	0.142E+01
0.130E-01	0.179E+02
0.259E-01	0.343E+02
0.389E-01	0.508E+02
0.518E-01	0.556E+02
0.648E-01	0.575E+02
0.777E-01	0.592E+02
0.907E-01	0.606E+02
0.104E+00	0.619E+02
0.117E+00	0.630E+02
0.130E+00	0.640E+02
0.143E+00	0.650E+02
0.155E+00	0.659E+02
0.350E+00	0.786E+02
0.968E+01	0.786E+02
0.190E+02	0.786E+02
0.283E+02	0.786E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
6.00	9.33	24.0	0.637E-01	2.37	1.75	0.251E+02	0.949E+01

Y	P
IN	LBS/IN
0.000E+00	-0.142E+01
0.130E-01	0.674E+01
0.259E-01	0.149E+02
0.389E-01	0.231E+02
0.518E-01	0.312E+02
0.648E-01	0.363E+02
0.777E-01	0.371E+02
0.907E-01	0.378E+02
0.104E+00	0.384E+02
0.117E+00	0.389E+02
0.130E+00	0.394E+02
0.143E+00	0.398E+02
0.155E+00	0.402E+02
0.350E+00	0.462E+02
0.968E+01	0.462E+02
0.190E+02	0.462E+02
0.283E+02	0.462E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
18.00	9.33	24.0	0.637E-01	1.52	1.08		0.364E+02	0.437E+02

Y IN	P LBS/IN
0.000E+00	0.142E+01
0.130E-01	0.259E+02
0.259E-01	0.504E+02
0.389E-01	0.663E+02
0.518E-01	0.698E+02
0.648E-01	0.727E+02
0.777E-01	0.751E+02
0.907E-01	0.772E+02
0.104E+00	0.791E+02
0.117E+00	0.808E+02
0.130E+00	0.823E+02
0.143E+00	0.838E+02
0.155E+00	0.851E+02
0.350E+00	0.104E+03
0.968E+01	0.104E+03
0.190E+02	0.104E+03
0.283E+02	0.104E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
12.00	9.33	24.0	0.637E-01	1.91	1.39		0.307E+02	0.241E+02

Y IN	P LBS/IN
0.000E+00	-0.142E+01
0.130E-01	0.149E+02
0.259E-01	0.312E+02
0.389E-01	0.476E+02
0.518E-01	0.525E+02
0.648E-01	0.544E+02
0.777E-01	0.560E+02
0.907E-01	0.574E+02
0.104E+00	0.587E+02
0.117E+00	0.598E+02
0.130E+00	0.608E+02
0.143E+00	0.618E+02
0.155E+00	0.627E+02

0.350E+00	0.753E+02
0.968E+01	0.753E+02
0.190E+02	0.753E+02
0.283E+02	0.753E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
24.00	9.33	24.0	0.637E-01	1.21	0.84	0.420E+02	0.685E+02	

Y	P
IN	LBS/IN
0.000E+00	0.142E+01
0.130E-01	0.341E+02
0.259E-01	0.667E+02
0.389E-01	0.766E+02
0.518E-01	0.811E+02
0.648E-01	0.847E+02
0.777E-01	0.879E+02
0.907E-01	0.906E+02
0.104E+00	0.930E+02
0.117E+00	0.952E+02
0.130E+00	0.973E+02
0.143E+00	0.991E+02
0.155E+00	0.101E+03
0.350E+00	0.126E+03
0.968E+01	0.126E+03
0.190E+02	0.126E+03
0.283E+02	0.126E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
18.00	9.33	24.0	0.637E-01	1.52	1.08	0.364E+02	0.437E+02	

Y	P
IN	LBS/IN
0.000E+00	-0.142E+01
0.130E-01	0.231E+02
0.259E-01	0.476E+02
0.389E-01	0.635E+02
0.518E-01	0.670E+02
0.648E-01	0.698E+02
0.777E-01	0.723E+02
0.907E-01	0.744E+02

0.104E+00	0.763E+02
0.117E+00	0.779E+02
0.130E+00	0.795E+02
0.143E+00	0.809E+02
0.155E+00	0.822E+02
0.350E+00	0.101E+03
0.968E+01	0.101E+03
0.190E+02	0.101E+03
0.283E+02	0.101E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
30.00	9.33	24.0	0.637E-01	1.03	0.67		0.477E+02	0.983E+02

Y	P
IN	LBS/IN
0.000E+00	0.142E+01
0.130E-01	0.422E+02
0.259E-01	0.747E+02
0.389E-01	0.823E+02
0.518E-01	0.883E+02
0.648E-01	0.931E+02
0.777E-01	0.973E+02
0.907E-01	0.101E+03
0.104E+00	0.104E+03
0.117E+00	0.107E+03
0.130E+00	0.110E+03
0.143E+00	0.113E+03
0.155E+00	0.115E+03
0.350E+00	0.150E+03
0.968E+01	0.150E+03
0.190E+02	0.150E+03
0.283E+02	0.150E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
23.90	9.33	24.0	0.637E-01	1.21	0.84		0.419E+02	0.680E+02

Y	P
IN	LBS/IN
0.000E+00	-0.142E+01
0.130E-01	0.311E+02
0.259E-01	0.636E+02

0.389E-01	0.736E+02
0.518E-01	0.781E+02
0.648E-01	0.817E+02
0.777E-01	0.848E+02
0.907E-01	0.876E+02
0.104E+00	0.900E+02
0.117E+00	0.922E+02
0.130E+00	0.942E+02
0.143E+00	0.960E+02
0.155E+00	0.978E+02
0.350E+00	0.123E+03
0.968E+01	0.123E+03
0.190E+02	0.123E+03
0.283E+02	0.123E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
35.90	9.33	24.0	0.637E-01	0.92	0.56	0.532E+02	0.133E+03	

Y	P
IN	LBS/IN
0.000E+00	0.142E+01
0.130E-01	0.503E+02
0.259E-01	0.749E+02
0.389E-01	0.846E+02
0.518E-01	0.923E+02
0.648E-01	0.987E+02
0.777E-01	0.104E+03
0.907E-01	0.109E+03
0.104E+00	0.114E+03
0.117E+00	0.118E+03
0.130E+00	0.122E+03
0.143E+00	0.125E+03
0.155E+00	0.129E+03
0.350E+00	0.177E+03
0.968E+01	0.177E+03
0.190E+02	0.177E+03
0.283E+02	0.177E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
24.10	9.33	28.0	0.637E-01	1.54	1.09	0.617E+02	0.574E+02	

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.299E+02
0.259E-01	0.598E+02
0.389E-01	0.896E+02
0.518E-01	0.104E+03
0.648E-01	0.108E+03
0.777E-01	0.111E+03
0.907E-01	0.114E+03
0.104E+00	0.117E+03
0.117E+00	0.119E+03
0.130E+00	0.121E+03
0.143E+00	0.123E+03
0.155E+00	0.125E+03
0.350E+00	0.150E+03
0.968E+01	0.150E+03
0.190E+02	0.150E+03
0.283E+02	0.150E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
36.10	9.33	28.0	0.637E-01	1.03	0.68	0.772E+02	0.133E+03	

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.501E+02
0.259E-01	0.100E+03
0.389E-01	0.122E+03
0.518E-01	0.130E+03
0.648E-01	0.137E+03
0.777E-01	0.143E+03
0.907E-01	0.148E+03
0.104E+00	0.152E+03
0.117E+00	0.156E+03
0.130E+00	0.160E+03
0.143E+00	0.164E+03
0.155E+00	0.167E+03
0.350E+00	0.214E+03
0.968E+01	0.214E+03
0.190E+02	0.214E+03
0.283E+02	0.214E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
31.50	9.33	28.0	0.643E-01	1.16	0.80	0.714E+02	0.101E+03

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.423E+02
0.259E-01	0.847E+02
0.389E-01	0.117E+03
0.518E-01	0.124E+03
0.648E-01	0.129E+03
0.777E-01	0.134E+03
0.907E-01	0.138E+03
0.104E+00	0.141E+03
0.117E+00	0.144E+03
0.130E+00	0.147E+03
0.143E+00	0.150E+03
0.155E+00	0.153E+03
0.350E+00	0.189E+03
0.968E+01	0.189E+03
0.190E+02	0.189E+03
0.283E+02	0.189E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
43.50	9.33	28.0	0.643E-01	0.90	0.53	0.870E+02	0.196E+03

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.626E+02
0.259E-01	0.111E+03
0.389E-01	0.126E+03
0.518E-01	0.137E+03
0.648E-01	0.147E+03
0.777E-01	0.155E+03
0.907E-01	0.163E+03
0.104E+00	0.169E+03
0.117E+00	0.175E+03
0.130E+00	0.181E+03
0.143E+00	0.186E+03
0.155E+00	0.191E+03
0.350E+00	0.264E+03
0.968E+01	0.264E+03
0.190E+02	0.264E+03
0.283E+02	0.264E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
39.00	9.33	28.0	0.648E-01	0.98	0.62		0.813E+02	0.158E+03

Y IN	P LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.550E+02
0.259E-01	0.110E+03
0.389E-01	0.126E+03
0.518E-01	0.136E+03
0.648E-01	0.144E+03
0.777E-01	0.150E+03
0.907E-01	0.156E+03
0.104E+00	0.162E+03
0.117E+00	0.167E+03
0.130E+00	0.171E+03
0.143E+00	0.175E+03
0.155E+00	0.179E+03
0.350E+00	0.236E+03
0.968E+01	0.236E+03
0.190E+02	0.236E+03
0.283E+02	0.236E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
51.00	9.33	28.0	0.648E-01	0.88	0.51		0.968E+02	0.271E+03

Y IN	P LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.752E+02
0.259E-01	0.125E+03
0.389E-01	0.144E+03
0.518E-01	0.159E+03
0.648E-01	0.172E+03
0.777E-01	0.184E+03
0.907E-01	0.194E+03
0.104E+00	0.203E+03
0.117E+00	0.212E+03
0.130E+00	0.220E+03
0.143E+00	0.227E+03
0.155E+00	0.234E+03

0.350E+00	0.337E+03
0.968E+01	0.337E+03
0.190E+02	0.337E+03
0.283E+02	0.337E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
46.50	9.33	28.0	0.651E-01		0.89	0.52	0.911E+02	0.226E+03

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.676E+02
0.259E-01	0.117E+03
0.389E-01	0.134E+03
0.518E-01	0.147E+03
0.648E-01	0.158E+03
0.777E-01	0.167E+03
0.907E-01	0.176E+03
0.104E+00	0.183E+03
0.117E+00	0.190E+03
0.130E+00	0.197E+03
0.143E+00	0.203E+03
0.155E+00	0.209E+03
0.350E+00	0.293E+03
0.968E+01	0.293E+03
0.190E+02	0.293E+03
0.283E+02	0.293E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
58.50	9.33	28.0	0.651E-01		0.88	0.50	0.107E+03	0.359E+03

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.878E+02
0.259E-01	0.145E+03
0.389E-01	0.169E+03
0.518E-01	0.188E+03
0.648E-01	0.205E+03
0.777E-01	0.220E+03
0.907E-01	0.233E+03

0.104E+00	0.245E+03
0.117E+00	0.257E+03
0.130E+00	0.267E+03
0.143E+00	0.277E+03
0.155E+00	0.286E+03
0.350E+00	0.423E+03
0.968E+01	0.423E+03
0.190E+02	0.423E+03
0.283E+02	0.423E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
53.90	9.33	28.0	0.653E-01	0.88	0.50	0.101E+03	0.306E+03	

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.801E+02
0.259E-01	0.132E+03
0.389E-01	0.153E+03
0.518E-01	0.170E+03
0.648E-01	0.184E+03
0.777E-01	0.197E+03
0.907E-01	0.208E+03
0.104E+00	0.219E+03
0.117E+00	0.228E+03
0.130E+00	0.237E+03
0.143E+00	0.246E+03
0.155E+00	0.254E+03
0.350E+00	0.370E+03
0.968E+01	0.370E+03
0.190E+02	0.370E+03
0.283E+02	0.370E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
65.90	9.33	28.0	0.653E-01	0.88	0.50	0.116E+03	0.457E+03	

Y	P
IN	LBS/IN
0.000E+00	0.000E+00
0.130E-01	0.100E+03
0.259E-01	0.168E+03

0.389E-01	0.197E+03
0.518E-01	0.222E+03
0.648E-01	0.243E+03
0.777E-01	0.261E+03
0.907E-01	0.278E+03
0.104E+00	0.293E+03
0.117E+00	0.307E+03
0.130E+00	0.321E+03
0.143E+00	0.333E+03
0.155E+00	0.345E+03
0.350E+00	0.519E+03
0.968E+01	0.519E+03
0.190E+02	0.519E+03
0.283E+02	0.519E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	PHI	GAMMA	AVG	A	B	PCT	PCD
IN	IN		LBS/IN**3					
54.10	9.33	28.00	0.65E-01	0.88	0.50	0.43E+03	0.79E+03	

Y	P
IN	LBS/IN
0.000	-8.421
0.013	39.204
0.026	64.167
0.039	84.460
0.052	102.213
0.065	118.289
0.078	133.143
0.091	147.053
0.104	160.202
0.117	172.720
0.130	184.703
0.143	196.225
0.155	207.343
0.350	371.324
9.680	371.324
19.010	371.324
28.340	371.324

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	PHI	GAMMA	AVG	A	B	PCT	PCD
IN	IN		LBS/IN**3					
66.10	9.33	28.00	0.65E-01	0.88	0.50	0.61E+03	0.96E+03	

Y	P
IN	LBS/IN
0.000	8.421
0.013	75.589
0.026	110.795
0.039	139.416
0.052	164.454
0.065	187.126
0.078	208.076
0.091	227.693
0.104	246.237
0.117	263.893
0.130	280.793
0.143	297.043
0.155	312.723
0.350	543.993
9.680	543.993
19.010	543.993
28.340	543.993

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	PHI	GAMMA AVG	A	B	PCT	PCD
IN	IN	LBS/IN**3					
55.50	9.33	28.00	0.65E-01	0.88	0.50	0.45E+03	0.81E+03

Y	P
IN	LBS/IN
0.000	-8.421
0.013	41.338
0.026	67.419
0.039	88.621
0.052	107.170
0.065	123.966
0.078	139.485
0.091	154.018
0.104	167.756
0.117	180.835
0.130	193.356
0.143	205.394
0.155	217.010
0.350	388.337
9.680	388.337
19.010	388.337
28.340	388.337

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	PCT	PCD
67.50	9.33	28.00	0.65E-01	0.88	0.50		0.63E+03	0.97E+03

Y IN	P LBS/IN
0.000	8.421
0.013	78.120
0.026	114.652
0.039	144.351
0.052	170.333
0.065	193.859
0.078	215.598
0.091	235.954
0.104	255.198
0.117	273.518
0.130	291.056
0.143	307.918
0.155	324.189
0.350	564.172
9.680	564.172
19.010	564.172
28.340	564.172

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	PCT	PCD
57.00	9.33	28.00	0.65E-01	0.88	0.50		0.47E+03	0.83E+03

Y IN	P LBS/IN
0.000	-8.421
0.013	43.675
0.026	70.981
0.039	93.179
0.052	112.599
0.065	130.184
0.078	146.433
0.091	161.648
0.104	176.031
0.117	189.725
0.130	202.833
0.143	215.437
0.155	227.598
0.350	406.973
9.680	406.973
19.010	406.973
28.340	406.973

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	PCT	PCD
69.00	9.33	28.00	0.65E-01		0.88	0.50	0.66E+03	0.10E+04

Y IN	P LBS/IN
0.000	8.421
0.013	80.882
0.026	118.863
0.039	149.738
0.052	176.750
0.065	201.209
0.078	223.809
0.091	244.972
0.104	264.978
0.117	284.025
0.130	302.257
0.143	319.788
0.155	336.704
0.350	586.198
9.680	586.198
19.010	586.198
28.340	586.198

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	PCT	PCD
58.50	9.33	28.00	0.65E-01		0.88	0.50	0.49E+03	0.85E+03

Y IN	P LBS/IN
0.000	-8.421
0.013	46.065
0.026	74.624
0.039	97.840
0.052	118.151
0.065	136.543
0.078	153.537
0.091	169.450
0.104	184.493
0.117	198.815
0.130	212.525
0.143	225.707
0.155	238.426

0.350	426.030
9.680	426.030
19.010	426.030
28.340	426.030

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	PHI	GAMMA AVG	A	B	PCT	PCD
IN	IN		LBS/IN**3				
70.50	9.33	28.00	0.65E-01	0.88	0.50	0.68E+03	0.10E+04

Y	P
IN	LBS/IN
0.000	8.421
0.013	83.697
0.026	123.153
0.039	155.229
0.052	183.289
0.065	208.699
0.078	232.177
0.091	254.162
0.104	274.946
0.117	294.732
0.130	313.673
0.143	331.885
0.155	349.458
0.350	608.645
9.680	608.645
19.010	608.645
28.340	608.645

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	PHI	GAMMA AVG	A	B	PCT	PCD
IN	IN		LBS/IN**3				
59.90	9.33	28.00	0.65E-01	0.88	0.50	0.51E+03	0.87E+03

Y	P
IN	LBS/IN
0.000	-8.421
0.013	48.343
0.026	78.096
0.039	102.284
0.052	123.444
0.065	142.605
0.078	160.309
0.091	176.888

0.104	192.560
0.117	207.481
0.130	221.764
0.143	235.497
0.155	248.748
0.350	444.197
9.680	444.197
19.010	444.197
28.340	444.197

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH BELOW GS IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	PCT	PCD
71.90	9.33	28.00	0.65E-01	0.88	0.50		0.71E+03	0.10E+04

Y IN	P LBS/IN
0.000	8.421
0.013	86.373
0.026	127.230
0.039	160.446
0.052	189.504
0.065	215.816
0.078	240.129
0.091	262.895
0.104	284.417
0.117	304.907
0.130	324.521
0.143	343.379
0.155	361.577
0.350	629.975
9.680	629.975
19.010	629.975
28.340	629.975

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

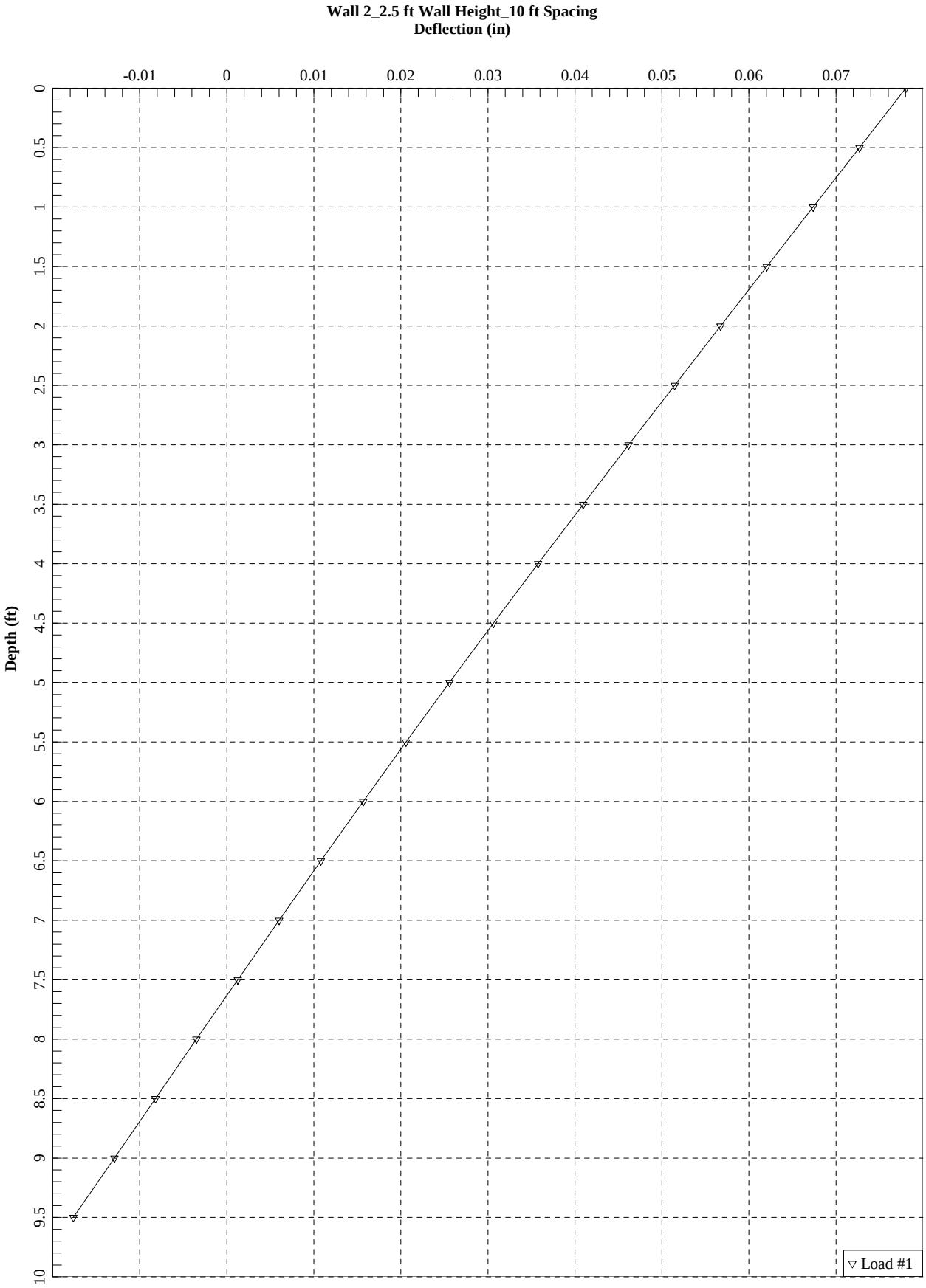
U-5114 Wall No. 2 - H=1.0' & SPC = 10.0'

RESULTS -- ITERATION 4

STA	I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0		0.000E+00	0.502E-01	-0.104E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.439E-01	-0.104E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.377E-01	-0.103E-02	0.360E+04	0.356E+03	0.113E+03	0.211E+11
3		0.180E+02	0.315E-01	-0.103E-02	0.608E+04	0.357E+03	-0.111E+03	0.211E+11

4	0.240E+02	0.253E-01	-0.103E-02	0.789E+04	0.210E+03	-0.183E+03	0.211E+11
5	0.300E+02	0.191E-01	-0.103E-02	0.860E+04	0.147E+02	-0.209E+03	0.211E+11
6	0.360E+02	0.130E-01	-0.103E-02	0.806E+04	-0.183E+03	-0.186E+03	0.211E+11
7	0.420E+02	0.682E-02	-0.102E-02	0.641E+04	-0.342E+03	-0.133E+03	0.211E+11
8	0.480E+02	0.679E-03	-0.102E-02	0.395E+04	-0.417E+03	-0.152E+02	0.211E+11
9	0.540E+02	-0.546E-02	-0.102E-02	0.141E+04	-0.330E+03	0.189E+03	0.211E+11
10	0.600E+02	-0.116E-01	-0.102E-02	0.102E-08	-0.117E+03	0.235E+03	0.106E+11

END OF ANALYSIS


Wall 2_2.5 ft Wall Height_10 ft Spacing
Deflection (in)
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Depth (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 2 - H = 2.5' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 18
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 30.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	18	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.300E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.240E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.240E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	30.0	0.7	26.0	0.064	T	0.00
2	174.0	0.7	26.0	0.064	T	30.00
3	36.0	0.7	26.0	0.064	T	204.00
4	360.0	0.7	26.0	0.064	T	240.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.300E+02	0.365E+01
0.204E+03	0.147E+02
0.240E+03	0.170E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01
4	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER	PA1	Z1	PA2	Z2	PA3	Z3	PA4

NO	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2
1	0.00	15.00	0.00	20.00	0.00	22.55	6.21

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.814E+02
0.100E+01	0.000E+00
0.200E+01	0.000E+00
0.300E+01	0.000E+00
0.400E+01	0.000E+00
0.500E+01	0.000E+00
0.600E+01	0.000E+00
0.700E+01	0.000E+00
0.800E+01	0.106E+01
0.900E+01	0.404E+01
0.100E+02	0.703E+01
0.110E+02	0.100E+02
0.120E+02	0.130E+02
0.130E+02	0.160E+02
0.140E+02	0.190E+02
0.150E+02	0.220E+02
0.160E+02	0.250E+02
0.170E+02	0.280E+02
0.180E+02	0.308E+02
0.190E+02	0.338E+02
0.200E+02	0.368E+02
0.210E+02	0.398E+02
0.220E+02	0.428E+02
0.230E+02	0.458E+02
0.240E+02	0.488E+02
0.250E+02	0.517E+02
0.260E+02	0.547E+02
0.270E+02	0.577E+02
0.280E+02	0.607E+02
0.290E+02	0.637E+02
0.300E+02	0.667E+02

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 30.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH

4 POINTS

X,IN	WEIGHT,LBS/IN**3
30.0000	0.6366D-01
204.0000	0.6366D-01
204.0000	0.6366D-01
240.0000	0.6366D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH

2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
30.00	0.6944D+00	26.000	-----
120.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	-0.504E+01
0.259E-01	-0.489E+01
0.389E-01	-0.474E+01
0.518E-01	-0.459E+01
0.648E-01	-0.444E+01
0.777E-01	-0.429E+01
0.907E-01	-0.414E+01
0.104E+00	-0.399E+01
0.117E+00	-0.384E+01
0.130E+00	-0.369E+01
0.143E+00	-0.355E+01
0.155E+00	-0.340E+01
0.350E+00	-0.116E+01
0.968E+01	0.147E+02
0.190E+02	0.147E+02
0.283E+02	0.147E+02

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
30.10	9.33	26.0	0.637E-01	1.02	0.67		0.478E+02	0.116E+03

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.500E+02
0.259E-01	0.835E+02
0.389E-01	0.923E+02
0.518E-01	0.991E+02
0.648E-01	0.105E+03
0.777E-01	0.110E+03
0.907E-01	0.114E+03
0.104E+00	0.118E+03
0.117E+00	0.121E+03
0.130E+00	0.125E+03
0.143E+00	0.128E+03
0.155E+00	0.130E+03
0.350E+00	0.172E+03
0.968E+01	0.172E+03
0.190E+02	0.172E+03
0.283E+02	0.172E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
22.50	9.33	26.0	0.637E-01	1.27	0.89		0.406E+02	0.720E+02

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.283E+02
0.259E-01	0.619E+02
0.389E-01	0.734E+02
0.518E-01	0.783E+02
0.648E-01	0.822E+02
0.777E-01	0.856E+02
0.907E-01	0.886E+02
0.104E+00	0.913E+02
0.117E+00	0.937E+02
0.130E+00	0.959E+02
0.143E+00	0.979E+02
0.155E+00	0.998E+02
0.350E+00	0.127E+03
0.968E+01	0.127E+03
0.190E+02	0.127E+03
0.283E+02	0.127E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
52.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.302E+03

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.756E+02
0.259E-01	0.101E+03
0.389E-01	0.119E+03
0.518E-01	0.134E+03
0.648E-01	0.148E+03
0.777E-01	0.160E+03
0.907E-01	0.170E+03
0.104E+00	0.180E+03
0.117E+00	0.190E+03
0.130E+00	0.198E+03
0.143E+00	0.207E+03
0.155E+00	0.214E+03
0.350E+00	0.329E+03
0.968E+01	0.329E+03
0.190E+02	0.329E+03
0.283E+02	0.329E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
45.00	9.33	26.0	0.637E-01	0.88	0.51	0.583E+02	0.230E+03

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.596E+02
0.259E-01	0.803E+02
0.389E-01	0.953E+02
0.518E-01	0.107E+03
0.648E-01	0.118E+03
0.777E-01	0.127E+03
0.907E-01	0.136E+03
0.104E+00	0.143E+03
0.117E+00	0.150E+03
0.130E+00	0.157E+03
0.143E+00	0.163E+03
0.155E+00	0.169E+03
0.350E+00	0.256E+03
0.968E+01	0.256E+03

0.190E+02	0.256E+03
0.283E+02	0.256E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
75.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.575E+03

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.104E+03
0.259E-01	0.145E+03
0.389E-01	0.177E+03
0.518E-01	0.204E+03
0.648E-01	0.227E+03
0.777E-01	0.249E+03
0.907E-01	0.268E+03
0.104E+00	0.287E+03
0.117E+00	0.304E+03
0.130E+00	0.320E+03
0.143E+00	0.336E+03
0.155E+00	0.351E+03
0.350E+00	0.569E+03
0.968E+01	0.569E+03
0.190E+02	0.569E+03
0.283E+02	0.569E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
67.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.474E+03

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.827E+02
0.259E-01	0.118E+03
0.389E-01	0.145E+03
0.518E-01	0.168E+03
0.648E-01	0.188E+03
0.777E-01	0.205E+03
0.907E-01	0.222E+03
0.104E+00	0.237E+03
0.117E+00	0.252E+03

0.130E+00	0.265E+03
0.143E+00	0.278E+03
0.155E+00	0.290E+03
0.350E+00	0.470E+03
0.968E+01	0.470E+03
0.190E+02	0.470E+03
0.283E+02	0.470E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
97.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.934E+03	

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.142E+03
0.259E-01	0.205E+03
0.389E-01	0.253E+03
0.518E-01	0.295E+03
0.648E-01	0.332E+03
0.777E-01	0.366E+03
0.907E-01	0.398E+03
0.104E+00	0.427E+03
0.117E+00	0.455E+03
0.130E+00	0.481E+03
0.143E+00	0.506E+03
0.155E+00	0.530E+03
0.350E+00	0.885E+03
0.968E+01	0.885E+03
0.190E+02	0.885E+03
0.283E+02	0.885E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
89.90	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.803E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.518E+01
0.130E-01	0.118E+03
0.259E-01	0.172E+03
0.389E-01	0.215E+03
0.518E-01	0.251E+03

0.648E-01	0.284E+03
0.777E-01	0.313E+03
0.907E-01	0.340E+03
0.104E+00	0.365E+03
0.117E+00	0.389E+03
0.130E+00	0.412E+03
0.143E+00	0.434E+03
0.155E+00	0.454E+03
0.350E+00	0.760E+03
0.968E+01	0.760E+03
0.190E+02	0.760E+03
0.283E+02	0.760E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN	LBS/IN**3					
119.90	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.126E+04

Y	P
IN	LBS/IN
0.000E+00	0.518E+01
0.130E-01	0.178E+03
0.259E-01	0.259E+03
0.389E-01	0.323E+03
0.518E-01	0.379E+03
0.648E-01	0.428E+03
0.777E-01	0.473E+03
0.907E-01	0.515E+03
0.104E+00	0.554E+03
0.117E+00	0.591E+03
0.130E+00	0.627E+03
0.143E+00	0.661E+03
0.155E+00	0.693E+03
0.350E+00	0.117E+04
0.968E+01	0.117E+04
0.190E+02	0.117E+04
0.283E+02	0.117E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

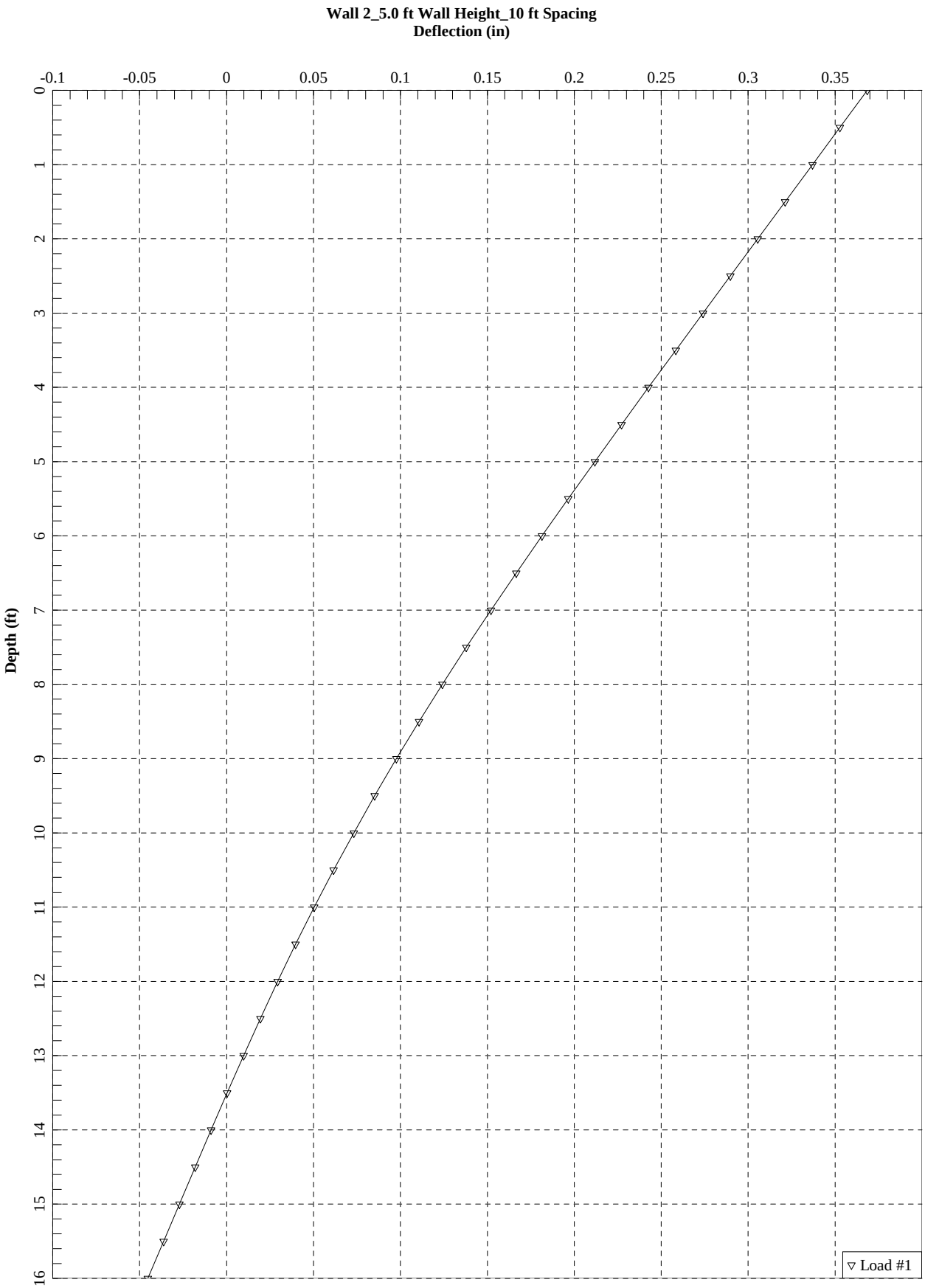
U-5114 Wall No. 2 - H = 2.5' & SPC = 10.0'

RESULTS -- ITERATION 5

STA I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
	IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0	0.000E+00	0.780E-01	-0.888E-03	0.000E+00	0.150E+03	0.300E+03	0.106E+11

1	0.600E+01	0.727E-01	-0.888E-03	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2	0.120E+02	0.674E-01	-0.887E-03	0.360E+04	0.339E+03	0.778E+02	0.211E+11
3	0.180E+02	0.621E-01	-0.886E-03	0.587E+04	0.470E+03	0.185E+03	0.211E+11
4	0.240E+02	0.567E-01	-0.884E-03	0.924E+04	0.709E+03	0.293E+03	0.211E+11
5	0.300E+02	0.514E-01	-0.880E-03	0.144E+05	0.106E+04	0.414E+03	0.211E+11
6	0.360E+02	0.462E-01	-0.875E-03	0.220E+05	0.122E+04	-0.933E+02	0.211E+11
7	0.420E+02	0.409E-01	-0.868E-03	0.291E+05	0.107E+04	-0.208E+03	0.211E+11
8	0.480E+02	0.358E-01	-0.859E-03	0.349E+05	0.813E+03	-0.311E+03	0.211E+11
9	0.540E+02	0.306E-01	-0.848E-03	0.388E+05	0.459E+03	-0.397E+03	0.211E+11
10	0.600E+02	0.256E-01	-0.837E-03	0.404E+05	0.638E+02	-0.395E+03	0.211E+11
11	0.660E+02	0.206E-01	-0.826E-03	0.396E+05	-0.313E+03	-0.360E+03	0.211E+11
12	0.720E+02	0.157E-01	-0.815E-03	0.366E+05	-0.663E+03	-0.340E+03	0.211E+11
13	0.780E+02	0.108E-01	-0.805E-03	0.316E+05	-0.980E+03	-0.292E+03	0.211E+11
14	0.840E+02	0.601E-02	-0.797E-03	0.249E+05	-0.121E+04	-0.170E+03	0.211E+11
15	0.900E+02	0.125E-02	-0.791E-03	0.171E+05	-0.130E+04	-0.152E+02	0.211E+11
16	0.960E+02	-0.348E-02	-0.788E-03	0.922E+04	-0.119E+04	0.251E+03	0.211E+11
17	0.102E+03	-0.820E-02	-0.786E-03	0.286E+04	-0.768E+03	0.583E+03	0.211E+11
18	0.108E+03	-0.129E-01	-0.785E-03	-0.102E-08	-0.238E+03	0.477E+03	0.106E+11

END OF ANALYSIS


Wall 2_5.0 ft Wall Height_10 ft Spacing
Deflection (in)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES
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U-5114 Wall No. 2 - H = 5.0' & SPC = 10.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 31
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 60.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	31	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.600E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.240E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.240E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	60.0	0.7	26.0	0.064	T	0.00
2	144.0	0.7	26.0	0.064	T	60.00
3	36.0	1.4	25.0	0.064	T	204.00
4	360.0	1.4	25.0	0.064	T	240.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.600E+02	0.556E+01
0.204E+03	0.147E+02
0.240E+03	0.170E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.406E+00	0.246E+01
4	0.406E+00	0.246E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER	PA1	Z1	PA2	Z2	PA3	Z3	PA4

NO	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2
1	0.00	30.00	0.00	40.00	0.00	42.55	34.07

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.814E+02
0.600E+01	0.000E+00
0.120E+02	0.130E+02
0.180E+02	0.308E+02
0.240E+02	0.488E+02
0.300E+02	0.667E+02
0.360E+02	0.846E+02
0.420E+02	0.102E+03
0.480E+02	0.120E+03
0.540E+02	0.138E+03
0.600E+02	0.156E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 60.00 IN

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
60.0000	0.6366D-01
204.0000	0.6366D-01
204.0000	0.6366D-01
240.0000	0.6366D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
60.00	0.6944D+00	26.000	-----
198.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	-0.120E+02
0.259E-01	-0.118E+02
0.389E-01	-0.117E+02
0.518E-01	-0.115E+02
0.648E-01	-0.114E+02
0.777E-01	-0.112E+02
0.907E-01	-0.111E+02
0.104E+00	-0.109E+02
0.117E+00	-0.108E+02
0.130E+00	-0.107E+02
0.143E+00	-0.105E+02
0.155E+00	-0.104E+02
0.350E+00	-0.812E+01
0.968E+01	0.776E+01
0.190E+02	0.776E+01
0.283E+02	0.776E+01

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
60.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.384E+03

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.907E+02
0.259E-01	0.121E+03
0.389E-01	0.143E+03
0.518E-01	0.162E+03
0.648E-01	0.179E+03
0.777E-01	0.193E+03
0.907E-01	0.207E+03
0.104E+00	0.219E+03
0.117E+00	0.231E+03
0.130E+00	0.242E+03
0.143E+00	0.253E+03
0.155E+00	0.263E+03
0.350E+00	0.409E+03
0.968E+01	0.409E+03

0.190E+02	0.409E+03
0.283E+02	0.409E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
34.50	9.33	26.0	0.637E-01	0.95	0.58	0.519E+02	0.146E+03

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.393E+02
0.259E-01	0.666E+02
0.389E-01	0.771E+02
0.518E-01	0.854E+02
0.648E-01	0.924E+02
0.777E-01	0.984E+02
0.907E-01	0.104E+03
0.104E+00	0.109E+03
0.117E+00	0.113E+03
0.130E+00	0.117E+03
0.143E+00	0.121E+03
0.155E+00	0.125E+03
0.350E+00	0.178E+03
0.968E+01	0.178E+03
0.190E+02	0.178E+03
0.283E+02	0.178E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
94.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.881E+03

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.143E+03
0.259E-01	0.203E+03
0.389E-01	0.249E+03
0.518E-01	0.289E+03
0.648E-01	0.324E+03
0.777E-01	0.356E+03
0.907E-01	0.386E+03
0.104E+00	0.413E+03
0.117E+00	0.439E+03

0.130E+00	0.464E+03
0.143E+00	0.488E+03
0.155E+00	0.511E+03
0.350E+00	0.845E+03
0.968E+01	0.845E+03
0.190E+02	0.845E+03
0.283E+02	0.845E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
69.00	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.494E+03

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.777E+02
0.259E-01	0.114E+03
0.389E-01	0.142E+03
0.518E-01	0.166E+03
0.648E-01	0.186E+03
0.777E-01	0.205E+03
0.907E-01	0.222E+03
0.104E+00	0.238E+03
0.117E+00	0.253E+03
0.130E+00	0.267E+03
0.143E+00	0.280E+03
0.155E+00	0.293E+03
0.350E+00	0.480E+03
0.968E+01	0.480E+03
0.190E+02	0.480E+03
0.283E+02	0.480E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
129.00	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.136E+04

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.195E+03
0.259E-01	0.282E+03
0.389E-01	0.351E+03
0.518E-01	0.410E+03

0.648E-01	0.463E+03
0.777E-01	0.511E+03
0.907E-01	0.556E+03
0.104E+00	0.599E+03
0.117E+00	0.639E+03
0.130E+00	0.677E+03
0.143E+00	0.713E+03
0.155E+00	0.748E+03
0.350E+00	0.126E+04
0.968E+01	0.126E+04
0.190E+02	0.126E+04
0.283E+02	0.126E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
103.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.104E+04

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.137E+03
0.259E-01	0.206E+03
0.389E-01	0.260E+03
0.518E-01	0.306E+03
0.648E-01	0.347E+03
0.777E-01	0.385E+03
0.907E-01	0.420E+03
0.104E+00	0.453E+03
0.117E+00	0.484E+03
0.130E+00	0.513E+03
0.143E+00	0.541E+03
0.155E+00	0.568E+03
0.350E+00	0.965E+03
0.968E+01	0.965E+03
0.190E+02	0.965E+03
0.283E+02	0.965E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
163.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.172E+04

Y	P
IN	LBS/IN

0.000E+00	0.121E+02
0.130E-01	0.235E+03
0.259E-01	0.343E+03
0.389E-01	0.429E+03
0.518E-01	0.503E+03
0.648E-01	0.569E+03
0.777E-01	0.630E+03
0.907E-01	0.687E+03
0.104E+00	0.740E+03
0.117E+00	0.791E+03
0.130E+00	0.839E+03
0.143E+00	0.885E+03
0.155E+00	0.929E+03
0.350E+00	0.158E+04
0.968E+01	0.158E+04
0.190E+02	0.158E+04
0.283E+02	0.158E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
137.90	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.145E+04

Y	P
IN	LBS/IN
0.000E+00	-0.121E+02
0.130E-01	0.181E+03
0.259E-01	0.273E+03
0.389E-01	0.347E+03
0.518E-01	0.410E+03
0.648E-01	0.466E+03
0.777E-01	0.518E+03
0.907E-01	0.566E+03
0.104E+00	0.611E+03
0.117E+00	0.654E+03
0.130E+00	0.694E+03
0.143E+00	0.733E+03
0.155E+00	0.770E+03
0.350E+00	0.132E+04
0.968E+01	0.132E+04
0.190E+02	0.132E+04
0.283E+02	0.132E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí

IN	IN	LBS/IN**3					
197.90	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.208E+04

Y	P
IN	LBS/IN
0.000E+00	0.121E+02
0.130E-01	0.275E+03
0.259E-01	0.403E+03
0.389E-01	0.506E+03
0.518E-01	0.595E+03
0.648E-01	0.675E+03
0.777E-01	0.749E+03
0.907E-01	0.817E+03
0.104E+00	0.881E+03
0.117E+00	0.942E+03
0.130E+00	0.100E+04
0.143E+00	0.106E+04
0.155E+00	0.111E+04
0.350E+00	0.190E+04
0.968E+01	0.190E+04
0.190E+02	0.190E+04
0.283E+02	0.190E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

U-5114 Wall No. 2 - H = 5.0' & SPC = 10.0'

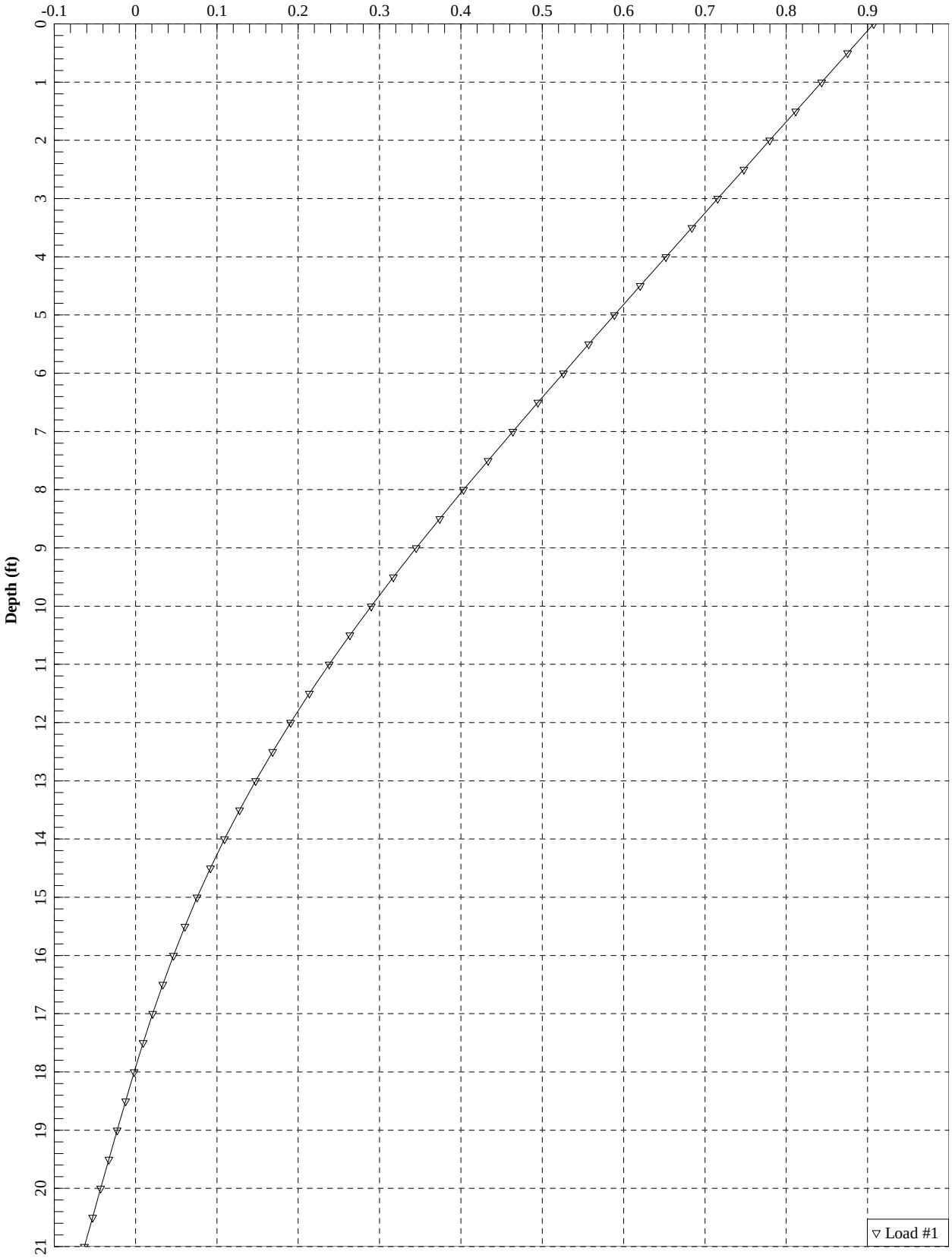
RESULTS -- ITERATION 6

STA	I	X	DEFL.	SLOPE'	MOMENT	SHEAR	NET REACT/STA	EI
		IN	IN		LBS-IN	LBS	LBS	LBS-IN**2
0		0.000E+00	0.369E+00	-0.263E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.353E+00	-0.263E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.337E+00	-0.263E-02	0.360E+04	0.339E+03	0.778E+02	0.211E+11
3		0.180E+02	0.321E+00	-0.263E-02	0.587E+04	0.470E+03	0.185E+03	0.211E+11
4		0.240E+02	0.305E+00	-0.262E-02	0.924E+04	0.709E+03	0.293E+03	0.211E+11
5		0.300E+02	0.290E+00	-0.262E-02	0.144E+05	0.106E+04	0.400E+03	0.211E+11
6		0.360E+02	0.274E+00	-0.262E-02	0.219E+05	0.151E+04	0.508E+03	0.211E+11
7		0.420E+02	0.258E+00	-0.261E-02	0.325E+05	0.207E+04	0.615E+03	0.211E+11
8		0.480E+02	0.243E+00	-0.260E-02	0.468E+05	0.274E+04	0.720E+03	0.211E+11
9		0.540E+02	0.227E+00	-0.258E-02	0.654E+05	0.351E+04	0.828E+03	0.211E+11
10		0.600E+02	0.212E+00	-0.256E-02	0.889E+05	0.441E+04	0.965E+03	0.211E+11
11		0.660E+02	0.197E+00	-0.253E-02	0.118E+06	0.485E+04	-0.867E+02	0.211E+11
12		0.720E+02	0.181E+00	-0.249E-02	0.147E+06	0.469E+04	-0.224E+03	0.211E+11
13		0.780E+02	0.167E+00	-0.245E-02	0.175E+06	0.440E+04	-0.354E+03	0.211E+11
14		0.840E+02	0.152E+00	-0.239E-02	0.200E+06	0.399E+04	-0.475E+03	0.211E+11
15		0.900E+02	0.138E+00	-0.233E-02	0.222E+06	0.346E+04	-0.587E+03	0.211E+11
16		0.960E+02	0.124E+00	-0.227E-02	0.241E+06	0.282E+04	-0.691E+03	0.211E+11
17		0.102E+03	0.111E+00	-0.220E-02	0.256E+06	0.207E+04	-0.801E+03	0.211E+11
18		0.108E+03	0.977E-01	-0.212E-02	0.266E+06	0.123E+04	-0.887E+03	0.211E+11
19		0.114E+03	0.852E-01	-0.205E-02	0.271E+06	0.311E+03	-0.949E+03	0.211E+11
20		0.120E+03	0.732E-01	-0.197E-02	0.270E+06	-0.656E+03	-0.986E+03	0.211E+11

21	0.126E+03	0.616E-01	-0.189E-02	0.263E+06	-0.165E+04	-0.996E+03	0.211E+11
22	0.132E+03	0.504E-01	-0.182E-02	0.250E+06	-0.264E+04	-0.981E+03	0.211E+11
23	0.138E+03	0.397E-01	-0.175E-02	0.232E+06	-0.363E+04	-0.100E+04	0.211E+11
24	0.144E+03	0.294E-01	-0.169E-02	0.207E+06	-0.461E+04	-0.967E+03	0.211E+11
25	0.150E+03	0.195E-01	-0.164E-02	0.176E+06	-0.552E+04	-0.848E+03	0.211E+11
26	0.156E+03	0.979E-02	-0.159E-02	0.141E+06	-0.622E+04	-0.547E+03	0.211E+11
27	0.162E+03	0.363E-03	-0.156E-02	0.102E+06	-0.647E+04	0.476E+02	0.211E+11
28	0.168E+03	-0.889E-02	-0.153E-02	0.629E+05	-0.594E+04	0.101E+04	0.211E+11
29	0.174E+03	-0.180E-01	-0.152E-02	0.303E+05	-0.455E+04	0.176E+04	0.211E+11
30	0.180E+03	-0.271E-01	-0.151E-02	0.828E+04	-0.253E+04	0.229E+04	0.211E+11
31	0.186E+03	-0.362E-01	-0.151E-02	-0.204E-08	-0.690E+03	0.138E+04	0.106E+11

END OF ANALYSIS

Wall 2_7.5 ft Wall Height_8.5 ft Spacing
Deflection (in)



PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES
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U-5114 Wall No. 2 - H = 7.5' & SPC = 8.5'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 41
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 90.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	41	0	0.211E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.106E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.900E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.102E+03 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.240E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.240E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	90.0	0.7	26.0	0.064	T	0.00
2	114.0	0.7	26.0	0.064	T	90.00
3	36.0	0.7	26.0	0.064	T	204.00
4	360.0	0.7	26.0	0.064	T	240.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.900E+02	0.747E+01
0.204E+03	0.147E+02
0.240E+03	0.170E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01
4	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER	PA1	Z1	PA2	Z2	PA3	Z3	PA4

NO	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2
1	0.00	45.00	0.00	60.00	0.00	62.55	84.29

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.692E+02
0.600E+01	0.000E+00
0.120E+02	0.110E+02
0.180E+02	0.262E+02
0.240E+02	0.415E+02
0.300E+02	0.567E+02
0.360E+02	0.719E+02
0.420E+02	0.871E+02
0.480E+02	0.102E+03
0.540E+02	0.117E+03
0.600E+02	0.133E+03
0.660E+02	0.148E+03
0.720E+02	0.163E+03
0.780E+02	0.178E+03
0.840E+02	0.194E+03
0.900E+02	0.209E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 90.00 IN

2 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

LAYER 2
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
90.0000	0.6366D-01
204.0000	0.6366D-01
204.0000	0.6366D-01
240.0000	0.6366D-01
240.0000	0.2766D-01
258.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH

4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
90.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
258.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA AVG LBS/IN**3	A	B	Puc	Puí
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y IN	P LBS/IN
0.000E+00	-0.191E+02
0.130E-01	-0.189E+02
0.259E-01	-0.188E+02
0.389E-01	-0.187E+02
0.518E-01	-0.185E+02
0.648E-01	-0.184E+02
0.777E-01	-0.182E+02
0.907E-01	-0.181E+02
0.104E+00	-0.179E+02
0.117E+00	-0.178E+02
0.130E+00	-0.176E+02
0.143E+00	-0.175E+02
0.155E+00	-0.173E+02
0.350E+00	-0.151E+02
0.968E+01	0.799E+00
0.190E+02	0.799E+00
0.283E+02	0.799E+00

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA AVG LBS/IN**3	A	B	Puc	Puí
90.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.806E+03

Y IN	P LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.142E+03
0.259E-01	0.197E+03

0.389E-01	0.240E+03
0.518E-01	0.276E+03
0.648E-01	0.309E+03
0.777E-01	0.338E+03
0.907E-01	0.366E+03
0.104E+00	0.391E+03
0.117E+00	0.415E+03
0.130E+00	0.438E+03
0.143E+00	0.460E+03
0.155E+00	0.480E+03
0.350E+00	0.787E+03
0.968E+01	0.787E+03
0.190E+02	0.787E+03
0.283E+02	0.787E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
28.50	9.33	26.0	0.637E-01	1.05	0.70	0.463E+02	0.106E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.234E+02
0.259E-01	0.582E+02
0.389E-01	0.663E+02
0.518E-01	0.726E+02
0.648E-01	0.778E+02
0.777E-01	0.823E+02
0.907E-01	0.862E+02
0.104E+00	0.898E+02
0.117E+00	0.930E+02
0.130E+00	0.959E+02
0.143E+00	0.987E+02
0.155E+00	0.101E+03
0.350E+00	0.138E+03
0.968E+01	0.138E+03
0.190E+02	0.138E+03
0.283E+02	0.138E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
118.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.124E+04	

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.190E+03
0.259E-01	0.271E+03
0.389E-01	0.334E+03
0.518E-01	0.389E+03
0.648E-01	0.438E+03
0.777E-01	0.482E+03
0.907E-01	0.524E+03
0.104E+00	0.562E+03
0.117E+00	0.599E+03
0.130E+00	0.634E+03
0.143E+00	0.668E+03
0.155E+00	0.700E+03
0.350E+00	0.117E+04
0.968E+01	0.117E+04
0.190E+02	0.117E+04
0.283E+02	0.117E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
57.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.350E+03	

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.560E+02
0.259E-01	0.839E+02
0.389E-01	0.105E+03
0.518E-01	0.122E+03
0.648E-01	0.137E+03
0.777E-01	0.151E+03
0.907E-01	0.163E+03
0.104E+00	0.175E+03
0.117E+00	0.185E+03
0.130E+00	0.195E+03
0.143E+00	0.205E+03
0.155E+00	0.214E+03
0.350E+00	0.347E+03
0.968E+01	0.347E+03
0.190E+02	0.347E+03
0.283E+02	0.347E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
147.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.154E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.223E+03
0.259E-01	0.321E+03
0.389E-01	0.398E+03
0.518E-01	0.465E+03
0.648E-01	0.525E+03
0.777E-01	0.580E+03
0.907E-01	0.631E+03
0.104E+00	0.679E+03
0.117E+00	0.725E+03
0.130E+00	0.768E+03
0.143E+00	0.810E+03
0.155E+00	0.850E+03
0.350E+00	0.144E+04
0.968E+01	0.144E+04
0.190E+02	0.144E+04
0.283E+02	0.144E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
85.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.731E+03

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.961E+02
0.259E-01	0.147E+03
0.389E-01	0.186E+03
0.518E-01	0.219E+03
0.648E-01	0.249E+03
0.777E-01	0.276E+03
0.907E-01	0.301E+03
0.104E+00	0.324E+03
0.117E+00	0.346E+03
0.130E+00	0.366E+03
0.143E+00	0.386E+03
0.155E+00	0.405E+03
0.350E+00	0.683E+03
0.968E+01	0.683E+03
0.190E+02	0.683E+03
0.283E+02	0.683E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
175.50	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.184E+04

Y IN	P LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.256E+03
0.259E-01	0.371E+03
0.389E-01	0.463E+03
0.518E-01	0.542E+03
0.648E-01	0.613E+03
0.777E-01	0.678E+03
0.907E-01	0.739E+03
0.104E+00	0.796E+03
0.117E+00	0.851E+03
0.130E+00	0.902E+03
0.143E+00	0.952E+03
0.155E+00	0.999E+03
0.350E+00	0.170E+04
0.968E+01	0.170E+04
0.190E+02	0.170E+04
0.283E+02	0.170E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
113.90	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.120E+04

Y IN	P LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.147E+03
0.259E-01	0.224E+03
0.389E-01	0.286E+03
0.518E-01	0.338E+03
0.648E-01	0.385E+03
0.777E-01	0.428E+03
0.907E-01	0.468E+03
0.104E+00	0.505E+03
0.117E+00	0.541E+03
0.130E+00	0.574E+03
0.143E+00	0.607E+03
0.155E+00	0.637E+03

0.350E+00	0.109E+04
0.968E+01	0.109E+04
0.190E+02	0.109E+04
0.283E+02	0.109E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
203.90	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.214E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.289E+03
0.259E-01	0.421E+03
0.389E-01	0.527E+03
0.518E-01	0.618E+03
0.648E-01	0.701E+03
0.777E-01	0.776E+03
0.907E-01	0.847E+03
0.104E+00	0.913E+03
0.117E+00	0.976E+03
0.130E+00	0.104E+04
0.143E+00	0.109E+04
0.155E+00	0.115E+04
0.350E+00	0.196E+04
0.968E+01	0.196E+04
0.190E+02	0.196E+04
0.283E+02	0.196E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
114.10	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.117E+04

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.144E+03
0.259E-01	0.220E+03
0.389E-01	0.279E+03
0.518E-01	0.331E+03
0.648E-01	0.377E+03
0.777E-01	0.419E+03
0.907E-01	0.458E+03

0.104E+00	0.494E+03
0.117E+00	0.529E+03
0.130E+00	0.562E+03
0.143E+00	0.593E+03
0.155E+00	0.623E+03
0.350E+00	0.107E+04
0.968E+01	0.107E+04
0.190E+02	0.107E+04
0.283E+02	0.107E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
204.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.211E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.285E+03
0.259E-01	0.416E+03
0.389E-01	0.521E+03
0.518E-01	0.611E+03
0.648E-01	0.692E+03
0.777E-01	0.767E+03
0.907E-01	0.837E+03
0.104E+00	0.902E+03
0.117E+00	0.964E+03
0.130E+00	0.102E+04
0.143E+00	0.108E+04
0.155E+00	0.113E+04
0.350E+00	0.194E+04
0.968E+01	0.194E+04
0.190E+02	0.194E+04
0.283E+02	0.194E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
127.50	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.131E+04

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.159E+03
0.259E-01	0.243E+03

0.389E-01	0.310E+03
0.518E-01	0.367E+03
0.648E-01	0.418E+03
0.777E-01	0.465E+03
0.907E-01	0.509E+03
0.104E+00	0.549E+03
0.117E+00	0.588E+03
0.130E+00	0.625E+03
0.143E+00	0.660E+03
0.155E+00	0.694E+03
0.350E+00	0.119E+04
0.968E+01	0.119E+04
0.190E+02	0.119E+04
0.283E+02	0.119E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
217.50	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.225E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.301E+03
0.259E-01	0.440E+03
0.389E-01	0.551E+03
0.518E-01	0.647E+03
0.648E-01	0.734E+03
0.777E-01	0.813E+03
0.907E-01	0.887E+03
0.104E+00	0.957E+03
0.117E+00	0.102E+04
0.130E+00	0.109E+04
0.143E+00	0.115E+04
0.155E+00	0.120E+04
0.350E+00	0.206E+04
0.968E+01	0.206E+04
0.190E+02	0.206E+04
0.283E+02	0.206E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
141.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.145E+04

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.174E+03
0.259E-01	0.267E+03
0.389E-01	0.340E+03
0.518E-01	0.403E+03
0.648E-01	0.460E+03
0.777E-01	0.512E+03
0.907E-01	0.560E+03
0.104E+00	0.605E+03
0.117E+00	0.648E+03
0.130E+00	0.688E+03
0.143E+00	0.727E+03
0.155E+00	0.765E+03
0.350E+00	0.132E+04
0.968E+01	0.132E+04
0.190E+02	0.132E+04
0.283E+02	0.132E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
231.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.240E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.317E+03
0.259E-01	0.464E+03
0.389E-01	0.582E+03
0.518E-01	0.684E+03
0.648E-01	0.775E+03
0.777E-01	0.860E+03
0.907E-01	0.938E+03
0.104E+00	0.101E+04
0.117E+00	0.108E+04
0.130E+00	0.115E+04
0.143E+00	0.121E+04
0.155E+00	0.128E+04
0.350E+00	0.219E+04
0.968E+01	0.219E+04
0.190E+02	0.219E+04
0.283E+02	0.219E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
154.50	9.33	26.0	0.626E-01	0.88	0.50	0.583E+02	0.157E+04

Y	P
IN	LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.187E+03
0.259E-01	0.286E+03
0.389E-01	0.365E+03
0.518E-01	0.433E+03
0.648E-01	0.494E+03
0.777E-01	0.549E+03
0.907E-01	0.601E+03
0.104E+00	0.650E+03
0.117E+00	0.696E+03
0.130E+00	0.740E+03
0.143E+00	0.782E+03
0.155E+00	0.822E+03
0.350E+00	0.142E+04
0.968E+01	0.142E+04
0.190E+02	0.142E+04
0.283E+02	0.142E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
244.50	9.33	26.0	0.626E-01	0.88	0.50	0.583E+02	0.250E+04

Y	P
IN	LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.328E+03
0.259E-01	0.481E+03
0.389E-01	0.603E+03
0.518E-01	0.709E+03
0.648E-01	0.805E+03
0.777E-01	0.893E+03
0.907E-01	0.974E+03
0.104E+00	0.105E+04
0.117E+00	0.112E+04
0.130E+00	0.119E+04
0.143E+00	0.126E+04
0.155E+00	0.133E+04
0.350E+00	0.227E+04
0.968E+01	0.227E+04
0.190E+02	0.227E+04
0.283E+02	0.227E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
167.90	9.33	26.0	0.598E-01	0.88	0.50		0.583E+02	0.163E+04

Y IN	P LBS/IN
0.000E+00	-0.191E+02
0.130E-01	0.194E+03
0.259E-01	0.297E+03
0.389E-01	0.378E+03
0.518E-01	0.449E+03
0.648E-01	0.512E+03
0.777E-01	0.570E+03
0.907E-01	0.624E+03
0.104E+00	0.674E+03
0.117E+00	0.722E+03
0.130E+00	0.768E+03
0.143E+00	0.812E+03
0.155E+00	0.854E+03
0.350E+00	0.147E+04
0.968E+01	0.147E+04
0.190E+02	0.147E+04
0.283E+02	0.147E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
257.90	9.33	26.0	0.598E-01	0.88	0.50		0.583E+02	0.252E+04

Y IN	P LBS/IN
0.000E+00	0.191E+02
0.130E-01	0.330E+03
0.259E-01	0.484E+03
0.389E-01	0.608E+03
0.518E-01	0.715E+03
0.648E-01	0.811E+03
0.777E-01	0.899E+03
0.907E-01	0.982E+03
0.104E+00	0.106E+04
0.117E+00	0.113E+04
0.130E+00	0.120E+04
0.143E+00	0.127E+04
0.155E+00	0.134E+04

0.350E+00	0.229E+04
0.968E+01	0.229E+04
0.190E+02	0.229E+04
0.283E+02	0.229E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

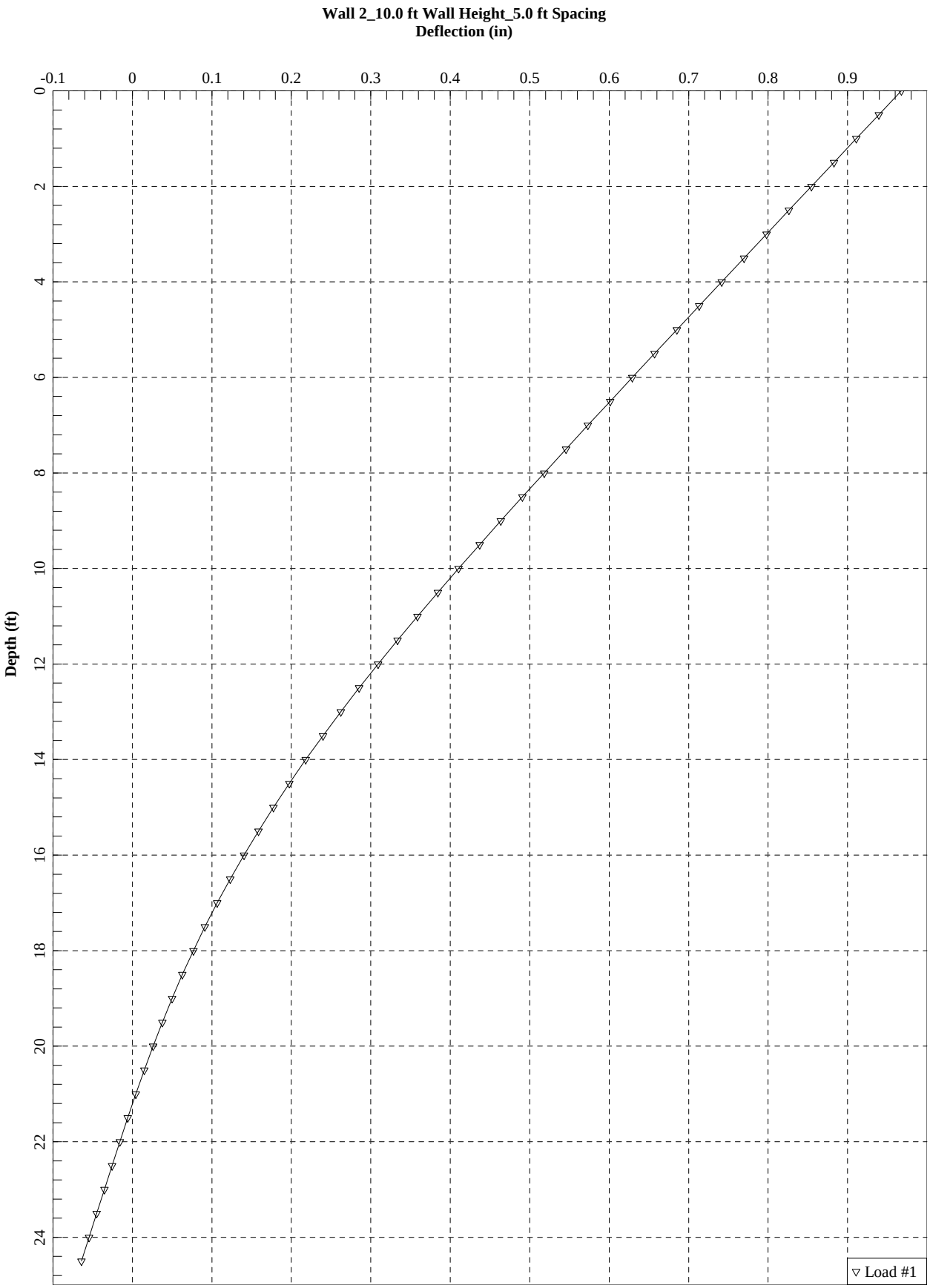
U-5114 Wall No. 2 - H = 7.5' & SPC = 8.5'

RESULTS -- ITERATION 7

STA	I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0		0.000E+00	0.908E+00	-0.533E-02	0.000E+00	0.150E+03	0.300E+03	0.106E+11
1		0.600E+01	0.876E+00	-0.533E-02	0.180E+04	0.300E+03	0.000E+00	0.211E+11
2		0.120E+02	0.844E+00	-0.533E-02	0.360E+04	0.333E+03	0.661E+02	0.211E+11
3		0.180E+02	0.812E+00	-0.533E-02	0.580E+04	0.445E+03	0.157E+03	0.211E+11
4		0.240E+02	0.780E+00	-0.532E-02	0.894E+04	0.648E+03	0.249E+03	0.211E+11
5		0.300E+02	0.748E+00	-0.532E-02	0.136E+05	0.943E+03	0.340E+03	0.211E+11
6		0.360E+02	0.716E+00	-0.532E-02	0.202E+05	0.133E+04	0.431E+03	0.211E+11
7		0.420E+02	0.684E+00	-0.531E-02	0.295E+05	0.181E+04	0.523E+03	0.211E+11
8		0.480E+02	0.652E+00	-0.530E-02	0.419E+05	0.237E+04	0.612E+03	0.211E+11
9		0.540E+02	0.620E+00	-0.528E-02	0.580E+05	0.303E+04	0.704E+03	0.211E+11
10		0.600E+02	0.589E+00	-0.526E-02	0.783E+05	0.378E+04	0.796E+03	0.211E+11
11		0.660E+02	0.557E+00	-0.524E-02	0.103E+06	0.462E+04	0.887E+03	0.211E+11
12		0.720E+02	0.526E+00	-0.521E-02	0.134E+06	0.556E+04	0.979E+03	0.211E+11
13		0.780E+02	0.495E+00	-0.516E-02	0.170E+06	0.658E+04	0.107E+04	0.211E+11
14		0.840E+02	0.464E+00	-0.511E-02	0.213E+06	0.770E+04	0.116E+04	0.211E+11
15		0.900E+02	0.433E+00	-0.504E-02	0.262E+06	0.893E+04	0.130E+04	0.211E+11
16		0.960E+02	0.403E+00	-0.496E-02	0.320E+06	0.953E+04	-0.936E+02	0.211E+11
17		0.102E+03	0.374E+00	-0.486E-02	0.377E+06	0.935E+04	-0.277E+03	0.211E+11
18		0.108E+03	0.345E+00	-0.474E-02	0.432E+06	0.898E+04	-0.457E+03	0.211E+11
19		0.114E+03	0.317E+00	-0.461E-02	0.485E+06	0.844E+04	-0.614E+03	0.211E+11
20		0.120E+03	0.290E+00	-0.447E-02	0.533E+06	0.776E+04	-0.759E+03	0.211E+11
21		0.126E+03	0.263E+00	-0.431E-02	0.578E+06	0.691E+04	-0.929E+03	0.211E+11
22		0.132E+03	0.238E+00	-0.414E-02	0.616E+06	0.591E+04	-0.107E+04	0.211E+11
23		0.138E+03	0.214E+00	-0.396E-02	0.649E+06	0.479E+04	-0.118E+04	0.211E+11
24		0.144E+03	0.190E+00	-0.378E-02	0.674E+06	0.356E+04	-0.127E+04	0.211E+11
25		0.150E+03	0.168E+00	-0.358E-02	0.691E+06	0.225E+04	-0.134E+04	0.211E+11
26		0.156E+03	0.147E+00	-0.338E-02	0.701E+06	0.820E+03	-0.153E+04	0.211E+11
27		0.162E+03	0.128E+00	-0.319E-02	0.701E+06	-0.778E+03	-0.167E+04	0.211E+11
28		0.168E+03	0.109E+00	-0.299E-02	0.691E+06	-0.250E+04	-0.177E+04	0.211E+11
29		0.174E+03	0.919E-01	-0.279E-02	0.671E+06	-0.429E+04	-0.182E+04	0.211E+11
30		0.180E+03	0.757E-01	-0.261E-02	0.640E+06	-0.610E+04	-0.181E+04	0.211E+11
31		0.186E+03	0.606E-01	-0.243E-02	0.598E+06	-0.788E+04	-0.175E+04	0.211E+11
32		0.192E+03	0.465E-01	-0.227E-02	0.545E+06	-0.957E+04	-0.163E+04	0.211E+11
33		0.198E+03	0.334E-01	-0.212E-02	0.483E+06	-0.111E+05	-0.145E+04	0.211E+11
34		0.204E+03	0.211E-01	-0.200E-02	0.412E+06	-0.124E+05	-0.117E+04	0.211E+11
35		0.210E+03	0.942E-02	-0.189E-02	0.334E+06	-0.133E+05	-0.634E+03	0.211E+11
36		0.216E+03	-0.164E-02	-0.181E-02	0.252E+06	-0.135E+05	0.328E+03	0.211E+11
37		0.222E+03	-0.123E-01	-0.175E-02	0.172E+06	-0.124E+05	0.174E+04	0.211E+11
38		0.228E+03	-0.226E-01	-0.171E-02	0.103E+06	-0.103E+05	0.252E+04	0.211E+11

39	0.234E+03	-0.328E-01	-0.169E-02	0.483E+05	-0.748E+04	0.316E+04	0.211E+11
40	0.240E+03	-0.429E-01	-0.168E-02	0.129E+05	-0.403E+04	0.375E+04	0.211E+11
41	0.246E+03	-0.529E-01	-0.168E-02	0.407E-08	-0.108E+04	0.215E+04	0.106E+11

END OF ANALYSIS


Wall 2_10.0 ft Wall Height_5.0 ft Spacing
Deflection (in)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
▽ Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 2 - H = 10.0' & SPC = 5.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 48
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 120.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	48	0	0.354E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.177E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.120E+03 IN
WIDTH FOR EARTH PRESSURE, WA = 0.600E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.933E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.240E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.240E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	120.0	0.7	26.0	0.064	T	0.00
2	84.0	0.7	26.0	0.064	T	120.00
3	36.0	0.7	26.0	0.064	T	204.00
4	360.0	0.7	26.0	0.064	T	240.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.120E+03	0.937E+01
0.204E+03	0.147E+02
0.240E+03	0.170E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.390E+00	0.256E+01
3	0.390E+00	0.256E+01
4	0.390E+00	0.256E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER	PA1	Z1	PA2	Z2	PA3	Z3	PA4

NO	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2	IN	LBS/IN**2
1	0.00	60.00	0.00	80.00	0.00	82.55	156.89

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.407E+02
0.600E+01	0.000E+00
0.120E+02	0.648E+01
0.180E+02	0.154E+02
0.240E+02	0.244E+02
0.300E+02	0.334E+02
0.360E+02	0.423E+02
0.420E+02	0.512E+02
0.480E+02	0.600E+02
0.540E+02	0.690E+02
0.600E+02	0.780E+02
0.660E+02	0.870E+02
0.720E+02	0.960E+02
0.780E+02	0.105E+03
0.840E+02	0.114E+03
0.900E+02	0.123E+03
0.960E+02	0.132E+03
0.102E+03	0.141E+03
0.108E+03	0.149E+03
0.114E+03	0.158E+03
0.120E+03	0.167E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 120.00 IN

2 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

LAYER 2
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
120.0000	0.6366D-01
204.0000	0.6366D-01
204.0000	0.6366D-01
240.0000	0.6366D-01

240.0000 0.2766D-01
300.0000 0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
120.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
204.00	0.6944D+00	26.000	-----
300.00	0.6944D+00	26.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA AVG LBS/IN**3	A	B	Puc	Puí
0.10	9.33	26.0	0.637E-01	2.82	2.13	0.195E+02	0.130E+00

Y IN	P LBS/IN
0.000E+00	-0.261E+02
0.130E-01	-0.259E+02
0.259E-01	-0.258E+02
0.389E-01	-0.256E+02
0.518E-01	-0.255E+02
0.648E-01	-0.253E+02
0.777E-01	-0.252E+02
0.907E-01	-0.250E+02
0.104E+00	-0.249E+02
0.117E+00	-0.247E+02
0.130E+00	-0.246E+02
0.143E+00	-0.244E+02
0.155E+00	-0.243E+02
0.350E+00	-0.220E+02
0.968E+01	-0.616E+01
0.190E+02	-0.616E+01
0.283E+02	-0.616E+01

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA AVG LBS/IN**3	A	B	Puc	Puí
120.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.126E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.199E+03
0.259E-01	0.280E+03
0.389E-01	0.345E+03
0.518E-01	0.400E+03
0.648E-01	0.449E+03
0.777E-01	0.495E+03
0.907E-01	0.537E+03
0.104E+00	0.576E+03
0.117E+00	0.613E+03
0.130E+00	0.649E+03
0.143E+00	0.683E+03
0.155E+00	0.715E+03
0.350E+00	0.119E+04
0.968E+01	0.119E+04
0.190E+02	0.119E+04
0.283E+02	0.119E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
21.00	9.33	26.0	0.637E-01	1.35	0.95	0.392E+02	0.645E+02	

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.524E+01
0.259E-01	0.365E+02
0.389E-01	0.498E+02
0.518E-01	0.545E+02
0.648E-01	0.582E+02
0.777E-01	0.614E+02
0.907E-01	0.642E+02
0.104E+00	0.667E+02
0.117E+00	0.690E+02
0.130E+00	0.711E+02
0.143E+00	0.730E+02
0.155E+00	0.748E+02
0.350E+00	0.101E+03
0.968E+01	0.101E+03
0.190E+02	0.101E+03
0.283E+02	0.101E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
141.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.148E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.223E+03
0.259E-01	0.317E+03
0.389E-01	0.392E+03
0.518E-01	0.456E+03
0.648E-01	0.514E+03
0.777E-01	0.567E+03
0.907E-01	0.616E+03
0.104E+00	0.662E+03
0.117E+00	0.705E+03
0.130E+00	0.747E+03
0.143E+00	0.787E+03
0.155E+00	0.825E+03
0.350E+00	0.139E+04
0.968E+01	0.139E+04
0.190E+02	0.139E+04
0.283E+02	0.139E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
42.00	9.33	26.0	0.637E-01	0.89	0.51	0.583E+02	0.204E+03

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.365E+02
0.259E-01	0.574E+02
0.389E-01	0.711E+02
0.518E-01	0.822E+02
0.648E-01	0.916E+02
0.777E-01	0.100E+03
0.907E-01	0.107E+03
0.104E+00	0.114E+03
0.117E+00	0.121E+03
0.130E+00	0.127E+03
0.143E+00	0.132E+03
0.155E+00	0.137E+03
0.350E+00	0.214E+03
0.968E+01	0.214E+03
0.190E+02	0.214E+03
0.283E+02	0.214E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
162.00	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.170E+04

Y IN	P LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.247E+03
0.259E-01	0.354E+03
0.389E-01	0.439E+03
0.518E-01	0.513E+03
0.648E-01	0.579E+03
0.777E-01	0.639E+03
0.907E-01	0.695E+03
0.104E+00	0.748E+03
0.117E+00	0.798E+03
0.130E+00	0.846E+03
0.143E+00	0.891E+03
0.155E+00	0.935E+03
0.350E+00	0.158E+04
0.968E+01	0.158E+04
0.190E+02	0.158E+04
0.283E+02	0.158E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH IN	DIAM IN	PHI	GAMMA LBS/IN**3	AVG	A	B	Puc	Puí
63.00	9.33	26.0	0.637E-01	0.88	0.50		0.583E+02	0.419E+03

Y IN	P LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.560E+02
0.259E-01	0.881E+02
0.389E-01	0.112E+03
0.518E-01	0.133E+03
0.648E-01	0.150E+03
0.777E-01	0.166E+03
0.907E-01	0.181E+03
0.104E+00	0.195E+03
0.117E+00	0.207E+03
0.130E+00	0.219E+03
0.143E+00	0.231E+03
0.155E+00	0.242E+03

0.350E+00	0.401E+03
0.968E+01	0.401E+03
0.190E+02	0.401E+03
0.283E+02	0.401E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
183.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.192E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.271E+03
0.259E-01	0.391E+03
0.389E-01	0.487E+03
0.518E-01	0.569E+03
0.648E-01	0.643E+03
0.777E-01	0.711E+03
0.907E-01	0.775E+03
0.104E+00	0.834E+03
0.117E+00	0.891E+03
0.130E+00	0.944E+03
0.143E+00	0.996E+03
0.155E+00	0.105E+04
0.350E+00	0.178E+04
0.968E+01	0.178E+04
0.190E+02	0.178E+04
0.283E+02	0.178E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
83.90	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.706E+03

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.865E+02
0.259E-01	0.135E+03
0.389E-01	0.174E+03
0.518E-01	0.206E+03
0.648E-01	0.235E+03
0.777E-01	0.261E+03
0.907E-01	0.285E+03

0.104E+00	0.307E+03
0.117E+00	0.328E+03
0.130E+00	0.348E+03
0.143E+00	0.367E+03
0.155E+00	0.385E+03
0.350E+00	0.654E+03
0.968E+01	0.654E+03
0.190E+02	0.654E+03
0.283E+02	0.654E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
203.90	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.214E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.296E+03
0.259E-01	0.428E+03
0.389E-01	0.534E+03
0.518E-01	0.625E+03
0.648E-01	0.708E+03
0.777E-01	0.783E+03
0.907E-01	0.854E+03
0.104E+00	0.920E+03
0.117E+00	0.983E+03
0.130E+00	0.104E+04
0.143E+00	0.110E+04
0.155E+00	0.116E+04
0.350E+00	0.197E+04
0.968E+01	0.197E+04
0.190E+02	0.197E+04
0.283E+02	0.197E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
84.10	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.682E+03

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.839E+02
0.259E-01	0.132E+03

0.389E-01	0.168E+03
0.518E-01	0.200E+03
0.648E-01	0.228E+03
0.777E-01	0.253E+03
0.907E-01	0.276E+03
0.104E+00	0.298E+03
0.117E+00	0.318E+03
0.130E+00	0.337E+03
0.143E+00	0.356E+03
0.155E+00	0.374E+03
0.350E+00	0.633E+03
0.968E+01	0.633E+03
0.190E+02	0.633E+03
0.283E+02	0.633E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN	LBS/IN**3					
204.10	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.213E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.294E+03
0.259E-01	0.425E+03
0.389E-01	0.530E+03
0.518E-01	0.621E+03
0.648E-01	0.703E+03
0.777E-01	0.778E+03
0.907E-01	0.848E+03
0.104E+00	0.914E+03
0.117E+00	0.976E+03
0.130E+00	0.104E+04
0.143E+00	0.109E+04
0.155E+00	0.115E+04
0.350E+00	0.196E+04
0.968E+01	0.196E+04
0.190E+02	0.196E+04
0.283E+02	0.196E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN	LBS/IN**3					
108.00	9.33	26.0	0.637E-01	0.88	0.50	0.583E+02	0.110E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.129E+03
0.259E-01	0.201E+03
0.389E-01	0.257E+03
0.518E-01	0.306E+03
0.648E-01	0.349E+03
0.777E-01	0.388E+03
0.907E-01	0.425E+03
0.104E+00	0.459E+03
0.117E+00	0.492E+03
0.130E+00	0.523E+03
0.143E+00	0.552E+03
0.155E+00	0.580E+03
0.350E+00	0.997E+03
0.968E+01	0.997E+03
0.190E+02	0.997E+03
0.283E+02	0.997E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
228.00	9.33	26.0	0.637E-01		0.88	0.50	0.583E+02	0.238E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.321E+03
0.259E-01	0.467E+03
0.389E-01	0.584E+03
0.518E-01	0.686E+03
0.648E-01	0.777E+03
0.777E-01	0.860E+03
0.907E-01	0.938E+03
0.104E+00	0.101E+04
0.117E+00	0.108E+04
0.130E+00	0.115E+04
0.143E+00	0.121E+04
0.155E+00	0.127E+04
0.350E+00	0.218E+04
0.968E+01	0.218E+04
0.190E+02	0.218E+04
0.283E+02	0.218E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
132.00	9.33	26.0	0.604E-01	0.88	0.50	0.583E+02	0.130E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.151E+03
0.259E-01	0.234E+03
0.389E-01	0.300E+03
0.518E-01	0.357E+03
0.648E-01	0.408E+03
0.777E-01	0.454E+03
0.907E-01	0.498E+03
0.104E+00	0.538E+03
0.117E+00	0.576E+03
0.130E+00	0.613E+03
0.143E+00	0.648E+03
0.155E+00	0.681E+03
0.350E+00	0.117E+04
0.968E+01	0.117E+04
0.190E+02	0.117E+04
0.283E+02	0.117E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
252.00	9.33	26.0	0.604E-01	0.88	0.50	0.583E+02	0.249E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.334E+03
0.259E-01	0.487E+03
0.389E-01	0.609E+03
0.518E-01	0.716E+03
0.648E-01	0.811E+03
0.777E-01	0.899E+03
0.907E-01	0.980E+03
0.104E+00	0.106E+04
0.117E+00	0.113E+04
0.130E+00	0.120E+04
0.143E+00	0.127E+04
0.155E+00	0.133E+04
0.350E+00	0.228E+04
0.968E+01	0.228E+04
0.190E+02	0.228E+04
0.283E+02	0.228E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
156.00	9.33	26.0	0.553E-01		0.88	0.50	0.583E+02	0.141E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.163E+03
0.259E-01	0.253E+03
0.389E-01	0.324E+03
0.518E-01	0.386E+03
0.648E-01	0.441E+03
0.777E-01	0.491E+03
0.907E-01	0.538E+03
0.104E+00	0.581E+03
0.117E+00	0.623E+03
0.130E+00	0.663E+03
0.143E+00	0.700E+03
0.155E+00	0.737E+03
0.350E+00	0.127E+04
0.968E+01	0.127E+04
0.190E+02	0.127E+04
0.283E+02	0.127E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
276.00	9.33	26.0	0.553E-01		0.88	0.50	0.583E+02	0.251E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.336E+03
0.259E-01	0.489E+03
0.389E-01	0.612E+03
0.518E-01	0.718E+03
0.648E-01	0.814E+03
0.777E-01	0.902E+03
0.907E-01	0.984E+03
0.104E+00	0.106E+04
0.117E+00	0.114E+04
0.130E+00	0.121E+04
0.143E+00	0.127E+04
0.155E+00	0.134E+04

0.350E+00	0.229E+04
0.968E+01	0.229E+04
0.190E+02	0.229E+04
0.283E+02	0.229E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
179.90	9.33	26.0	0.517E-01		0.88	0.50	0.583E+02	0.152E+04

Y	P
IN	LBS/IN
0.000E+00	-0.261E+02
0.130E-01	0.175E+03
0.259E-01	0.271E+03
0.389E-01	0.348E+03
0.518E-01	0.414E+03
0.648E-01	0.473E+03
0.777E-01	0.527E+03
0.907E-01	0.577E+03
0.104E+00	0.624E+03
0.117E+00	0.669E+03
0.130E+00	0.712E+03
0.143E+00	0.753E+03
0.155E+00	0.792E+03
0.350E+00	0.137E+04
0.968E+01	0.137E+04
0.190E+02	0.137E+04
0.283E+02	0.137E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
299.90	9.33	26.0	0.517E-01		0.88	0.50	0.583E+02	0.254E+04

Y	P
IN	LBS/IN
0.000E+00	0.261E+02
0.130E-01	0.340E+03
0.259E-01	0.495E+03
0.389E-01	0.620E+03
0.518E-01	0.728E+03
0.648E-01	0.825E+03
0.777E-01	0.915E+03
0.907E-01	0.998E+03

0.104E+00	0.108E+04
0.117E+00	0.115E+04
0.130E+00	0.122E+04
0.143E+00	0.129E+04
0.155E+00	0.136E+04
0.350E+00	0.232E+04
0.968E+01	0.232E+04
0.190E+02	0.232E+04
0.283E+02	0.232E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

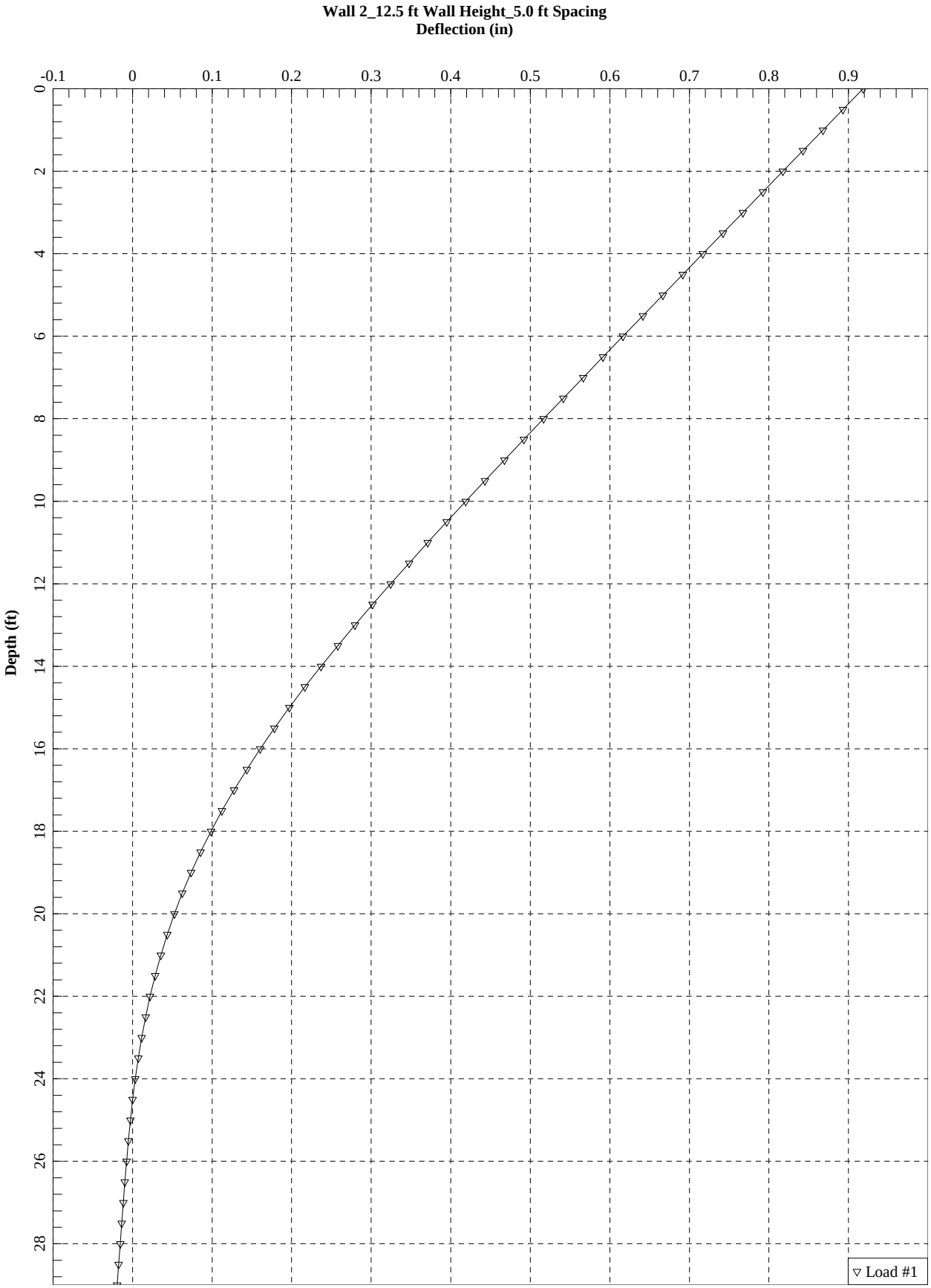
U-5114 Wall No. 2 - H = 10.0' & SPC = 5.0'

RESULTS -- ITERATION 7

STA	I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0		0.000E+00	0.968E+00	-0.472E-02	0.000E+00	0.150E+03	0.300E+03	0.177E+11
1		0.600E+01	0.939E+00	-0.472E-02	0.180E+04	0.300E+03	-0.364E-07	0.354E+11
2		0.120E+02	0.911E+00	-0.472E-02	0.360E+04	0.319E+03	0.389E+02	0.354E+11
3		0.180E+02	0.883E+00	-0.471E-02	0.563E+04	0.385E+03	0.925E+02	0.354E+11
4		0.240E+02	0.855E+00	-0.471E-02	0.822E+04	0.505E+03	0.147E+03	0.354E+11
5		0.300E+02	0.826E+00	-0.471E-02	0.117E+05	0.678E+03	0.200E+03	0.354E+11
6		0.360E+02	0.798E+00	-0.471E-02	0.164E+05	0.905E+03	0.254E+03	0.354E+11
7		0.420E+02	0.770E+00	-0.471E-02	0.225E+05	0.119E+04	0.307E+03	0.354E+11
8		0.480E+02	0.742E+00	-0.470E-02	0.306E+05	0.152E+04	0.360E+03	0.354E+11
9		0.540E+02	0.713E+00	-0.470E-02	0.408E+05	0.191E+04	0.414E+03	0.354E+11
10		0.600E+02	0.685E+00	-0.469E-02	0.535E+05	0.235E+04	0.468E+03	0.354E+11
11		0.660E+02	0.657E+00	-0.468E-02	0.689E+05	0.284E+04	0.522E+03	0.354E+11
12		0.720E+02	0.629E+00	-0.466E-02	0.876E+05	0.339E+04	0.576E+03	0.354E+11
13		0.780E+02	0.601E+00	-0.465E-02	0.110E+06	0.399E+04	0.630E+03	0.354E+11
14		0.840E+02	0.573E+00	-0.463E-02	0.136E+06	0.465E+04	0.684E+03	0.354E+11
15		0.900E+02	0.546E+00	-0.460E-02	0.165E+06	0.536E+04	0.738E+03	0.354E+11
16		0.960E+02	0.518E+00	-0.457E-02	0.200E+06	0.613E+04	0.792E+03	0.354E+11
17		0.102E+03	0.491E+00	-0.453E-02	0.239E+06	0.695E+04	0.846E+03	0.354E+11
18		0.108E+03	0.464E+00	-0.449E-02	0.283E+06	0.782E+04	0.896E+03	0.354E+11
19		0.114E+03	0.437E+00	-0.444E-02	0.333E+06	0.874E+04	0.950E+03	0.354E+11
20		0.120E+03	0.410E+00	-0.437E-02	0.388E+06	0.975E+04	0.107E+04	0.354E+11
21		0.126E+03	0.384E+00	-0.430E-02	0.450E+06	0.103E+05	-0.528E+02	0.354E+11
22		0.132E+03	0.359E+00	-0.422E-02	0.511E+06	0.101E+05	-0.237E+03	0.354E+11
23		0.138E+03	0.334E+00	-0.413E-02	0.571E+06	0.979E+04	-0.411E+03	0.354E+11
24		0.144E+03	0.309E+00	-0.403E-02	0.629E+06	0.930E+04	-0.573E+03	0.354E+11
25		0.150E+03	0.285E+00	-0.392E-02	0.683E+06	0.864E+04	-0.746E+03	0.354E+11
26		0.156E+03	0.262E+00	-0.380E-02	0.732E+06	0.782E+04	-0.896E+03	0.354E+11
27		0.162E+03	0.240E+00	-0.367E-02	0.777E+06	0.686E+04	-0.102E+04	0.354E+11
28		0.168E+03	0.218E+00	-0.353E-02	0.815E+06	0.576E+04	-0.117E+04	0.354E+11
29		0.174E+03	0.197E+00	-0.339E-02	0.846E+06	0.453E+04	-0.129E+04	0.354E+11
30		0.180E+03	0.178E+00	-0.325E-02	0.869E+06	0.319E+04	-0.139E+04	0.354E+11
31		0.186E+03	0.158E+00	-0.310E-02	0.884E+06	0.176E+04	-0.147E+04	0.354E+11
32		0.192E+03	0.140E+00	-0.295E-02	0.890E+06	0.207E+03	-0.164E+04	0.354E+11
33		0.198E+03	0.123E+00	-0.280E-02	0.887E+06	-0.150E+04	-0.177E+04	0.354E+11

34	0.204E+03	0.107E+00	-0.265E-02	0.872E+06	-0.332E+04	-0.187E+04	0.354E+11
35	0.210E+03	0.913E-01	-0.250E-02	0.847E+06	-0.522E+04	-0.193E+04	0.354E+11
36	0.216E+03	0.767E-01	-0.236E-02	0.810E+06	-0.715E+04	-0.193E+04	0.354E+11
37	0.222E+03	0.629E-01	-0.223E-02	0.761E+06	-0.906E+04	-0.189E+04	0.354E+11
38	0.228E+03	0.499E-01	-0.211E-02	0.701E+06	-0.109E+05	-0.179E+04	0.354E+11
39	0.234E+03	0.376E-01	-0.199E-02	0.630E+06	-0.126E+05	-0.157E+04	0.354E+11
40	0.240E+03	0.260E-01	-0.189E-02	0.550E+06	-0.140E+05	-0.131E+04	0.354E+11
41	0.246E+03	0.149E-01	-0.181E-02	0.462E+06	-0.151E+05	-0.944E+03	0.354E+11
42	0.252E+03	0.430E-02	-0.174E-02	0.368E+06	-0.157E+05	-0.195E+03	0.354E+11
43	0.258E+03	-0.594E-02	-0.168E-02	0.273E+06	-0.153E+05	0.100E+04	0.354E+11
44	0.264E+03	-0.159E-01	-0.164E-02	0.184E+06	-0.137E+05	0.222E+04	0.354E+11
45	0.270E+03	-0.257E-01	-0.162E-02	0.109E+06	-0.111E+05	0.291E+04	0.354E+11
46	0.276E+03	-0.353E-01	-0.161E-02	0.507E+05	-0.795E+04	0.347E+04	0.354E+11
47	0.282E+03	-0.449E-01	-0.160E-02	0.134E+05	-0.422E+04	0.398E+04	0.354E+11
48	0.288E+03	-0.545E-01	-0.160E-02	-0.682E-08	-0.111E+04	0.223E+04	0.177E+11

END OF ANALYSIS


Wall 2_12.5 ft Wall Height_5.0 ft Spacing
Deflection (in)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Load #1

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES

U-5114 Wall No. 2 - H = 12.5' & SPC = 5.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 57
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 150.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	57	0	0.354E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.177E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.150E+03 IN
WIDTH FOR EARTH PRESSURE, WA = 0.600E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.120E+02 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.289E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.289E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	40.8	1.4	28.0	0.067	T	0.00
2	109.2	1.0	28.0	0.064	T	40.80
3	88.8	1.0	28.0	0.064	T	150.00
4	50.4	0.7	24.0	0.064	T	238.80
5	490.8	0.7	24.0	0.064	T	289.20

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.408E+02	0.445E+01
0.150E+03	0.114E+02
0.239E+03	0.171E+02
0.289E+03	0.203E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.361E+00	0.277E+01
2	0.361E+00	0.277E+01
3	0.361E+00	0.277E+01
4	0.422E+00	0.237E+01
5	0.422E+00	0.237E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *

****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	20.40	0.00	27.20	0.00	41.66	0.00
2	175.50	95.40	137.03	113.60	-136.70	0.00	0.00

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.376E+02
0.597E+01	0.000E+00
0.119E+02	0.000E+00
0.179E+02	0.000E+00
0.239E+02	0.000E+00
0.299E+02	0.000E+00
0.358E+02	0.000E+00
0.418E+02	0.227E+02
0.478E+02	0.310E+02
0.538E+02	0.393E+02
0.598E+02	0.476E+02
0.658E+02	0.559E+02
0.719E+02	0.642E+02
0.779E+02	0.726E+02
0.839E+02	0.810E+02
0.899E+02	0.888E+02
0.959E+02	0.972E+02
0.102E+03	0.106E+03
0.108E+03	0.114E+03
0.114E+03	0.122E+03
0.120E+03	0.130E+03
0.126E+03	0.139E+03
0.132E+03	0.147E+03
0.138E+03	0.155E+03
0.144E+03	0.164E+03
0.150E+03	0.172E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 150.00 IN

2 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SILT

LAYER 2
THE SOIL IS A SILT

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
150.0000	0.6366D-01
238.8000	0.6366D-01
238.8000	0.6366D-01
289.2000	0.6366D-01
289.2000	0.2766D-01
354.0000	0.2766D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
150.00	0.1042D+01	28.000	-----
238.80	0.1042D+01	28.000	-----
238.80	0.6944D+00	24.000	-----
354.00	0.6944D+00	24.000	-----

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
0.10	12.00	28.0	0.637E-01	2.82	2.13	0.376E+02	0.185E+00

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.167E-01	-0.342E+02
0.333E-01	-0.340E+02
0.500E-01	-0.338E+02
0.667E-01	-0.336E+02
0.833E-01	-0.334E+02
0.100E+00	-0.332E+02
0.117E+00	-0.330E+02
0.133E+00	-0.328E+02
0.150E+00	-0.327E+02
0.167E+00	-0.325E+02
0.183E+00	-0.323E+02
0.200E+00	-0.321E+02
0.450E+00	-0.292E+02
0.124E+02	0.377E+01
0.244E+02	0.377E+01
0.365E+02	0.377E+01

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
150.10	12.00	28.0	0.637E-01	0.88	0.50	0.113E+03	0.257E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.167E-01	0.322E+03
0.333E-01	0.548E+03
0.500E-01	0.678E+03
0.667E-01	0.791E+03
0.833E-01	0.891E+03
0.100E+00	0.983E+03
0.117E+00	0.107E+04
0.133E+00	0.115E+04
0.150E+00	0.122E+04
0.167E+00	0.130E+04
0.183E+00	0.137E+04
0.200E+00	0.143E+04
0.450E+00	0.241E+04
0.124E+02	0.241E+04
0.244E+02	0.241E+04
0.365E+02	0.241E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
22.20	12.00	28.0	0.637E-01	1.56	1.12	0.660E+02	0.910E+02

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.167E-01	0.817E+01
0.333E-01	0.507E+02
0.500E-01	0.933E+02
0.667E-01	0.101E+03
0.833E-01	0.107E+03
0.100E+00	0.112E+03
0.117E+00	0.117E+03
0.133E+00	0.121E+03
0.150E+00	0.124E+03
0.167E+00	0.127E+03
0.183E+00	0.130E+03
0.200E+00	0.133E+03
0.450E+00	0.174E+03

0.124E+02	0.174E+03
0.244E+02	0.174E+03
0.365E+02	0.174E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
172.20	12.00	28.0	0.637E-01		0.88	0.50	0.113E+03	0.296E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.167E-01	0.364E+03
0.333E-01	0.613E+03
0.500E-01	0.762E+03
0.667E-01	0.891E+03
0.833E-01	0.101E+04
0.100E+00	0.111E+04
0.117E+00	0.121E+04
0.133E+00	0.130E+04
0.150E+00	0.139E+04
0.167E+00	0.147E+04
0.183E+00	0.155E+04
0.200E+00	0.163E+04
0.450E+00	0.275E+04
0.124E+02	0.275E+04
0.244E+02	0.275E+04
0.365E+02	0.275E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
44.40	12.00	28.0	0.637E-01		0.95	0.58	0.945E+02	0.282E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.167E-01	0.507E+02
0.333E-01	0.113E+03
0.500E-01	0.133E+03
0.667E-01	0.149E+03
0.833E-01	0.162E+03
0.100E+00	0.174E+03
0.117E+00	0.184E+03
0.133E+00	0.194E+03

0.150E+00	0.202E+03
0.167E+00	0.211E+03
0.183E+00	0.218E+03
0.200E+00	0.225E+03
0.450E+00	0.328E+03
0.124E+02	0.328E+03
0.244E+02	0.328E+03
0.365E+02	0.328E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
194.40	12.00	28.0	0.637E-01	0.88	0.50		0.113E+03	0.334E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.167E-01	0.407E+03
0.333E-01	0.677E+03
0.500E-01	0.845E+03
0.667E-01	0.989E+03
0.833E-01	0.112E+04
0.100E+00	0.124E+04
0.117E+00	0.135E+04
0.133E+00	0.145E+04
0.150E+00	0.155E+04
0.167E+00	0.164E+04
0.183E+00	0.173E+04
0.200E+00	0.182E+04
0.450E+00	0.309E+04
0.124E+02	0.309E+04
0.244E+02	0.309E+04
0.365E+02	0.309E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
66.60	12.00	28.0	0.637E-01	0.88	0.50		0.113E+03	0.574E+03

Y	P
IN	LBS/IN
0.000E+00	-0.344E+02
0.167E-01	0.933E+02
0.333E-01	0.148E+03
0.500E-01	0.184E+03

0.667E-01	0.213E+03
0.833E-01	0.238E+03
0.100E+00	0.261E+03
0.117E+00	0.281E+03
0.133E+00	0.300E+03
0.150E+00	0.318E+03
0.167E+00	0.335E+03
0.183E+00	0.350E+03
0.200E+00	0.365E+03
0.450E+00	0.583E+03
0.124E+02	0.583E+03
0.244E+02	0.583E+03
0.365E+02	0.583E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
216.60	12.00	28.0	0.637E-01		0.88	0.50	0.113E+03	0.373E+04

Y	P
IN	LBS/IN
0.000E+00	0.344E+02
0.167E-01	0.450E+03
0.333E-01	0.742E+03
0.500E-01	0.927E+03
0.667E-01	0.109E+04
0.833E-01	0.123E+04
0.100E+00	0.136E+04
0.117E+00	0.148E+04
0.133E+00	0.160E+04
0.150E+00	0.171E+04
0.167E+00	0.181E+04
0.183E+00	0.191E+04
0.200E+00	0.201E+04
0.450E+00	0.343E+04
0.124E+02	0.343E+04
0.244E+02	0.343E+04
0.365E+02	0.343E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
88.70	12.00	28.0	0.637E-01		0.88	0.50	0.113E+03	0.964E+03

Y	P

IN	LBS/IN
0.000E+00	-0.344E+02
0.167E-01	0.136E+03
0.333E-01	0.211E+03
0.500E-01	0.266E+03
0.667E-01	0.312E+03
0.833E-01	0.352E+03
0.100E+00	0.388E+03
0.117E+00	0.422E+03
0.133E+00	0.453E+03
0.150E+00	0.482E+03
0.167E+00	0.509E+03
0.183E+00	0.535E+03
0.200E+00	0.560E+03
0.450E+00	0.927E+03
0.124E+02	0.927E+03
0.244E+02	0.927E+03
0.365E+02	0.927E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
238.70	12.00	28.0	0.637E-01	0.88	0.50	0.113E+03	0.411E+04

Y IN	P LBS/IN
0.000E+00	0.344E+02
0.167E-01	0.492E+03
0.333E-01	0.805E+03
0.500E-01	0.101E+04
0.667E-01	0.118E+04
0.833E-01	0.134E+04
0.100E+00	0.149E+04
0.117E+00	0.162E+04
0.133E+00	0.175E+04
0.150E+00	0.187E+04
0.167E+00	0.198E+04
0.183E+00	0.209E+04
0.200E+00	0.220E+04
0.450E+00	0.376E+04
0.124E+02	0.376E+04
0.244E+02	0.376E+04
0.365E+02	0.376E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
88.90	12.00	24.0	0.637E-01	0.88	0.50	0.750E+02	0.850E+03

Y	P
IN	LBS/IN
0.000E+00	-0.469E+02
0.167E-01	0.915E+02
0.333E-01	0.151E+03
0.500E-01	0.197E+03
0.667E-01	0.236E+03
0.833E-01	0.271E+03
0.100E+00	0.303E+03
0.117E+00	0.332E+03
0.133E+00	0.359E+03
0.150E+00	0.384E+03
0.167E+00	0.408E+03
0.183E+00	0.431E+03
0.200E+00	0.453E+03
0.450E+00	0.776E+03
0.124E+02	0.776E+03
0.244E+02	0.776E+03
0.365E+02	0.776E+03

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
238.90	12.00	24.0	0.637E-01	0.88	0.50	0.750E+02	0.265E+04

Y	P
IN	LBS/IN
0.000E+00	0.469E+02
0.167E-01	0.382E+03
0.333E-01	0.547E+03
0.500E-01	0.678E+03
0.667E-01	0.792E+03
0.833E-01	0.894E+03
0.100E+00	0.987E+03
0.117E+00	0.107E+04
0.133E+00	0.116E+04
0.150E+00	0.123E+04
0.167E+00	0.131E+04
0.183E+00	0.138E+04
0.200E+00	0.145E+04
0.450E+00	0.246E+04
0.124E+02	0.246E+04
0.244E+02	0.246E+04
0.365E+02	0.246E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
117.60	12.00	24.0	0.637E-01	0.88	0.50	0.750E+02	0.136E+04

Y	P
IN	LBS/IN
0.000E+00	-0.469E+02
0.167E-01	0.146E+03
0.333E-01	0.235E+03
0.500E-01	0.305E+03
0.667E-01	0.366E+03
0.833E-01	0.419E+03
0.100E+00	0.468E+03
0.117E+00	0.513E+03
0.133E+00	0.556E+03
0.150E+00	0.596E+03
0.167E+00	0.634E+03
0.183E+00	0.671E+03
0.200E+00	0.706E+03
0.450E+00	0.122E+04
0.124E+02	0.122E+04
0.244E+02	0.122E+04
0.365E+02	0.122E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3				
267.60	12.00	24.0	0.637E-01	0.88	0.50	0.750E+02	0.296E+04

Y	P
IN	LBS/IN
0.000E+00	0.469E+02
0.167E-01	0.416E+03
0.333E-01	0.598E+03
0.500E-01	0.744E+03
0.667E-01	0.870E+03
0.833E-01	0.983E+03
0.100E+00	0.109E+04
0.117E+00	0.118E+04
0.133E+00	0.128E+04
0.150E+00	0.136E+04
0.167E+00	0.145E+04
0.183E+00	0.152E+04
0.200E+00	0.160E+04
0.450E+00	0.272E+04

0.124E+02	0.272E+04
0.244E+02	0.272E+04
0.365E+02	0.272E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
146.40	12.00	24.0	0.619E-01	0.88	0.50	0.750E+02	0.162E+04	

Y	P
IN	LBS/IN
0.000E+00	-0.469E+02
0.167E-01	0.176E+03
0.333E-01	0.280E+03
0.500E-01	0.363E+03
0.667E-01	0.434E+03
0.833E-01	0.498E+03
0.100E+00	0.556E+03
0.117E+00	0.610E+03
0.133E+00	0.661E+03
0.150E+00	0.709E+03
0.167E+00	0.754E+03
0.183E+00	0.798E+03
0.200E+00	0.840E+03
0.450E+00	0.146E+04
0.124E+02	0.146E+04
0.244E+02	0.146E+04
0.365E+02	0.146E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
296.40	12.00	24.0	0.619E-01	0.88	0.50	0.750E+02	0.317E+04	

Y	P
IN	LBS/IN
0.000E+00	0.469E+02
0.167E-01	0.440E+03
0.333E-01	0.634E+03
0.500E-01	0.790E+03
0.667E-01	0.925E+03
0.833E-01	0.105E+04
0.100E+00	0.116E+04
0.117E+00	0.126E+04
0.133E+00	0.136E+04

0.150E+00	0.145E+04
0.167E+00	0.154E+04
0.183E+00	0.163E+04
0.200E+00	0.171E+04
0.450E+00	0.291E+04
0.124E+02	0.291E+04
0.244E+02	0.291E+04
0.365E+02	0.291E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
175.20	12.00	24.0	0.563E-01		0.88	0.50	0.750E+02	0.175E+04

Y	P
IN	LBS/IN
0.000E+00	-0.469E+02
0.167E-01	0.189E+03
0.333E-01	0.301E+03
0.500E-01	0.389E+03
0.667E-01	0.466E+03
0.833E-01	0.534E+03
0.100E+00	0.596E+03
0.117E+00	0.654E+03
0.133E+00	0.709E+03
0.150E+00	0.760E+03
0.167E+00	0.809E+03
0.183E+00	0.856E+03
0.200E+00	0.901E+03
0.450E+00	0.156E+04
0.124E+02	0.156E+04
0.244E+02	0.156E+04
0.365E+02	0.156E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
325.20	12.00	24.0	0.563E-01		0.88	0.50	0.750E+02	0.316E+04

Y	P
IN	LBS/IN
0.000E+00	0.469E+02
0.167E-01	0.438E+03
0.333E-01	0.631E+03
0.500E-01	0.786E+03

0.667E-01	0.920E+03
0.833E-01	0.104E+04
0.100E+00	0.115E+04
0.117E+00	0.126E+04
0.133E+00	0.135E+04
0.150E+00	0.145E+04
0.167E+00	0.153E+04
0.183E+00	0.162E+04
0.200E+00	0.170E+04
0.450E+00	0.290E+04
0.124E+02	0.290E+04
0.244E+02	0.290E+04
0.365E+02	0.290E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE EXCAVATION SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
203.90	12.00	24.0	0.522E-01		0.88	0.50	0.750E+02	0.187E+04

Y	P
IN	LBS/IN
0.000E+00	-0.469E+02
0.167E-01	0.203E+03
0.333E-01	0.322E+03
0.500E-01	0.416E+03
0.667E-01	0.498E+03
0.833E-01	0.571E+03
0.100E+00	0.637E+03
0.117E+00	0.699E+03
0.133E+00	0.758E+03
0.150E+00	0.813E+03
0.167E+00	0.865E+03
0.183E+00	0.916E+03
0.200E+00	0.964E+03
0.450E+00	0.168E+04
0.124E+02	0.168E+04
0.244E+02	0.168E+04
0.365E+02	0.168E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

AT THE BACKFILL SIDE

DEPTH	DIAM	PHI	GAMMA	AVG	A	B	Puc	Puí
IN	IN		LBS/IN**3					
353.90	12.00	24.0	0.522E-01		0.88	0.50	0.750E+02	0.318E+04

Y	P

IN	LBS/IN
0.000E+00	0.469E+02
0.167E-01	0.440E+03
0.333E-01	0.635E+03
0.500E-01	0.791E+03
0.667E-01	0.927E+03
0.833E-01	0.105E+04
0.100E+00	0.116E+04
0.117E+00	0.126E+04
0.133E+00	0.136E+04
0.150E+00	0.146E+04
0.167E+00	0.154E+04
0.183E+00	0.163E+04
0.200E+00	0.171E+04
0.450E+00	0.292E+04
0.124E+02	0.292E+04
0.244E+02	0.292E+04
0.365E+02	0.292E+04

P-Multiplier = 0.100E+01 Y-Multiplier = 0.100E+01

U-5114 Wall No. 2 - H = 12.5' & SPC = 5.0'

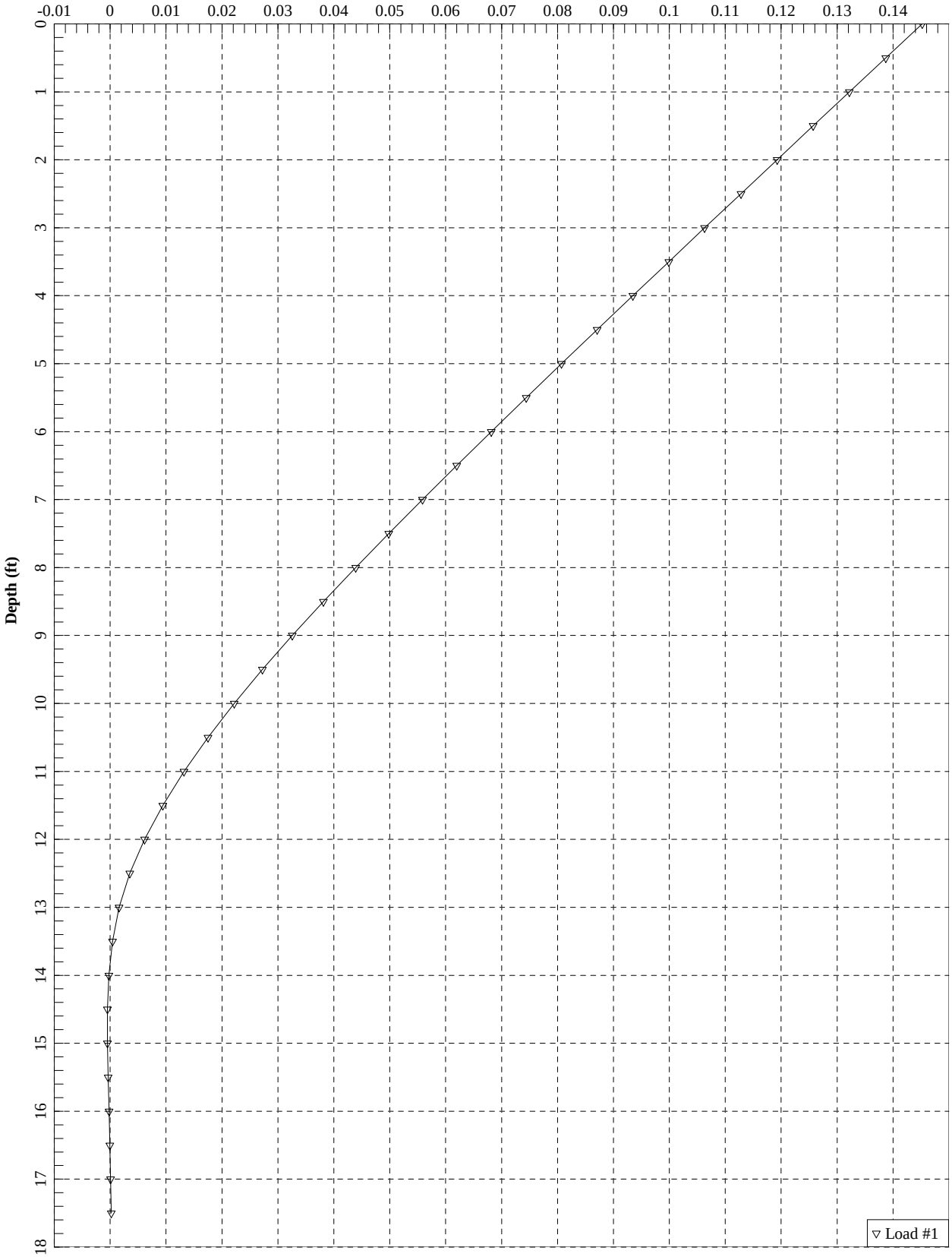
RESULTS -- ITERATION 7

STA	I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0		0.000E+00	0.918E+00	-0.420E-02	0.000E+00	0.150E+03	0.300E+03	0.177E+11
1		0.600E+01	0.893E+00	-0.420E-02	0.180E+04	0.300E+03	-0.364E-07	0.354E+11
2		0.120E+02	0.868E+00	-0.420E-02	0.360E+04	0.300E+03	0.364E-07	0.354E+11
3		0.180E+02	0.843E+00	-0.420E-02	0.540E+04	0.300E+03	0.303E-12	0.354E+11
4		0.240E+02	0.818E+00	-0.420E-02	0.720E+04	0.300E+03	-0.364E-07	0.354E+11
5		0.300E+02	0.792E+00	-0.420E-02	0.900E+04	0.300E+03	0.364E-07	0.354E+11
6		0.360E+02	0.767E+00	-0.420E-02	0.108E+05	0.300E+03	0.303E-12	0.354E+11
7		0.420E+02	0.742E+00	-0.419E-02	0.126E+05	0.369E+03	0.138E+03	0.354E+11
8		0.480E+02	0.717E+00	-0.419E-02	0.152E+05	0.531E+03	0.187E+03	0.354E+11
9		0.540E+02	0.692E+00	-0.419E-02	0.190E+05	0.744E+03	0.237E+03	0.354E+11
10		0.600E+02	0.667E+00	-0.418E-02	0.242E+05	0.101E+04	0.287E+03	0.354E+11
11		0.660E+02	0.642E+00	-0.418E-02	0.311E+05	0.132E+04	0.337E+03	0.354E+11
12		0.720E+02	0.617E+00	-0.417E-02	0.400E+05	0.168E+04	0.386E+03	0.354E+11
13		0.780E+02	0.592E+00	-0.417E-02	0.512E+05	0.209E+04	0.436E+03	0.354E+11
14		0.840E+02	0.567E+00	-0.416E-02	0.651E+05	0.255E+04	0.487E+03	0.354E+11
15		0.900E+02	0.542E+00	-0.414E-02	0.818E+05	0.306E+04	0.534E+03	0.354E+11
16		0.960E+02	0.517E+00	-0.413E-02	0.102E+06	0.362E+04	0.584E+03	0.354E+11
17		0.102E+03	0.492E+00	-0.411E-02	0.125E+06	0.423E+04	0.634E+03	0.354E+11
18		0.108E+03	0.468E+00	-0.409E-02	0.153E+06	0.489E+04	0.684E+03	0.354E+11
19		0.114E+03	0.443E+00	-0.406E-02	0.184E+06	0.560E+04	0.734E+03	0.354E+11
20		0.120E+03	0.419E+00	-0.402E-02	0.220E+06	0.636E+04	0.781E+03	0.354E+11
21		0.126E+03	0.395E+00	-0.398E-02	0.260E+06	0.716E+04	0.832E+03	0.354E+11
22		0.132E+03	0.371E+00	-0.393E-02	0.306E+06	0.802E+04	0.882E+03	0.354E+11
23		0.138E+03	0.348E+00	-0.388E-02	0.356E+06	0.893E+04	0.932E+03	0.354E+11
24		0.144E+03	0.325E+00	-0.381E-02	0.413E+06	0.988E+04	0.983E+03	0.354E+11

25	0.150E+03	0.302E+00	-0.374E-02	0.475E+06	0.109E+05	0.112E+04	0.354E+11
26	0.156E+03	0.280E+00	-0.365E-02	0.544E+06	0.115E+05	-0.788E+02	0.354E+11
27	0.162E+03	0.258E+00	-0.355E-02	0.613E+06	0.113E+05	-0.333E+03	0.354E+11
28	0.168E+03	0.237E+00	-0.344E-02	0.679E+06	0.108E+05	-0.578E+03	0.354E+11
29	0.174E+03	0.217E+00	-0.332E-02	0.742E+06	0.101E+05	-0.814E+03	0.354E+11
30	0.180E+03	0.197E+00	-0.319E-02	0.800E+06	0.920E+04	-0.978E+03	0.354E+11
31	0.186E+03	0.178E+00	-0.305E-02	0.853E+06	0.815E+04	-0.112E+04	0.354E+11
32	0.192E+03	0.161E+00	-0.290E-02	0.898E+06	0.697E+04	-0.125E+04	0.354E+11
33	0.198E+03	0.144E+00	-0.275E-02	0.936E+06	0.567E+04	-0.136E+04	0.354E+11
34	0.204E+03	0.128E+00	-0.259E-02	0.966E+06	0.426E+04	-0.145E+04	0.354E+11
35	0.210E+03	0.113E+00	-0.242E-02	0.987E+06	0.278E+04	-0.151E+04	0.354E+11
36	0.216E+03	0.985E-01	-0.225E-02	0.999E+06	0.124E+04	-0.155E+04	0.354E+11
37	0.222E+03	0.855E-01	-0.208E-02	0.100E+07	-0.344E+03	-0.162E+04	0.354E+11
38	0.228E+03	0.735E-01	-0.191E-02	0.995E+06	-0.198E+04	-0.166E+04	0.354E+11
39	0.234E+03	0.626E-01	-0.175E-02	0.978E+06	-0.364E+04	-0.166E+04	0.354E+11
40	0.240E+03	0.526E-01	-0.158E-02	0.952E+06	-0.529E+04	-0.164E+04	0.354E+11
41	0.246E+03	0.436E-01	-0.142E-02	0.915E+06	-0.686E+04	-0.151E+04	0.354E+11
42	0.252E+03	0.355E-01	-0.127E-02	0.869E+06	-0.830E+04	-0.137E+04	0.354E+11
43	0.258E+03	0.283E-01	-0.113E-02	0.815E+06	-0.959E+04	-0.120E+04	0.354E+11
44	0.264E+03	0.219E-01	-0.997E-03	0.754E+06	-0.107E+05	-0.103E+04	0.354E+11
45	0.270E+03	0.163E-01	-0.874E-03	0.687E+06	-0.116E+05	-0.851E+03	0.354E+11
46	0.276E+03	0.114E-01	-0.764E-03	0.614E+06	-0.123E+05	-0.542E+03	0.354E+11
47	0.282E+03	0.717E-02	-0.666E-03	0.539E+06	-0.127E+05	-0.254E+03	0.354E+11
48	0.288E+03	0.345E-02	-0.581E-03	0.462E+06	-0.129E+05	0.146E+02	0.354E+11
49	0.294E+03	0.193E-03	-0.510E-03	0.385E+06	-0.127E+05	0.266E+03	0.354E+11
50	0.300E+03	-0.267E-02	-0.451E-03	0.309E+06	-0.123E+05	0.658E+03	0.354E+11
51	0.306E+03	-0.522E-02	-0.405E-03	0.237E+06	-0.114E+05	0.102E+04	0.354E+11
52	0.312E+03	-0.752E-02	-0.370E-03	0.172E+06	-0.102E+05	0.134E+04	0.354E+11
53	0.318E+03	-0.966E-02	-0.346E-03	0.115E+06	-0.875E+04	0.164E+04	0.354E+11
54	0.324E+03	-0.117E-01	-0.330E-03	0.670E+05	-0.697E+04	0.192E+04	0.354E+11
55	0.330E+03	-0.136E-01	-0.322E-03	0.309E+05	-0.491E+04	0.220E+04	0.354E+11
56	0.336E+03	-0.155E-01	-0.319E-03	0.806E+04	-0.258E+04	0.247E+04	0.354E+11
57	0.342E+03	-0.174E-01	-0.318E-03	0.000E+00	-0.672E+03	0.134E+04	0.177E+11

END OF ANALYSIS

Wall 2_12.5 ft Wall Height_5.0 ft Spacing_Rock Socket
Deflection (in)



PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES
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U-5114 Wall No. 2 - H = 12.5' & SPC = 5.0'

****
* PROGRAM CONTROL PARAMETERS *
****

NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 34
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 150.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

****
* STIFFNESS AND LOAD DATA *
****
EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	34	0	0.354E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0	0	0	0.177E+11	0.300E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

****
* WALL INFORMATION *
****

FREE HEIGHT OF WALL = 0.150E+03 IN
WIDTH FOR EARTH PRESSURE, WA = 0.600E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.947E+01 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.186E+03 IN
DEPTH TO THE WATER TABLE AT EXCAVATION = 0.186E+03 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.000E+00
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.100E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.174E+01 LBS/IN**2

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	36.0	0.7	26.0	0.064	T	0.00
2	30.0	1.4	28.0	0.067	T	36.00
3	30.0	0.0	26.0	0.064	T	66.00
4	54.0	0.7	26.0	0.064	T	96.00
5	36.0	2000.0	0.0	0.081	F	150.00
6	414.0	10000.0	0.0	0.095	F	186.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.174E+01
0.360E+02	0.403E+01
0.660E+02	0.602E+01
0.960E+02	0.793E+01
0.150E+03	0.114E+02
0.186E+03	0.143E+02

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT
1	0.390E+00	0.256E+01
2	0.361E+00	0.277E+01
3	0.390E+00	0.256E+01
4	0.390E+00	0.256E+01
5	0.100E+01	0.100E+01
6	0.100E+01	0.100E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	18.00	0.00	24.00	0.00	26.55	9.99
2	0.00	51.00	0.00	56.00	0.00	58.98	5.33
3	70.57	81.00	11.19	86.00	0.00	0.00	0.00
4	167.29	123.00	36.24	132.00	-46.87	0.00	0.00

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.407E+02
0.600E+01	0.000E+00
0.120E+02	0.648E+01
0.180E+02	0.154E+02
0.240E+02	0.244E+02
0.300E+02	0.334E+02
0.360E+02	0.423E+02
0.420E+02	0.000E+00
0.480E+02	0.440E+01
0.540E+02	0.131E+02
0.600E+02	0.217E+02
0.660E+02	0.304E+02
0.720E+02	0.150E+03
0.780E+02	0.159E+03
0.840E+02	0.168E+03
0.900E+02	0.177E+03
0.960E+02	0.186E+03
0.102E+03	0.143E+03
0.108E+03	0.152E+03
0.114E+03	0.161E+03
0.120E+03	0.170E+03
0.126E+03	0.179E+03
0.132E+03	0.187E+03
0.138E+03	0.196E+03
0.144E+03	0.205E+03
0.150E+03	0.214E+03

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 150.00 IN

2 LAYER(S) OF SOIL

LAYER 1

THE LAYER IS ROCK

LAYER 2
THE LAYER IS ROCK

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,IN	WEIGHT,LBS/IN**3
150.0000	0.8102D-01
186.0000	0.8102D-01
186.0000	0.5949D-01
600.0000	0.5949D-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
150.00	0.2000D+04	0.000	-----
186.00	0.2000D+04	0.000	-----
186.00	0.1000D+05	0.000	-----
216.00	0.1000D+05	0.000	-----

P-Y CURVES DATA

DEPTH-EXCAVATION SIDE DIAM C
IN IN LBS/IN**2
0.10 9.470 0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.384D-01

DEPTH-BACKFILL SIDE DIAM C

IN	IN	LBS/IN**2
150.10	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.576D+02

DEPTH-EXCAVATION SIDE DIAM C

IN	IN	LBS/IN**2
9.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.345D+01

DEPTH-BACKFILL SIDE DIAM C

IN	IN	LBS/IN**2
159.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04

0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.610D+02

DEPTH-EXCAVATION SIDE	DIAM	C
IN	IN	LBS/IN**2
18.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.691D+01

DEPTH-BACKFILL SIDE	DIAM	C
IN	IN	LBS/IN**2
168.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04

0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.644D+02

DEPTH-EXCAVATION SIDE DIAM C

IN	IN	LBS/IN**2
27.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.104D+02

DEPTH-BACKFILL SIDE DIAM C

IN	IN	LBS/IN**2
177.00	9.470	0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.679D+02

DEPTH-EXCAVATION SIDE DIAM C
IN IN LBS/IN**2
35.90 9.470 0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.138D+02

DEPTH-BACKFILL SIDE DIAM C
IN IN LBS/IN**2
185.90 9.470 0.1E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.303D+04
0.303D-02	0.606D+04
0.455D-02	0.765D+04
0.606D-02	0.780D+04
0.758D-02	0.795D+04
0.909D-02	0.811D+04
0.106D-01	0.826D+04
0.121D-01	0.841D+04
0.136D-01	0.856D+04
0.152D-01	0.871D+04
0.167D-01	0.886D+04
0.182D-01	0.902D+04
0.197D-01	0.917D+04
0.212D-01	0.932D+04
0.227D-01	0.947D+04
0.242D-01	0.713D+02

DEPTH-EXCAVATION SIDE DIAM C
IN IN LBS/IN**2
36.10 9.470 0.5E+04

Y	P
IN	LBS/IN

0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.138D+02

DEPTH-BACKFILL SIDE	DIAM	C
IN	IN	LBS/IN**2
186.10	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.713D+02

DEPTH-EXCAVATION SIDE	DIAM	C
IN	IN	LBS/IN**2
43.50	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05

0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.159D+02

DEPTH-BACKFILL SIDE DIAM C

IN	IN	LBS/IN**2
193.50	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.708D+02

DEPTH-EXCAVATION SIDE DIAM C

IN	IN	LBS/IN**2
51.00	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05

0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.180D+02

DEPTH-BACKFILL	SIDE	DIAM	C
IN	IN	LBS/IN**2	
201.00	9.470	0.5E+04	

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.711D+02

DEPTH-EXCAVATION	SIDE	DIAM	C
IN	IN	LBS/IN**2	
58.50	9.470	0.5E+04	

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.201D+02

DEPTH-BACKFILL	SIDE	DIAM	C
IN	IN	LBS/IN**2	

208.50 9.470 0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.718D+02

DEPTH-EXCAVATION SIDE DIAM C

IN	IN	LBS/IN**2
65.90	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05
0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.222D+02

DEPTH-BACKFILL SIDE DIAM C

IN	IN	LBS/IN**2
215.90	9.470	0.5E+04

Y	P
IN	LBS/IN
0.000D+00	0.000D+00
0.152D-02	0.152D+05
0.303D-02	0.303D+05
0.455D-02	0.383D+05

0.606D-02	0.390D+05
0.758D-02	0.398D+05
0.909D-02	0.405D+05
0.106D-01	0.413D+05
0.121D-01	0.420D+05
0.136D-01	0.428D+05
0.152D-01	0.436D+05
0.167D-01	0.443D+05
0.182D-01	0.451D+05
0.197D-01	0.458D+05
0.212D-01	0.466D+05
0.227D-01	0.474D+05
0.242D-01	0.728D+02

U-5114 Wall No. 2 - H = 12.5' & SPC = 5.0'

RESULTS -- ITERATION 3

STA I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0	0.000E+00	0.145E+00	-0.108E-02	0.000E+00	0.150E+03	0.300E+03	0.177E+11
1	0.600E+01	0.139E+00	-0.108E-02	0.180E+04	0.300E+03	-0.909E-08	0.354E+11
2	0.120E+02	0.132E+00	-0.108E-02	0.360E+04	0.319E+03	0.389E+02	0.354E+11
3	0.180E+02	0.126E+00	-0.108E-02	0.563E+04	0.385E+03	0.925E+02	0.354E+11
4	0.240E+02	0.119E+00	-0.108E-02	0.822E+04	0.505E+03	0.147E+03	0.354E+11
5	0.300E+02	0.113E+00	-0.108E-02	0.117E+05	0.678E+03	0.200E+03	0.354E+11
6	0.360E+02	0.106E+00	-0.107E-02	0.164E+05	0.905E+03	0.254E+03	0.354E+11
7	0.420E+02	0.999E-01	-0.107E-02	0.225E+05	0.103E+04	-0.121E-11	0.354E+11
8	0.480E+02	0.935E-01	-0.107E-02	0.287E+05	0.105E+04	0.264E+02	0.354E+11
9	0.540E+02	0.871E-01	-0.106E-02	0.351E+05	0.110E+04	0.785E+02	0.354E+11
10	0.600E+02	0.807E-01	-0.105E-02	0.419E+05	0.120E+04	0.130E+03	0.354E+11
11	0.660E+02	0.744E-01	-0.105E-02	0.495E+05	0.136E+04	0.182E+03	0.354E+11
12	0.720E+02	0.682E-01	-0.104E-02	0.582E+05	0.190E+04	0.900E+03	0.354E+11
13	0.780E+02	0.620E-01	-0.103E-02	0.723E+05	0.283E+04	0.954E+03	0.354E+11
14	0.840E+02	0.558E-01	-0.101E-02	0.921E+05	0.381E+04	0.101E+04	0.354E+11
15	0.900E+02	0.498E-01	-0.995E-03	0.118E+06	0.484E+04	0.106E+04	0.354E+11
16	0.960E+02	0.439E-01	-0.972E-03	0.150E+06	0.593E+04	0.112E+04	0.354E+11
17	0.102E+03	0.381E-01	-0.944E-03	0.189E+06	0.692E+04	0.857E+03	0.354E+11
18	0.108E+03	0.326E-01	-0.908E-03	0.233E+06	0.780E+04	0.911E+03	0.354E+11
19	0.114E+03	0.272E-01	-0.864E-03	0.283E+06	0.874E+04	0.965E+03	0.354E+11
20	0.120E+03	0.222E-01	-0.811E-03	0.338E+06	0.973E+04	0.102E+04	0.354E+11
21	0.126E+03	0.175E-01	-0.749E-03	0.400E+06	0.108E+05	0.107E+04	0.354E+11
22	0.132E+03	0.132E-01	-0.675E-03	0.467E+06	0.119E+05	0.112E+04	0.354E+11
23	0.138E+03	0.940E-02	-0.590E-03	0.542E+06	0.130E+05	0.118E+04	0.354E+11
24	0.144E+03	0.614E-02	-0.491E-03	0.624E+06	0.142E+05	0.123E+04	0.354E+11
25	0.150E+03	0.351E-02	-0.378E-03	0.713E+06	0.564E+04	-0.184E+05	0.354E+11
26	0.156E+03	0.161E-02	-0.259E-03	0.691E+06	-0.132E+05	-0.193E+05	0.354E+11
27	0.162E+03	0.410E-03	-0.153E-03	0.554E+06	-0.253E+05	-0.490E+04	0.354E+11
28	0.168E+03	-0.226E-03	-0.730E-04	0.388E+06	-0.264E+05	0.270E+04	0.354E+11
29	0.174E+03	-0.466E-03	-0.199E-04	0.238E+06	-0.222E+05	0.558E+04	0.354E+11
30	0.180E+03	-0.465E-03	0.106E-04	0.121E+06	-0.167E+05	0.556E+04	0.354E+11
31	0.186E+03	-0.340E-03	0.241E-04	0.380E+05	-0.119E+05	0.406E+04	0.354E+11

32	0.192E+03	-0.176E-03	0.255E-04	-0.210E+05	-0.454E+04	0.106E+05	0.354E+11
33	0.198E+03	-0.337E-04	0.223E-04	-0.165E+05	0.175E+04	0.202E+04	0.354E+11
34	0.204E+03	0.919E-04	0.209E-04	0.000E+00	0.138E+04	-0.276E+04	0.177E+11

END OF ANALYSIS

Appendix IV

SOLDIER PILE RETAINING WALLS (5-16-17)

1.0 GENERAL

Construct soldier pile retaining walls consisting of driven or drilled-in steel H-piles with either precast concrete panels in between piles or a cast-in-place reinforced concrete face attached to front of piles unless required otherwise in the plans. Timber lagging is typically used for temporary support of excavations during construction. Provide cast-in-place reinforced concrete coping as required. Design and construct soldier pile retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Cantilever Wall Contractor to construct soldier pile retaining walls. Define "soldier pile wall" as a soldier pile retaining wall. Define "panel" as a precast concrete panel and "concrete facing" as a cast-in-place reinforced concrete face. Define "pile" as a steel H-pile and "coping" as cast-in-place concrete coping.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Joint Materials	1028
Masonry	1040
Grout, Type 1	1003
Portland Cement Concrete	1000
Reinforcing Steel	1070
Retaining Wall Panels	1077
Select Material	1016
Shoulder Drain Materials	816-2
Steel H-Piles	1084-1
Untreated Timber	1082-2
Welded Stud Shear Connectors	1072-6

Provide Type 2 geotextile for separation geotextiles and Class VI select material (standard size No. 57 stone) for leveling pads and backfilling. Use Class A concrete for concrete facing and coping and Class A concrete that meets Article 450-2 of the *Standard Specifications* or grout for drilled-in piles. Use untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging.

Unless required otherwise in the contract, produce panels with a smooth flat final finish that meets Article 1077-11 of the *Standard Specifications*. When noted in the plans, produce panels with an exposed aggregate finish that meets Article 1077-12 of the *Standard Specifications*. Produce panels within 1/4" of the panel dimensions shown in the accepted submittals. Damaged panels with excessive discoloration, chips or cracks as determined by the Engineer will be rejected.

For soldier pile walls with panels, galvanize piles in accordance with Section 1076 of the

Standard Specifications. When noted in the plans, paint galvanized piles in accordance with Article 442-12 of the *Standard Specifications*. Apply the following system to paint galvanized piles gray with waterborne paints that meet Article 1080-11 of the *Standard Specifications*. For painting galvanized piles other colors, contact the Materials and Tests (M&T) Unit for an appropriate paint system.

GRAY PAINT SYSTEM FOR GALVANIZED PILES			
Coat	**Color**	**Dry/Wet Film Thickness (Mils)**	
		Min.	**Max.**
Intermediate	Brown	3.0 DFT	5.0 DFT
Stripe	White	4.0 WFT	7.0 WFT
Topcoat	Gray	2.0 DFT	4.0 DFT
Total		**5.0 DFT**	**9.0 DFT**

Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store soldier pile wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

3.0 PRECONSTRUCTION REQUIREMENTS

A. Soldier Pile Wall Surveys

The Retaining Wall Plans show a plan view, typical sections, details, notes and an elevation or profile view (wall envelope) for each soldier pile wall. Before beginning soldier pile wall design, survey existing ground elevations shown in the plans and other elevations in the vicinity of soldier pile wall locations as needed. For proposed slopes above or below soldier pile walls, survey existing ground elevations to at least 10 ft beyond slope stake points. Based on these elevations, finished grades and actual soldier pile wall dimensions and details, submit revised wall envelopes for acceptance. Use accepted wall envelopes for design.

B. Soldier Pile Wall Designs

For soldier pile wall designs, submit 11 copies of working drawings and 3 copies of design calculations and a PDF copy of each at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until a design submittal is accepted.

Use a prequalified Cantilever Wall Design Consultant to design soldier pile walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Cantilever Wall Design Consultant.

Design soldier pile walls in accordance with the plans and Article 11.8 of the *AASHTO LRFD Bridge Design Specifications* unless otherwise required. Design soldier pile walls for seismic if walls are located in seismic zone 2 based on Figure 2-1 of the *Structure*

Design Manual. Design soldier pile walls for a maximum deflection of 2" or 1.5% of H, whichever is less, with H as shown in the plans.

When noted in the plans, design soldier pile walls for a live load (traffic) surcharge of 250 lb/sf in accordance with Article 11.5.6 of the AASHTO LRFD specifications. For steel beam guardrail with 8 ft posts above soldier pile walls, analyze walls for a horizontal load (P_{H1}) of 300 lb/ft of wall in accordance with Figure 3.11.6.3-2(a) of the AASHTO LRFD specifications. For concrete barrier rail above soldier pile walls, analyze walls for a P_{H1} of 500 lb/ft of wall in accordance with Figure 3.11.6.3-2(a).

When a rock mass shear strength (S_m) is noted in the plans, analyze piles using the equation shown in Figure 3.11.5.6-2 of the AASHTO LRFD specifications to calculate the passive resistance of the rock ($\overline{P_p}$). Use a maximum H-pile spacing of 10 ft. At the Contractor's option, use driven or drilled-in piles for soldier pile walls with concrete facing unless otherwise required. For soldier pile walls with panels, use drilled-in piles unless noted otherwise in the plans. Use concrete or grout for embedded portions of drilled-in piles. Install drilled-in piles by excavating holes with diameters that will result in at least 3" of clearance all around piles.

Provide temporary support of excavations for excavations more than 4 ft deep and timber lagging in accordance with the *AASHTO Guide Design Specifications for Bridge Temporary Works*. At the Contractor's option and when noted in the plans, provide temporary slopes instead of temporary support of excavations. Do not extend temporary slopes outside right-of-way or easement limits. Except for fill sections or when using temporary slopes, backfill voids behind panels, lagging and piles with No. 57 stone. Place separation geotextile between No. 57 stone and overlying fill or pavement sections except when concrete pavement, full depth asphalt or cement treated base is placed directly on stone.

At the Contractor's option, use panels or concrete facing unless required otherwise in the plans. Design panels and concrete facing in accordance with the plans and Section 5 of the *AASHTO LRFD Bridge Design Specifications*. Provide reinforcing steel of sufficient density to satisfy Article 5.7.3.4 of the AASHTO LRFD specifications. Use panels or concrete facing with the dimensions shown in the plans and attach facing to front of H-piles with welded stud shear connectors.

Use No. 57 stone for aggregate leveling pads. Use 6" thick leveling pads beneath panels and concrete facing. Unless required otherwise in the plans, embed top of leveling pads at least 12" below bottom of walls shown in the plans.

Provide wall drainage systems consisting of geocomposite sheet drains, an aggregate shoulder drain and outlet components. Place sheet drains with a horizontal spacing of no more than 10 ft and center drains between adjacent piles. Attach sheet drains to front of timber lagging or back of panels or concrete facing and connect drains to aggregate leveling pads. Locate a continuous aggregate shoulder drain along the base of panels or concrete facing in front of piles and leveling pads. Provide aggregate shoulder drains and outlet components in accordance with Standard Drawing No. 816.02 of the *Roadway*

Standard Drawings.

Unless required otherwise in the plans, use cast-in-place reinforced concrete coping at top of soldier pile walls with panels. Use coping dimensions shown in the plans and at the Contractor's option, connect coping to panels with dowels or extend coping down back of panels. When concrete barrier rail is required above soldier pile walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations for acceptance in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with pile locations, typical sections and details of piles, drainage, temporary support, leveling pads, panels and concrete facing. If necessary, include details on working drawings for coping, concrete barrier rail with moment slab and obstructions extending through walls or interfering with piles, barriers or moment slabs. Submit design calculations including deflection calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions in design calculations. When designing soldier pile walls with computer software, a hand calculation is required for the tallest wall section.

C. Soldier Pile Wall Construction Plan

Submit 4 copies and a PDF copy of a soldier pile wall construction plan at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until the construction plan submittal is accepted. Provide project specific information in the soldier pile wall construction plan including a detailed construction sequence. For driven piles, submit proposed pile driving methods and equipment in accordance with Subarticle 450-3(D)(2) of the *Standard Specifications*. For drilled-in piles, submit installation details including drilling equipment and methods for stabilizing and filling holes. Provide details in the construction plan of excavations including temporary support and any other information shown in the plans or requested by the Engineer.

If alternate construction procedures are proposed or necessary, a revised soldier pile wall construction plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend soldier pile wall construction until a revised plan is accepted.

D. Preconstruction Meeting

Before starting soldier pile wall construction, hold a preconstruction meeting to discuss the construction and inspection of the soldier pile walls. If this meeting occurs before all soldier pile wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of soldier pile walls without accepted submittals. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and Cantilever Wall Contractor Superintendent will attend preconstruction meetings.

4.0 CONSTRUCTION METHODS

Control drainage during construction in the vicinity of soldier pile walls. Direct run off away from soldier pile walls and areas above and behind walls. Contain and maintain No. 57 stone and backfill and protect material from erosion.

Notify the Engineer before blasting in the vicinity of soldier pile walls. Perform blasting in accordance with the contract. Unless required otherwise in the plans, install foundations located behind soldier pile walls before beginning wall construction if the horizontal distance to the closest foundation is less than the height of the tallest wall section.

Install soldier pile walls in accordance with the accepted submittals and as directed. Do not excavate behind soldier pile walls unless a temporary slope is shown in the accepted submittals. If overexcavation occurs and is not approved, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

A. Piles

If a temporary slope is shown in the accepted submittals, excavate the slope before installing piles. Otherwise, install piles before excavating for soldier pile walls. Weld stud shear connectors to piles in accordance with Article 1072-6 of the *Standard Specifications*.

Install piles within 1" of horizontal and vertical alignment shown in the accepted submittals and with no negative batter (piles leaning forward). Minimize alignment variations between piles for soldier pile walls with concrete facing since variations can result in thicker concrete facing in some locations in order to provide the minimum required facing thickness elsewhere. Locate piles so the minimum required concrete facing thickness, if applicable, and roadway clearances are maintained for variable pile alignments.

Install piles to the required elevations in accordance with Subarticles 450-3(D) and 450-3(E) of the *Standard Specifications*. Piles may be installed with a vibratory hammer as approved by the Engineer. Do not splice piles. If necessary, cut off piles at elevations shown in the accepted submittals along a plane normal to the pile axis.

Use pile excavation to install drilled-in piles. If overexcavation occurs, fill to required elevations with No. 57 stone before setting piles. After filling holes with concrete or grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 7 days before excavating.

Notify the Engineer if refusal is reached before pile excavation or driven piles attain the required penetration. When this occurs, a revised soldier pile wall design or construction plan submittal may be required. When a minimum pile penetration into rock is noted in the plans, rock is as determined by the Engineer.

B. Excavation

If a temporary slope is shown in the accepted submittals, excavate the slope as shown.

Otherwise, excavate in front of piles from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with a maximum height of 5 ft. Use timber lagging or an alternate approved method for temporary support of excavations in accordance with the accepted submittals.

Install temporary support within 24 hours of excavating each lift unless otherwise approved. The installation may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soldier pile wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

Remove flowable fill and material in between piles as necessary to install timber lagging. Position lagging with at least 3" of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until temporary support for the current lift is accepted.

C. Wall Drainage Systems

Install wall drainage systems as shown in the accepted submittals and in accordance with Section 816 of the *Standard Specifications*. Place geocomposite sheet drains with the geotextile side facing away from wall faces. Secure sheet drains so drains are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soldier pile walls. Discontinuous sheet drains are not allowed. If splices are needed, overlap sheet drains at least 12" so flow is not impeded. Connect sheet drains to aggregate leveling pads by embedding drain ends at least 4" into No. 57 stone.

D. Leveling Pads, Panels, Coping and Concrete Facing

Construct aggregate leveling pads at elevations and with dimensions shown in the accepted submittals. Compact leveling pads with a vibratory compactor to the satisfaction of the Engineer.

Set panels against pile flanges as shown in the accepted submittals. Position panels with at least 2" of contact in the horizontal direction between the panels and pile flanges. If contact cannot be maintained, remove panels, fill gaps with joint filler and reset panels. Securely support panels until enough No. 57 stone or backfill is placed to hold panels in place.

Construct coping as shown in the accepted submittals and Subarticle 452-3(C) of the *Standard Specifications*. When single faced precast concrete barrier is required in front of and against soldier pile walls, stop coping just above barrier so coping does not interfere with placing barrier up against wall faces. If the gap between a single faced barrier and wall face is wider than 2", fill gap with Class V select material (standard size

No. 78M stone). Otherwise, fill gap with backer rod and seal joint between barrier and soldier pile wall with silicone sealant.

Construct concrete facing in accordance with the accepted submittals and Section 420 of the *Standard Specifications*. Do not remove forms until concrete attains a compressive strength of at least 2,400 psi. Unless required otherwise in the plans, provide a Class 2 surface finish for concrete facing that meets Subarticle 420-17(F) of the *Standard Specifications*. Construct concrete facing joints at a spacing of 10 ft to 12 ft unless required otherwise in the plans. Make 1/2" thick expansion joints that meet Article 420-10 of the *Standard Specifications* for every third joint and 1/2" deep grooved contraction or sawed joints that meet Subarticle 825-10(B) or 825-10(E) respectively for the remaining joints. Stop reinforcing steel for concrete facing 2" on either side of expansion joints.

If a brick veneer is required, construct brick masonry in accordance with Section 830 of the *Standard Specifications*. Anchor brick veneers to soldier pile walls with approved brick to concrete type anchors in accordance with the manufacturer's instructions. Space anchors no more than 16" apart in the vertical direction and no more than 32" apart in the horizontal direction with each row of anchors staggered 16" from the row above and below.

Seal joints above and behind soldier pile walls between coping or concrete facing and concrete slope protection with silicone sealant.

E. Backfill

For fill sections or if a temporary slope is shown in the accepted submittals, backfill behind piles, panels and concrete facing in accordance with Article 410-8 of the *Standard Specifications*. Otherwise, backfill voids behind panels, lagging and piles with No. 57 stone as shown in the accepted submittals. Ensure all voids between panels and lagging and between piles, lagging and excavation faces are filled with No. 57 stone. Compact stone to the satisfaction of the Engineer. When separation geotextiles are required, overlap adjacent geotextiles at least 18" and hold separation geotextiles in place with wire staples or anchor pins as needed.

F. Pile Coatings

For soldier pile walls with panels, clean exposed galvanized or painted surfaces of piles with a 2,500 psi pressure washer after wall construction is complete. Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-7 of the *Standard Specifications*. Repair painted surfaces that are exposed and damaged by applying 4.0 to 7.0 mils wet film thickness of a topcoat to damaged areas with brushes or rollers. Use the same paint for damaged areas that was used for the topcoat when painting piles initially. Feather or taper topcoats in damaged areas to be level with surrounding areas.

5.0 MEASUREMENT AND PAYMENT

Soldier Pile Retaining Walls will be measured and paid in square feet. Soldier pile walls will

be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define "top of wall" as top of coping or top of panels or concrete facing for soldier pile walls without coping.

The contract unit price for *Soldier Pile Retaining Walls* will be full compensation for providing designs, submittals, labor, tools, equipment and soldier pile wall materials, installing piles, excavating, backfilling, hauling and removing excavated materials and supplying temporary support of excavations, wall drainage systems, leveling pads, panels, concrete facing, No. 57 stone, geotextiles and any incidentals necessary to construct soldier pile walls. The contract unit price for *Soldier Pile Retaining Walls* will also be full compensation for coping, pile coatings, backer rod and silicone sealant, No. 78M stone and brick veneers, if required. No additional payment will be made and no extension of completion date or time will be allowed for repairing overexcavations or unstable excavations or thicker concrete facing.

The contract unit price for *Soldier Pile Retaining Walls* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with soldier pile walls as these items will be paid for elsewhere in the contract.

Where it is necessary to provide backfill material behind soldier pile walls from sources other than excavated areas or borrow sources used in connection with other work in the contract, payment for furnishing and hauling such backfill material will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*. Placing and compacting such backfill material is not considered extra work but is incidental to the work being performed.

Payment will be made under:

Pay Item	**Pay Unit**
Soldier Pile Retaining Walls	Square Foot