

US Army Corps of Engineers® New England District

FAIRFIELD AND NEW HAVEN COUNTIES, CT

COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

DRAFT APPENDIX D3: GEOTECHNICAL DESIGN

December 2019

PREPARED BY:

DEPARTMENT OF ARMY NEW ENGLAND DISTRICT, CORPS OF ENGINEERS GEOTECHNICAL ENGINEERING SECTION CONCORD, MASSACHUSETTS 01742

NEW HAVEN CONNECTICUT GENERAL INVESTIGATION GEOTECHNICAL DESIGN APPENDIX

TABLE OF CONTENTS

1. PROJECT INFORMATION	2
1.1. Location and Existing Problem	2
2. EXPLORATIONS	3
2.1. Available Boring Information	3
2.2. Foundation Materials	3
3. DEVELOPMENT OF DESIGN SOIL STRATIFICATION	5
4. STRUCTURE SELECTION	8
4.1. I-walls	8
4.2. T-wall Configuration	10
5. DESIGN METHODS AND ASSUMPTIONS	11
5.1 Allowable Axial Loading	11
5.2 Allowable Lateral Loading	12
6 CONCLUSIONS	12
6.1 General	12
6.2 New Haven	12
7 RECOMMENDATIONS	12
7.1 Additional Subsurface Explorations	12
7.1.1 New Haven	13
7.2 Pile Driving Program	13
7.2.1 Vibration Reduction	13
7.2.2 Pile Testing	13
8 REFERENCES	13

ATTACHMENT A: ALLOWABLE AXIAL PILE LOADING ATTACHMENT B: BORING LOGS ATTACHMENT C: LABORATORY ANALYSES

1. Project Information

1.1. Location and Existing Problem

The New Haven County, CT study area is highly vulnerable to damages resulting from coastal storm events such as Hurricanes and Nor'easters. Hurricane Sandy (2012) is the most recent major event to cause wide spread damage to the region. The USACE North Atlantic Coast Comprehensive Study (completed in 2015) identified areas of high exposure and risk along the Connecticut coast study including New Haven county. Low lying coastal communities contain thousands of high-value residential structures, commercial properties and government facilities. Critical infrastructure throughout the region including the I-95 corridor and multiple railroad transportation systems, government facilities, and medical facilities become more at risk of damage from coastal storm events as climate changes.

This purpose of this general investigation was to determine the feasibility of a number of flood protection structures and alignments along the coast near Long Wharf adjacent to I-95 (Figure 1.1).



Figure 1.1: Approximate extent of potential flood protection structure alignments in New Haven

2. Explorations

2.1. Available Boring Information

New Haven subsurface information was provided by previous Long Wharf and I-95 preconstruction investigations performed by Langan Engineering & Environmental Services, the Connecticut Department of Transportation (CTDOT), and GZA GeoEnvironmental Inc. Boring information was available along the length of the coast of Long Wharf from the Long Wharf Drive underpass to just north of the jetty (Figure 2.1).

The three borings (PB-5, PB-6, PB-7) developed by the Connecticut Department of Transportation were all to depths 122 feet below surface. Boring information utilized from the Langan Engineering effort (LB-1, LB-4, LB-5, LB-6) varied from 47 to 52 feet below ground surface. The GZA boring (GZ-11) was drilled to 47 feet below the ground surface.

PB-5 • TP-1 ¶	PB_7 TP-2A/JP-2B • • B-3 LB-4 B-1 TP-3A/TP-3B	PB.9 97P-5 97P-62B-6	GZ-11
	Legend Connecticut DOT Borings GZA Borings Langan Engineering Borings 	L7 1000 ft	

Figure 2.1: Location of borings utilized in design for New Haven

2.2. Foundation Materials

A detailed description of the subsurface conditions at Long Wharf is available in a November 2010 report by Langan Engineering & Environmental Services based on the same information currently available for this study. It was assumed these soil stratifications would be similar to areas north and south of the Long Wharf where borings are not available. Below is a summary of these findings with additional notes regarding information from the CT DOT borings closer to the I-95 embankment.

<u>Miscellaneous Fill (SP)</u> - Up to 12 feet below grade is comprised of a miscellaneous sand fill. This includes medium to fine sands with varying levels of silt and gravel throughout. SPT Nvalues had a wide range of values from 1 to 55 blows per foot (bpf) indicating varying levels of compaction throughout the coastline. Samples in this area have average percent fines of approximately 13% with average water content of approximately 4%.

<u>Upper Sand (SP-SW)</u> - Beneath the miscellaneous fill is a dark layer of sand ranging in thickness from 10 to 29 feet. This sand layer is a medium dense coarse sand with varying proportions of silty gravel and silt. SPT N-values range from 6 to 23 bpf. This layer had an average 5% fines average water content of 17%.

While it is not referenced in the Langan report, this upper sand layer is not present in borings near the I-95 embankment. It appears that the miscellaneous sand fill discussed above was placed directly on top of a shallower organic silt layer as a part of the I-95 embankment construction.

<u>Organic Clayey Silt (OL/OH)</u> – Beneath the miscellaneous fill and upper sand is a thick layer of organic clayey silt with traces of shells, organics, and fines sand. The thickness varied from 14 to 40 feet. While SPT N-values ranged from weight of hammer (WOH) to 21 bpf, the average blow counts ranged from WOH to 2 bpf. This layer had an average water content of 68%. The average Liquid Limit, Plastic Limit, and Plasticity Index are approximately 84%, 38%, and 46%, respectively.

The Langan report notes that the average undrained shear strength was approximately 620 psf; results of the four UU tests showed significant variation in undrained strengths, ranging from a high of 918 psf, to a low of 432 psf. For this design, the lower bound of the undrained shear strengths were assumed.

<u>Lower Sand (SP)</u> – All of the Langan borings terminate within this lower sand layer beneath the organic silts. This is a layer of medium dense medium to fine sand with SPT N-values varying from 12 to 26 bpf. The deeper Connecticut DOT borings indicate this layer thickness varies from 8 to 10 feet. This layer has average percent fines of 8% and average percent water content of 24%.

<u>Upper and Lower Silts</u> – As the Langan borings terminate above this layer, the presence of the silts below the lower sands are indicated only in the CTDOT borings. The thickness of this layer varies from 58 to 63 feet. For the purpose of feasibility design this layer was separated into upper and lower silts due to varying SPT N-values directly below the organics and those deeper within the strata. Fines content varies from 77 to 98%.

3. Development of Design Soil Stratification

Due to the size of the project impact area and limited boring information along the proposed alignments it was necessary to create generalized soil stratifications that would be applicable for large portions of the proposed flood protection alignment.

Prior to developing the design soil strata, the blow counts for all applicable borings were normalized to N_{60} values. Free-draining granular material properties were estimated using the blow count correlations provided by Bowles (1984) and Koshida (1967) found in Table 1. Additional shear strength testing, in conjunction with future boring explorations, should be performed on soils using these correlations to confirm strength and unit weight assumptions.



Table 1: N-value Correlation Tables

The simplified sections were developed based on the similarities between nearby soil borings and whether or not the structure alignment was closer or further from shore. The depth to the organics layer, which appeared in all New Haven borings, is what largely dictated the separation between sections. It was shown in the available boring information that the organics layer was significantly shallower near the I-95 embankment when compared to the depth nearer the shoreline. There was also a noted presence of looser soils near the south end of the I-95 embankment. New Haven was eventually broken down into four separate reaches as noted on Figure 3.1. Design soil strata is provided in Table 2.



Figure 3.1: Design Soil Stratification Applicable Areas at New Haven

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type	² N60	³γt	⁴c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	0	4	Sand trace silt (Fill)	15	115	0	32	0	32
0	-34	38	Organic Silt (OH)	1	100	450	0	0	22
-34	-41	45	Medium to Fine Sand (SP)	10	125	0	30	0	30
-41	-58	62	⁷ Upper Silt trace Clay	12	128	0	25	0	25
-58	-102	106	Lower Silt trace Clay	20	132	0	25	0	25

 Table 2: Design Soil Stratification and Soil Properties at New Haven

 South End Near I-95 (PB-5 and PB-7)

South End Near Shoreline (LB-1 and LB-4)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type	² N60	³γt	⁴ c	⁵ф	c'	⁶ φ'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	0	4	Sand trace silt (Fill)	15	115	0	32	0	32
0	-9	13	Coarse to Fine Sand (SW)	20	120	0	35	0	35
-9	-37	41	Organic Silt (OH)	1	100	450	0	0	22
-37	-47	51	Medium to Fine Sand (SP)	20	120	0	35	0	35
-47	-75	79	⁷ Upper Silt trace Clay	12	128	0	25	0	25
-75	-120	124	Lower Silt trace Clay	20	132	0	25	0	25

Northend Near Shoreline (LB-5, LB-6, and GZ-11)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type	² N60	³γt	⁴ c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	20	120	0	35	0	35
4	-3	7	Sand trace silt (Fill)	20	120	0	35	0	35
-3	-14	18	Sand trace Silt (SP/SW)	15	115	0	32	0	32
-14	-40	44	Organic Silt (OH)	1	100	450	0	0	22
-40	-50	54	Medium to Fine Sand (SP)	20	120	0	35	0	35
-50	-100	104	⁷ Silt trace Clay	25	134	0	27	0	27

Northend Near I-95 (PB-9)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type	² N60	³γt	⁴ c	⁵ ф	כ'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pct)	(pst)	(deg)	(pst)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	1	3	Sand trace silt (Fill)	15	115	0	32	0	32
1	-39	43	Organic Silt (OH)	1	100	450	0	0	22
-39	-50	54	Medium to Fine Sand (SP)	30	125	0	35	0	35
-50	-110	114	⁷ Silt trace clay	20	132	0	25	0	25

Notes:

1. Design strata is based on the boring information provided by the indicated borings. Top of pile assumed at 4 feet NGVD29.

7. Depths to silts below El. -50 ft, NGVD29 are based on deep borings PB-5, PB-7, and PB-9

^{2.} N blow counts are based on N60 corrected blow counts from soil borings

^{3.} Unit weights are developed from Bowels 1984 correlations, assumed saturated unit weight and moist unit weight are equal 4. Organic silt undrained properties and unit weights based on UU testing on soil from LB-1, LB-4, LB-6, and PB-9

 $^{5. \}phi$ for granular soil based on N60 values and Kishida 1967 correlations. No shear strength lab testing information available for lower silts, assumed ϕ for loose to medium dense silts using Bowels 1988 representative values.

^{6.} Drained friction angle for organic silt estimated based on low undrained shear strengths and assumption of no cohesion. Typical values are not readily available, however it is assumed that the organics will have some drained shear strength similar to a very loose cohesionless silt.

4. Structure Selection

Concrete filled friction pipe pile supported T-walls with sheet pile seepage cutoff walls are recommended for the flood wall retaining structures. The general selection of a pile supported structure retaining wall was determined based on the following site conditions and limitations of other flood protection structures.

4.1. I-walls

I-walls were extensively considered in feasibility, but a number of factors excluded their use. The Corps engineering circular for I-wall design, EC 1110-2-6066 (April 2011), was referenced frequently to determine the general feasibility of I-walls. A number of criteria outlined in the EC regarding the availability of information to properly describe the site conditions as well as a number of caveats regarding the presence of soft soil are presented below.

As noted previously there was a general low availability of subsurface information along the proposed structure alignments. Table 3 shows the minimum drilling and sampling requirements for I-wall design during different project phases. As available boring information indicates soft fine grain soils are present (organic silt) the nominal boring spacing for feasibility level design is recommended at 500 feet. For pre-construction design the nominal boring spacing is 300 ft. At New Haven, this requirement is met in limited areas, largely along the southern beach shore, however it is not met along the entire alignment along the I-95 embankment and north of the Long Wharf shoreline jetty. Due to the limited number of borings available along the alignment the site could be considered as having "limited site information" available. Page 2-23 of the EC notes "*All I-walls serving as flood control barriers are critical and cannot be designed based on limited site information*".

Table 3: Minimum Drilling and Sampling Requirements for I-wall	S
(Table 5-1 in EC 1110-2-6066)	

Project Phase	Soil Type	Sample Type and Frequency	Nominal Boring Spacing (ft)*	Minimum Boring Depth	Remarks
	Soft Fine- Grained Soils	One Undisturbed 5" Shelby tube sample every 10 feet in depth	500		 clay foundations also require borings at both sides of levee
Reconnaissance/Feasibility	Medium/Stiff Fine-grained Soils	with disturbed sampling between tube samples.	1000	- 3 x total height of protection above	 Some borings should extend to 100 feet or top of rock.
	Loose Granular Soils	SPT method supplemented as	500	original ground, or	 sand foundations also require borings perpendicular to protection
	Medium/Dense Granular Soils	appropriate with CPT data	1000	 5 x exposed I- wall height, or 	 Some borings should extend to 100 feet or top of rock, whichever is less
	Soft Fine- Grained Soils	One Undisturbed 5" Shelby tube	300	 total thickness of soft clay layers, or 	- All clay strata must be continuously
	Medium/Stiff Fine-Grained	sample every 5 feet in depth.	500	- 50 feet	sampled for laboratory testing
Preconstruction Design	Loose Granular Soils	SPT method supplemented as	250	-	- Undisturbed sampling in clays can
	Medium/Dense Granular Soils	appropriate with CPT data	500		be supplemented with SPT, CPT, and/or geoprobes
	Soft Fine- Grained Soils	One Undisturbed 5" Shelby tube	100 - 250	_	 geophysical methods shall be used,
Post Construction	Medium/Stiff Fine-Grained Soils	sample every 5 feet in depth.	250 - 500		as appropriate ambient groundwater levels during
Structures**	Loose Granular Soils	SPT method supplemented as	100 - 250		drilling shall be recorded.
	Medium/Dense Granular Soils	appropriate with CPT data	250 - 500		 Prezometric response data is required by installing appropriate instrumentation.

Boring Layout must be consistent with uncertainties of strata and properties.

** For post construction activities, boring spacings shall be closer to the lower end of the range. Closer spacing may be required to adequately assess specific problem areas.

Next is the inclusion of soft organic soils. Page 6-34 of the EC notes, "For new designs, the maximum unsupported stem height for I-walls constructed on existing levees or in soft soils shall be limited to 6 feet." This 6 foot limiter would preclude the use of I-walls in many areas where required wall heights could extend upwards of 10 feet.

While this would seem to indicate that I-walls could be used in areas where the required protection requires a less than 6 foot wall, an additional condition is presented in the EC on page 5-5. The EC explicitly states that if "…*Normally consolidated to slightly overconsolidated soft clays, silts, or peat having SPT resistance less than 4 blows/foot or shear strength less than 500 psf located within 10 feet of the original ground surface…"* are found during feasibility, I-walls should not be considered, and the design of the flood protection system should be completed using T-based floodwalls, L-walls, or levees. This condition is applicable to much of the New Haven study area.

The blow counts (<1-2 in most areas) and available UU test data indicates that the organic soils present have less than 500 psf shear strength. Based on the available borings, soft organics are present within the first 10 feet for most of the proposed alignment. The areas where soft organics are not within the first 10 feet are in areas where an I-wall would not be appropriate (directly along the shore of Long Wharf New Haven). It cannot be said with confidence that soft organic soils would not be present within 10 feet of the ground surface for the proposed structure alignments. Therefore a pile supported T-wall was chosen as the appropriate design to use for this project phase.

I-walls may be considered during final design in some areas only after extensive subsurface information is obtained along the proposed alignments.

4.2. T-wall Configuration

T-walls were first considered without the use of pile foundations, but for various reasons it was determined that pipe supported walls would be necessary. At New Haven, for alignments closer to the shoreline where wave pressures would be highest, shallow foundations would not meet the overturning or sliding criteria without unrealistically wide bases or extensive backfilling behind the wall. For walls aligned closer to the I-95 embankment, shallow foundations would not meet the bearing capacity requirements due to the top of organics layer being shallower further inland at approximately El. 0 ft NAVD88. The depth of the T-wall bearing slip surfaces, which are generally estimated as the width of the base of the wall, would result in a large amount of the required shear strength being dependent on the soft organic layer. There was also a general concern with the space available near the I-95 embankment which would preclude the use of wide shallow foundations.

For the above reasons a pile supported T-wall, which would act more as a pile cap, was chosen as the general feasibility level structure type.

A sheetpile seepage cut off wall was also included with the intention of having a global seepage gradient less than 0.15. During the feasibility level of design the width of the base was largely dependent on the pile configuration which may change following feasibility. Therefore the shortest seepage path did not consider the width of the T-wall base. The shortest seepage path was considered to be twice the length of the sheet pile, plus the embedment of the wall (~4 feet). This assumes the seepage moves along the entire length of the sheet pile.

Driven piles were chosen for the foundation support structure for the retaining wall. Due to the presence of soft soils and limited boring information for sections of the study area, it was assumed that sufficient end bearing capacity of the piles could not be assured. Therefore, it was assumed that the piles would be acting as friction piles and that the forces transferred from the retaining wall would be carried entirely by the frictional skin resistance of the piles. This is a generally conservative assumption; if additional explorations borings are made available and the pile tip would pass entirely through the organics and into the underlying sand, then the final pile lengths may be reduced in design. Friction type piles are generally recommended to be driven, and the soft soils would make pre-drilled non-displacement pile construction difficult.

Due to the presence of soft soils across the site, drilled shaft and other non-displacement methods were only considered for limited use in areas where space limitations for a pile cap or vibrations would be an issue. Drilled shaft piles were not considered for most areas across the project due to concerns about the stability of the soft ground, however they were utilized for the closure structures near the I-95 roadway as there were concerns of vibrations near the bridge abutments as well as the space available which precluded the use of large pile capped structures.

5. Design Methods and Assumptions

5.1 Allowable Axial Loading

Pile supports were designed using empirical methods described in EM 1110-2-2906 to determine allowable axial loadings at depth. NAE Structural Engineering Section had determined that the general required loading would be approximately 50kips compression and 20 kips tension per pile. To determine the appropriate pile length and size the allowable axial loading was determined at the base of each soil layer type.

Due to the lack of subsurface information for large portions of the alignment and the presence of organics, it could not be guaranteed that the piles would terminate outside of these soft layers. Therefore, it was determined that the bearing capacity of the piles would not be considered for the allowable axial strengths at either site. Only the allowable capacity afforded by the skin friction would be considered.

An excel sheet was developed to assist with calculations using methods described in EM 1110-2-2906 to test different pile sizes. For each design soil strata, calculations were made to determine the appropriate pile length to reach the loading requirement.

Calculations were made near the lowest final ground surface elevation, or what could be considered the highest wall height. This was a wall height assumed to be near 10 feet in height, so ground surface was assumed to be near 6 feet NAVD88, and the top of the piles would be near 4 feet NAVD88. This would result in the maximum pile depths which could then be modified in final design after additional borings are performed.

As required skin friction is fairly high, larger diameter piles will be needed. It was determined that 20 inch close ended pipe piles for New Haven would be the most feasible without requiring additional splicing of smaller pile sizes. 24 inch close ended pipe piles are recommended along alignments at New Haven along the I-95 embankment. It is likely these pile sizes and depth could be reduced with further subsurface information and assuming additional bearing capacity could be guaranteed.

The presence of organics largely dictated the design of the piles. N values derived from blow count values for these materials were frequently low (1 to 4) with a number of weight of hammer and weight of rod SPT readings recorded across multiple borings. Unconfined undrained (UU) testing was available for the organic silts, however no Consolidated Undrained (CU) or Consolidated Drained (CD) tests were performed on these soils to determine drained properties. For this level of design, undrained shear strengths were assumed to be on the lower end of the available UU test data between 400 and 500 psf. The drained friction angle was assumed to be in the low 20s at 22° with no cohesion/adhesion which resulted in drained analyses dictating the overall depths and design of the piles.

EM 1110-2-2906 allows for piles to be battered using vertical axial loading calculations as long as the total axial loading of the battered pile does not exceed the allowable axial loading calculated assuming vertical piles.

5.2 Allowable Lateral Loading

Allowable lateral loading of vertical piles for concrete drilled shafts to be used at the closure structures was requested by structural engineering. The software program L-PILE was used to analyze multiple drilled shaft diameters varying from 2 feet to 5 feet diameters. L-PILE was set to test the piles with gradually increasing loads until the piles failed as noted by large excessive lateral deflections. It was determined that lateral loading against vertical piles would not be sufficient to support the resist the expected lateral loading and that pile battering would be required.

6 Conclusions

6.1 General

The New Haven study area has limited boring information along the structure alignment which in general led to a more conservative design of a pile supported T-wall. Other structure types were examined during feasibility, largely I-walls, however the lack of extensive boring information and presence of soft soils made these much higher risk structure types that would not be appropriate in most areas at a feasibility level.

Thick layers of soft soils (blow counts <1) were found along Long Wharf and the depth and extent of these soils is not clear along the entire length of the proposed alignments. This led to generally conservative assumptions for the T-wall design, such as assuming bearing capacity could not be guaranteed in the piles or that the soft soils would not be able to support shallow foundations. Even with these assumptions, due to the lack of information, it is not known whether these assumptions are actually conservative without obtaining additional subsurface information.

It is possible that the T-walls may be replaced with I-walls in some areas during design phase when more subsurface information and final structure alignments are determined.

A pile supported T-wall with a sheet pile seepage cutoff wall was selected for the proposed New Haven flood protection structures. This structure type was largely decided upon based on the large wave forces along Long Wharf beach, the thick layers of organics beneath the ground surface, and the limited boring information for portions of the alignment, especially north and south of the Long Wharf beach.

7 Recommendations

7.1 Additional Subsurface Explorations

It is possible that the T-walls may be replaced with I-walls in some areas during design phase when more subsurface information and final structure alignments are determined. Page 5-4 in the I-wall design engineering circular (EC 1110-2-6066) describes the required nominal boring spacing during different project phases (Table 3). As the site is primarily comprised of loose granular soils and soft fine-grained soils (organic layers) the required nominal boring spacing for

I-walls during design is 250 to 300 feet. Boring plans could target specific areas where I-walls would be preferred over T-walls by increasing the density of borings.

Boring information at New Haven was limited to the stretch of coast along Long Wharf. As alignments of alternatives are located both north and south of Long Wharf additional borings or the retrieval of additional boring information in these areas is recommended. Specifically this would include borings in the industrial park and restaurant area along the coast north of Long Wharf. To the south, boring information is needed for areas near 6th street and Howard Avenue where the southern section of the wall is planned for placement. It is possible this information is already available due to the number of large structures on the north end of New Haven and the recent I-95 construction.

7.2 Pile Driving Program

7.2.1 Vibration Reduction

Prior to driving piles near structures such as home residences, bridges, etc., a structural survey of these structures should be made to ensure vibration from the driving does not cause additional damage to these structures. During driving, vibrations should be monitored and additional measures be taken to reduce vibrations as needed. This may include pre-drilling holes to an elevation beneath the adjacent building foundations or trenching near pile driving. This could prevent pile vibrations from being transferred to adjacent foundations. This or other methods may be applied to reduce vibrations from pile driving.

7.2.2 Pile Testing

It is expected that load testing in accordance with ASTM D 4945 (IBC Chapter 18) would be performed on approximately 5% of the piles used at New Haven to determine axial capacity. Additional lateral load testing would also need to be performed on both driven and drilled piles. The cost of testing will include data interpretation and evaluation, which would be a requirement for all pile testing performed at the site.

8 References

Bowles, J.E. "Physical and Geotechnical Properties of Soils", 2nd Edition, 1984

International Code Council, Inc., "2018 International Building Code", 31 August 2017

Kishida, H., "Ultimate Bearing Capacity of Pile Driven in Loose Sand", Soils and Foundations, Vol. 7, No. 3:20-29

U.S. Army Corps of Engineers, "EC 1110-2-6066 Design of I-walls", 1 April 2011

U.S. Army Corps of Engineers, "EM 1110-2-2906 Design of Pile Foundations", 15 January 1991

U.S. Army Corps of Engineers, "EC 1110-2-2502 Retaining and Flood Walls", 29 September 1989

ATTACHMENT A: ALLOWABLE AXIAL PILE LOADING

Ĭ	Project:	New H	laven GI Study				Sheet No.	1	of <u>16</u>
US Army Corps	Subject:	Axial	Pile Capacity Sa	imple Calc	ulations				
of Engineers.	Computed b	у:	DPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019

<u>OBJECTIVE</u>: Geotechnical Engineering Section (GES) has calculated the allowable axial capacity of piles proposed to be used along the New Haven, CT shoreline using empirical methods described in EM 1110-2-2906. Available borings and lab data used to develop design soil strata along four separate reaches of the New Haven project. The reaches were determined by the availability of boring information and their location relative to project alternative alignments. Figure 1 presents the reaches at which the differing allowable capacities are applicable.



Figure 1: Design Soil Stratification Applicable Areas at New Haven

Ĭ	Project:	New Haven	n GI Study				Sheet No.	2	of <u>16</u>
US Army Corps	Subject:	Axial Pile	Capacity Sar	nple Calci	ulations				
of Engineers.	Computed b	y:	DPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019

PROCEDURE:

- 1. Determine soil parameters based on existing boring information.
 - a) New Haven subsurface information was provided by a previous subsurface investigation performed by Langan Engineering & Environmental Services and GZA Engineering. Borings information was available along the length of the coast of Long Wharf from the Long Wharf Drive underpass to the jetty, as well as a number of borings north of the wharf along the alignments of the I-95/I-91/CT-34 connector (Figure 2).

Final design strata soil properties are presented in Table 1 and 2.



Figure 2: Location of borings utilized in design for New Haven

ĨŦĨ	Project:	New Ha	wen GI Study			S	heet No.	3	of <u>16</u>	
US Army Corps	Subject:	Axial Pi	ile Capacity S	ample Calc	culations					<u> </u>
of Engineers.	Computed b	у:	DPF	Date:	4/23/2019	Checked by:	EWM	_Date:	5/6/201	9

Table 1: New Haven Design Soil Stratigraphy and Properties

South End N	South End Near I-95 (PB-5 and PB-7)								
¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type		³γt	⁴ c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	0	4	Sand trace silt (Fill)	15	115	0	32	0	32
0	-34	38	Organic Silt (OH)	1	100	450	0	0	22
-34	-41	45	Medium to Fine Sand (SP)	10	125	0	30	0	30
-41	-58	62	⁷ Upper Silt trace Clay	12	128	0	25	0	25
-58	-102	106	Lower Silt trace Clay	20	132	0	25	0	25

South End Near Shoreline (LB-1 and LB-4)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type 2		³γt	⁴c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	0	4	Sand trace silt (Fill)	15	115	0	32	0	32
0	-9	13	Coarse to Fine Sand (SW)	20	120	0	35	0	35
-9	-37	41	Organic Silt (OH)	1	100	450	0	0	22
-37	-47	51	Medium to Fine Sand (SP)	20	120	0	35	0	35
-47	-75	79	⁷ Upper Silt trace Clay	12	128	0	25	0	25
-75	-120	124	Lower Silt trace Clay	20	132	0	25	0	25

Northend Near Shoreline (LB-5, LB-6, and GZ-11)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type ²		³γt	⁴c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	20	120	0	35	0	35
4	-3	7	Sand trace silt (Fill)	20	120	0	35	0	35
-3	-14	18	Sand trace Silt (SP/SW)	15	115	0	32	0	32
-14	-40	44	Organic Silt (OH)	1	100	450	0	0	22
-40	-50	54	Medium to Fine Sand (SP)	20	120	0	35	0	35
-50	-100	104	⁷ Silt trace Clay	25	134	0	27	0	27

Northend Near I-95 (PB-9)

¹ Layer Top Elv.	¹ Layer Bottom Elv.	Depth	Soil Type 2		³γt	⁴c	⁵ф	c'	⁶ ф'
(ft,NGVD29)	(ft,NGVD29)	(ft)			(pcf)	(psf)	(deg)	(psf)	(deg)
6	4	0	Sand trace silt (Fill)	15	115	0	32	0	32
4	1	3	Sand trace silt (Fill)	15	115	0	32	0	32
1	-39	43	Organic Silt (OH)	1	100	450	0	0	22
-39	-50	54	Medium to Fine Sand (SP)	30	125	0	35	0	35
-50	-110	114	⁷ Silt trace clay	20	132	0	25	0	25

Notes:

1. Design strata is based on the boring information provided by the indicated borings. Top of pile assumed at El. 4 feet NGVD29. Groundwater table elevation is generally tidal due to the distance from the shoreline. For calculations assume 3 feet NGVD29. 2. Blow counts are based on N60 corrected field blow counts from soil borings

3. Unit weights are developed from Bowles 1984 correlations, assumed saturated unit weight and moist unit weight are equal 4. Organic silt undrained properties and unit weights based on UU testing on soil from LB-1, LB-4, LB-6, and PB-9

5. ϕ and ϕ' for granular soil based on N60 values and Kishida 1967 correlations. No shear strength lab testing information available for lower silts, assumed ϕ for loose to medium dense silts using Bowles 1988 representative values.

6. Drained friction angle for organic silt estimated based on low undrained shear strengths and normally consolidated. Typical values are not readily available, however it is assumed that the organics will have some drained shear strength similar to a very loose cohesionless silt.

7. Depths to silts below EL -50 ft, NGVD29 are based on deep borings PB-5, PB-7, and PB-9. LL and PI testing was not available to properly categorize these silts as MH or ML.

Ĭ	Project:	New Haven (GI Study	Sheet No.	4	of	16			
US Army Corps	Subject:	Axial Pile Ca	pacity San	nple Calc	ulations					
of Engineers.	Computed b	y: <u> </u>	OPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2	2019

b) Due to the large thickness of the organic soils and low number of borings for large sections of the alignment, it was assumed that pile tip could not be guaranteed to terminate below the organic layer. Therefore, it was assumed that tip capacity would not be guaranteed and the capacity of the pile was assumed to be held entirely by the skin friction of the piles. As no drained testing was available for the organic silts, it was assumed that the drained conditions for the organics would be a low friction angle and normally consolidated. Both drained and undrained analyses were performed during analysis, calculation results showed the drained properties of the organic layers would dictate design.

d) An excel sheet was developed to assist in calculating the various allowable axial loads for given depths. Below is a sample calculation for a 20 inch pipe pile along the north end of the New Haven shoreline.

	Sand Trace Silt (Fill)	Ground Surface = El. 6 feet NGVD29 GWT = El. 3 feet NGVD29
Top of Pile = El. 4 feet NGVD29	$\gamma = 120 \text{ pcf}$ $\phi' = 35^{\circ}$ c' = 0 psf	EL 2 fast NCVD20
	Sand Trace Silt (SP/SW) γ =115 pcf ϕ '=32° c'=0 psf	El14 feet NGVD29
	Organic Silt (OH) $\gamma = 100 \text{ pcf}$ $\phi' = 22^{\circ}$ c' = 0 psf $\phi = 0^{\circ}$ c = 450 psf	
	Medium to Fine Sand (SP) $\gamma=120 \text{ pcf}$ $\phi'=35^{\circ}$ e'=0 psf	El40 feet NGVD29
Various Tip Depth/Lengths analyzed	Silt Trace Clay $\gamma=134 \text{ pcf}$ $\phi'=27^{\circ}$ c'=0 psf	EI50 leet NGVD29

Figure 3: Pile configuration

Ĩ.w.Ĭ	Project:	New Haven GI Study	_Sheet No.	5	of <u>16</u>
	Subject:	Axial Pile Capacity Sample Calculations			
of Engineers.	Computed b	y:DPFDate:4/23/2019Checked b	y: EWM	Date:	5/6/2019
Calcula	ted Effective	Stress:			

 $\sigma'_{vo} = \sigma_{vo} - u$ $\sigma'_{vo} = \Sigma(\gamma_{soil,i} * z_{soil \; depth,i} - \gamma_{water} * z_{water \; depth,i})$

a) "Skin Friction. For design purposes the skin friction of piles in sand increase linearly to an assumed critical depth (Dc) and then remain constant below that depth. The critical depth varies between 10 to 20 pile diameters or widths (B), depending on the relative density of the sand. The critical depth is assumed as:

Dc = 10B for loose sands and silts Dc = 15B for medium dense sands and silts Dc = 20B for dense sands and silts"

-EM 1110-2-2906

Due to the presence of loose sands and silts. 10B was used as the critical depth. In this case, a 20 inch pipe pile is being used, **the critical depth is 17 feet deep**. Diagram of total and effective vertical stress is include in Figure 4.

At El. 4 feet (Top of Pile)

$$\sigma'_{vo} = \sigma_{vo} = 120 \ pcf * 2 \ ft = 240 \ psf$$

At El. 3 feet (Top of GWT)

$$\sigma'_{vo} = \sigma_{vo} = 120 \ pcf * 3 \ ft = 360 \ psf$$

At El. -3 feet

$$\sigma'_{vo} = 360 \, psf + (120 pcf - 62.4 pcf) * 6ft = 705.6 \, psf$$

At El. -11 feet (Critical Depth)

For the purpose of skin friction calculations the effective stress is constant below the critical depth

 $\sigma'_{vo} = 705.6 \, psf + (115 pcf - 62.4 pcf) * 8 ft = 1126 \, psf$



Figure 4: Vertical soil pressures

b) Skin Friction Calculations (Alpha Method)

Note: No cohesion was assumed in the organic silts drained case the alpha cancels in below equations.

$$\alpha = \alpha_1 \alpha_2$$

$$f_s = K\sigma'_v \tan \delta + \alpha c = K\sigma'_v \tan \delta$$

$$\sigma'_v = \gamma' D \text{ for } D < D_c$$

$$\sigma'_v = \gamma' D_c \text{ for } D > D_c$$

$$Q_s = f_s A_s$$

 α = adhesion factor

 α_1 = adhesion factor for undrained strength and effective stress ratio from Fig. 4-5b in EM 1110-2-2906

 α_2 = adhesion factor for pile length from Fig. 4-5b in EM 110-2-2906

K = lateral earth pressure coefficient (Kc for compression piles and Kt for tension piles)

 σ'_{ν} = effective overburden pressure

 δ = angle of friction between the soil and the pile from Table 4-3 in EM 1110-2-2906

 D_c = critical depth from page 4-11 of EM 1110-2-2916

 Q_s = capacity due to skin resistance

 A_s = surface area of pile shaft in contact with soil

 f_s = average unit skin resistance

Ĭwĭ	Project:	New Haven GI Study		5	Sheet No.	7	of <u>16</u>	
	Subject:	Axial Pile Capacity Sar	nple Calo	culations				
of Engineers.	Computed b	oy: DPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019

Two tables for determining values of K in compression and tension for displacement and non-displacement piles are provided in EM 1110-2-2916 (Figure 7). For displacement piles, the lower end of Table 4-4 were used as these were the more conservative values (Sand Kc=1.0, Kt=0.5; Silt Kc=1.0, Kt=0.5), and the higher K values in Table 4-5 are only recommended if testing validates those values. For the non-displacement pile calculations, the lower K tension values from Table 4-5 were used as well as the lower sand KC value from Table 4-4 (Sand Kc=1.0, Kt=0.5; Silt Kc=1.0, Kt=0.5; Silt Kc=1.0, Kt=0.5; Silt Kc=1.0, Kt=0.35).

	Table 4-4		Table 4-5								
	<u>Values of K</u>		Common Values for Corrected K								
Soil Type	K	Kt	Soil Type	Displacemen Compression	t Piles Tension	Nondisplacem Compression	ent Piles Tension				
Sand Silt Clay	1.00 to 2.00 1.00 1.00	0.50 to 0.70 0.50 to 0.70 0.70 to 1.00	Sand Silt Clay	2.00 1.25 1.25	0.67 0.50 0.90	1.50 1.00 1.00	0.50 0.35 0.70				

Note: The above do not apply to piles that are prebored, jetted, or installed with a vibratory hammer. Picking K values at the upper end of the above ranges should be based on local experience. K , δ , and N_q values back calculated from load tests may be used.

Note: Although these values may be commonly used in some areas they should not be used without experience and testing to validate them.

Figure 5: K value table in EM 1110-2-2916

Using Table 4-3 in the EM (Figure 6), a δ of 0.67 ϕ was used for steel pipe piles calculations and a δ of 0.9 ϕ was used for the concrete drilled shaft calculations.

Table 4-3

Values of δ

Pile Material			δ	
Steel	0.67	¢	to	0.83 Ø
Concrete	0.90	φ	to	1.0 ¢
Timber	0.80	¢	to	1.0 ¢

Figure 6: δ value table in EM 1110-2-2916

Ĩ.w.II	Project:	New Haven GI Study			Sheet No	. 8	of <u>16</u>
	Subject:						
of Engineers.	Computed	by:DPF	Date:	4/23/2019	Checked by: EWM	Date:	5/6/2019
Allowable	Compression	n Capacity:					
			Q_{All}	$_{ow} = \frac{Q_s}{FS}$			
No	ote: Piles are	friction based, bearing	capacity	not included	in compression capacit	.y	
Al	lowable Tens	sion Capacity:					
			Q _{Allow} :	$=\frac{Q_{s \text{ tension}}}{FS}$			
$Q_s = capacity$	city due to sk	tin resistance					
$Q_{s \text{ tension}}$ =	= capacity du	ue to skin resistance for	r pile in t	ension			

 Q_{Allow} = Allowable axial loading capacity FS = factor of safety for compression or tension from page 4-2 of EM 1110-2-2906 shown below

As loading is due to wave loads during storms which would not be considered normal day-to-day loading a factor of safety of 2.25 was used (Figure 7).

Method of Determining Capacity	Loading Condition	Minimum Factor Compression	of Safety Tension
Theoretical or empirical	Usual	2.0	2.0
prediction to be verified	Unusual	1.5	1.5
by pile load test	Extreme	1.15	1.15
Theoretical or empirical	Usual	2.5	3.0
prediction to be verified	Unusual	1.9	2.25
by pile driving analyzer as described in Paragraph 5-4a	Extreme	1.4	1.7
Theoretical or empirical	Usual	3.0	3.0
prediction not verified	Unusual	2.25	2.25
by load test	Extreme	1.7	1.7

Figure 7: Factor of Safety table from page 4-2 in EM 110-2-2906

Ĭ	Project:	New Haven	GI Study				Sheet No.	9	of <u>16</u>
لنظن	Subject:	Axial Pile C	Capacity Sar	nple Calcı	ulations				
US Army Corps of Engineers	Computed b	v:	DPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019

Skin friction from El. 4 feet to El. -1 ft was not considered for frictional resistance due to the potential disturbance during construction.

 $f_{s} = K\sigma'_{v avg} \tan \delta + \alpha c$ $f_{s} = K\sigma'_{v avg} \tan \delta$ $Q_{s} = f_{s}A_{s}$ $Q_{s} = K\sigma'_{v avg} \tan \delta * A_{s}$

El. 3 feet to El. -3 feet

$$\sigma'_{vavg} = \frac{360 \text{ psf} + 705.6 \text{ psf}}{2} = 532.8 \text{ psf}$$

$$K_{compression} = 1.0$$

$$K_{tension} = 0.5$$

$$A_s = \pi D * (Pile \text{ Length Below El.} -1 \text{ foot NGVD29}) = \pi * \frac{20 \text{ inches}}{12 \frac{\text{inches}}{ft}} * (2ft) = 10.5 \text{ ft}^2$$

 $Q_{s\ compression} = K\sigma'_{v\ avg} \tan \delta * A_s = 1.0 * 532.8\ psf * \tan(0.67 * 35^\circ) * 10.5\ ft^2 = 2420\ lb$

 $Q_{s \ tension} = K\sigma'_{v \ avg} \tan \delta * A_s = 0.5 * 532.8 \ psf * \tan(0.67 * 35^\circ) * 10.5 \ ft^2 = 1210 \ lb$

$$Q_{s \text{ allow,compression}} = \frac{\sum Q_s \text{ compression } @ \text{ El.} - 3 \text{ ft}}{FS} = \frac{2420 \text{ lb}}{2.25} = 1.1 \text{ kips}$$
$$Q_s \text{ allow,tension} = \frac{\sum Q_s \text{ tension } @ \text{ El.} - 3 \text{ ft}}{FS} = \frac{1210 \text{ lb}}{2.25} = 0.5 \text{ kips}$$

Ĩ	Project:	New Hav	en GI Study			S	heet No.	10	of <u>16</u>
	Subject:	Axial Pil	e Capacity Sa	ample Calc	ulations				
of Engineers.	Computed b	у:	DPF	Date:	4/23/2019	Checked by:	EWM	_Date:	5/6/2019
El3 fe	eet to El11	feet (Criti	cal Depth)						
				705 6 nst	5 ⊥ 1126 ngi	¢			
			$\sigma'_{vavg} = -$	703.0 <i>p</i> 3j	2	- = 915.8 <i>psf</i>			

 $A_{s} = \pi D * (Pile \ Length \ Below \ El. -1 \ foot \ NGVD29) = \pi * \frac{20 \ inches}{12 \frac{inches}{ft}} * (8 \ ft) = 41.9 \ ft^{2}$ $Q_{s \ compression} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 1.0 * 915.8 \ psf * \tan(0.67 * 32^{\circ}) * 41.9 \ ft^{2} = 15069 \ lb$ $Q_{s \ tension} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 0.5 * 915.8 \ psf * \tan(0.67 * 32^{\circ}) * 41.9 \ ft^{2} = 7534 \ lb$

$$Q_{s \ allow,compression} = \frac{\sum Q_{s \ compression} @ \ El.-11 \ ft}{FS} = \frac{15069 \ psf + 2420 \ psf}{2.25} = 7.8 \ kips$$

$$Q_{s \ allow,tension} = \frac{\sum Q_{s \ tension} @ \ El.-11 \ ft}{FS} = \frac{1210 \ psf + 7534 \ psf}{2.25} = 3.9 \ kips$$

El. -11 feet to El. -14 feet (Below Critical)

 $\sigma'_{vavg} = 1126 \, psf$

 $A_{s} = \pi D * (Pile \ Length \ Below \ El. -1 \ foot \ NGVD29) = \pi * \frac{20 \ inches}{12 \frac{inches}{ft}} * (3 \ ft) = 15.7 \ ft^{2}$ $Q_{s \ compression} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 1.0 * 1126 \ psf * \tan(0.67 * 32^{\circ}) * 15.7 \ ft^{2} = 6948 \ lb$ $Q_{s \ tension} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 0.5 * 1126 \ psf * \tan(0.67 * 32^{\circ}) * 15.7 \ ft^{2} = 3474 \ lb$

$$Q_{s \ allow,compression} = \frac{\sum Q_{s \ compression} @ \ El.-14 \ ft}{FS} = \frac{15069 \ lb + 2420 \ lb + 6948 \ lb}{2.25} = 10.9 \ kips$$

$$Q_{s \ allow,tension} = \frac{\sum Q_{s \ tension} @ \ El.-14 \ ft}{FS} = \frac{1210 \ lb + 7534 \ lb + 3474 \ lb}{2.25} = 5.4 \ kips$$

ĬĸĬ	Project:	New Haven GI Study			S	heet No.	11	of <u>16</u>
	Subject:	Axial Pile Capacity Sa	ample Calo	culations				
US Army Corps of Engineers®	Computed l	oy: DPF	Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019
El14	feet to El40) feet (Below Critical)						
Q_s	compression =	= $K\sigma'_{v avg} \tan \delta * A_s$	= 1.0 * 1	126 <i>psf</i> * ta	n(0.67 * 22°)	* 136 <i>f</i> t ²	= 40343	lb
	$Q_{s \ tension} = I$	$K\sigma'_{vavg} \tan \delta * A_s =$	0.5 * 112	26 <i>psf</i> * tan	(0.67 * 22°) * 2	$136 ft^2 =$	20172 l	b
Q	s allow,compre	$e_{ssion} = \sum \frac{Q_{s \ compres}}{Q_{s \ compres}}$	ssion @ El. FS	$\frac{-40 ft}{10} = \frac{150}{10}$	69 lb + 2420 l	<i>b</i> + 6948 2.25	<i>lb</i> + 403	43 <i>lb</i>
Qs	s allow,tension	$= \frac{28.8 kips}{E}$ $= \frac{\sum Q_{s tension @El4}}{FS}$	$\frac{12}{12} = \frac{12}{12}$	10 <i>lb</i> + 753	$\frac{4 \ lb + 3474 \ lb}{2.25}$	+ 20172	$\frac{lb}{ll} = 14.4$	4 kips

El. -40 feet to El. -50 feet (Below Critical)

 $Q_{s \ compression} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 1.0 * 1126 \ psf * \tan(0.67 * 35^{\circ}) * 52.4 \ ft^{2} = 25583 \ lb$ $Q_{s \ tension} = K\sigma'_{v \ avg} \tan \delta * A_{s} = 0.5 * 1126 \ psf * \tan(0.67 * 35^{\circ}) * 52.4 \ ft^{2} = 12792 \ lb$ $Q_{s \ allow, compression} = \sum_{i=1}^{i} \frac{Q_{s \ compression} @ \ El.-50 \ ft}{FS} \\ = \frac{15069 \ lb + 2420 \ lb + 6948 \ lb + 40343 \ lb + 25583 \ lb}{2.25} = 40.2 \ kips$ $Q_{s \ allow, tension} = \frac{\sum_{i=1}^{i} Q_{s \ tension} @ \ El.-50 \ ft}{FS} \\ = 20.1 \ kips$

ĨĸĨ	Project:	New Haven GI St	udy		S	heet No.	12	of	16
	Subject:	Axial Pile Capaci	ty Sample Cal	culations					
of Engineers®	Computed	by:DPF	Date:	4/23/2019	_ Checked by:	EWM	Date:	5/6/2	2019
El50	feet to El70	0 feet (Below Crit	cal)						
0 ₅ ,	compression =	$K\sigma'_{nana} \tan \delta *$	$A_{s} = 1.0 * 12$	126 <i>psf</i> * ta:	n(0.67 * 27°) *	$104.7 ft^{2}$	$^{2} = 3853$	1 <i>lb</i>	
($b \cdot \cdot \cdot = k$	$\langle \sigma' \rangle$ tan $\delta * A$	= 0.5 * 112	6nsf * tan(0 67 * 27°) * 1	$04.7 ft^2 =$	= 19266	lh	
	estension -	$\Sigma 0$				<i>,</i>	1,100		
Q_s	allow,compres	$c_{sion} = \frac{\Delta Q_{s \ compr}}{15060 \ lb + 24}$	$\frac{FS}{FS} = 694$	$\frac{0 ft}{2}$	2 1h ± 25502 11	L 20521	lb		
		$=\frac{1500910\pm24}{\Sigma}$	2010 + 094	2.25	5 <i>ib</i> + 25565 <i>ii</i>	1 + 20221	$\frac{10}{10} = 57.$	3 kip	S
Q_{z}	s allow,tension	$=\frac{2 V_{s tension @ F}}{FS}$	$\frac{El70 ft}{2000 ft}$			+ 10266	11.		
		$=\frac{1210 lb + 75}{1210 lb + 75}$	34 lD + 34/2	$\frac{10 + 201/2}{2.25}$	2 lD + 12792 lD	+ 19266	$\frac{ib}{-} = 28.6$	5 kips	5



Ĭ	Project:	New Hav	ven GI Study				Sheet No.	14	of _	16
	Subject:	Axial Pil	e Capacity Sa	imple Calc	ulations					
of Engineers.	Computed b	у:	DPF	Date:	4/23/2019	Checked by	: EWM	Date:	5/6/2	019

While tip capacity was ultimately not included in the allowable compression axial loading, calculations for tip capacity were included in the excel sheet. Bearing capacity was calculated at the top and bottom of layers to indicate stratification changes. Calculations for bearing capacity used bearing capacity equations and end bearing factors from EM 1110-2-2916. A sample calculation is provided for a single elevation.

End Bearing Calculations

Sand or Silt:

$$q = \sigma'_{v}N_{q}$$

$$\sigma'_{v} = \gamma'D \text{ for } D < D_{c}$$

$$\sigma'_{v} = \gamma'D_{c} \text{ for } D > D_{c}$$

$$Q_{t} = A_{t}q$$

$$q = 9c$$

$$Q_{t} = A_{t}q$$

Clay:

$$Q_{t \ allow} = \frac{Q_t}{FS}$$

q = unit tip-bearing capacity

 σ'_{v} = effective overburden pressure

 N_q = Suggested bearing capacity factor determined from Fig. 4-4 in EM 1110-2-2906

 A_t = effective area of the pile tip in contact with the soil



Figure 9: Bearing capacity figure from EM 1110-2-2916

Ĭ	Project:	New Haven GI Study				Sheet No.	15	of <u>16</u>
US Army Corps	Subject:	Axial Pile Capacity Sa	imple Calc	culations				
of Engineers.	Computed b	y: DPF	Date:	4/23/2019	Checked by	EWM	Date:	5/6/2019

El. -50 feet Bottom of Layer

Note: As 50 feet is below the critical depth the effective stress at the top and bottom of this layer (between -40 and -50 feet) is the same.

$$q = \sigma'_{v}N_{q}$$

$$\sigma'_{v} = \gamma'D_{c} \text{ for } D > D_{c}$$

$$Q_{t} = A_{t}\sigma'_{v}N_{q}$$



$$\phi = 27 \rightarrow N_a = 12$$

$$Q_t = \pi (\frac{(1.67 \, feet)}{2})^2 * 1126.4 \, psf * 12 = 30.5 \, kips$$

$$Q_{t \ allow} = \frac{Q_t}{FS} = \frac{30.5 \ kips}{2.25} = 13 \ kips$$

CONCLUSIONS:

A 20 inch pipe pile 65 feet in length will meet the 50 kip compression and 20 kip tension requirements along the north end of the New Haven shoreline. This method was applied to the attached excel sheets.

<u>REFERENCES</u>:

USACE <u>EM 1110-2-2906 Design of Pile Foundations</u> (1991) Bowles, J.E. <u>Physical and Geotechnical Properties of Soils 2nd Edition</u> (1984) Kishida, H. <u>Ultimate Bearing Capacity of Pile Driven in Loose Sand</u> Soils and Foundations, Vol. 7, No. 3: 20-29

Ĭ	Project:	New Haven GI	Study		S	heet No.	16	of <u>16</u>
	Subject:	Axial Pile Capa	city Sample Cal	culations				
of Engineers	Computed b	oy: DP	F Date:	4/23/2019	Checked by:	EWM	Date:	5/6/2019

ATTACHMENT 1: CALCULATIONS



	St	ratificatio	n							Soil Pro	perties			Vertical Soil Pr	essures at Botto	m of Layer			
New Haven Southend Near I-95	Soil Type	Layer	Layer Top Elv.	Layer Bottom Elv.	Depth to Layer Bottom	Layer Thickness	N ₆₀	γ _t	S _u	ф	c'	φ'	u	σ _{vo}	σ _{vo} '	$\sigma_{_{VO}}$ critical depth	$\sigma_{vo}^{}$ critical depth	Layer Thickness (Top 5 feet ignored)	Skin Friction Ares A _s
			(ft)	(ft)	(ft)	(ft)	Blow Count	(pcf)	(psf)	(degrees)	(psf)	(degrees)	(psf)	(psf)	(psf)	(psf)	(psf)	(ft)	(ft ²)
Final Grade	Sand trace silt (Fill)	1	6	6	0														
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill)	2	6	4	2	2	15	115	0	32	0	32	0	230	230	230	230	0	0
	Organic Silt (OH)	3	4	3	3	1	1	100	450	0	0	22	0	330	330	330	330	0	0.0
Ground Water Table		4	3	3	3	0							0	330	330	330	330	0	0.0
	Organic Silt (OH)	5	3	-14	20	17	1	100	450	0	0	22	1060.8	2030	969.2	2030	969.2	13	81.7
Critical Depth		6	-14	-14	20	0							1060.8	2030	969.2	2030	969.2	0	0.0
	Organic Silt (OH)	7	-14	-34	40	20	1	100	450	0	0	22	2308.8	4030	1721.2	2030	969.2	20	125.7
	Medium to Fine Sand (SP)	8	-34	-41	47	7	10	125	0	30	0	30	2745.6	4905	2159.4	2030	969.2	7	44.0
	Upper Silt trace Clay	9	-41	-58	64	17	12	128	0	25	0	25	3806.4	7081	3274.6	2030	969.2	17	106.8
	Lower Silt trace Clay	10	-58	-100	106	42	20	132	0	25	0	25	6427.2	12625	6197.8	2030	969.2	42	263.9
Pile Propertie Pile Type Pile Designation	e: Concrete Filled Steel Pipe Pile PP 24x0.500	2	Factor Of Safe Compression 2.25	Tension 2.25									Common Values for Correcte	ed K					
Diameter B (ft): 2.00		From page 4-2	in EM 1110-	2-2906 assumes "Th	eoretical or empirical pre	diction not verifi	ed by load	testing f	or Unusual Load	ling"		6.11 7	Non Disp	olacemnt				
Cross Sectional Area (in^2	36.91												Soli Type	Compression	Tension	1			
Pile Weight (lb/ft): 126			Cr	itical Depth Criteria		1						Sand	1.5	0.5	7			
Effective Area of Pile Tip (ft^2	3.14		Dc = 10B	20	loose silts	loose sands							Silt	1	0.35				
Perimete	r: 6.28		Dc = 15B	30	medium silts	medium dense sand							Clay	1	0.7				
			Dc = 20B	40	dense silts	dense sand							From Table 4-5 in EM 1110-2	-2906					
			From page 4-13	in EM 1110	0-2-2906, applicable	to both skin friction and	end bearing												
		_											Values of K for Driven Piles			_			
Adhesion Facto	or δ	_											Soil Type	Kc	Kt				
Steel	0.67¢ to 0.83 ¢												Sand	1 to 2	0.5 to 0.7				
Concrete	0.9 φ to 1.0 φ												Silt	1	0.5 to 0.7				
limber	0.80 φ to 1.0 φ	_											Clay	1	0.7 to 1.0				
Factor For Calculations	0.67												From Table 4-5 4n EM 1110-2	2-2906					
Table 4-3 in EM 1110-2-2906																			

Water Unit Weight (pcf): 62.4

												Ur	ndrained Analysis (Q c	ase)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	kial Capacity Qa*
Layer	K _c	ĸ	δ	Su/σ _{vo} '	α	L/B	α2	α α*	c σvo'avg	fs compression avg	Qs compression	ΣQs compression	Qs allow compression	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	q at Bottom of Layer	Qt allow at Top of Layer	Qt allow Bottom of Layer	Qa allow Compression (Undrained)	Qa allow Tension (Undrained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	21.44	0.0	1.0	0.0	1.0	1.0 0.	115.0	45	0	0	0.0	22.6	0.0	0	0.0	25	0	5750	0	8	0.0	0.0
3	1	0.5	0	1.4	0.5	0.5	1.0	0.5 225	.0 280.0	225	0	0	0.0	225.0	0.0	0	0.0	0	0	0	0	0	0.0	0.0
4	1	0.5	0	0.0	1.0	0.5	1.0	1.0 0.	330.0	0	0	0	0.0	0.0	0.0	0	0.0	0	0	0	0	0	0.0	0.0
5	1	0.5	0	0.5	0.9	9.0	1.0	0.9 393	.1 649.6	393	32112	32112	14.3	393.1	32111.6	32112	14.3	0	0	0	0	0	14.3	14.3
6	1	0.5	0	0.0	1.0	9.0	1.0	1.0 0.	969.2	0	0	32112	14.3	0.0	0.0	32112	14.3	0	0	0	0	0	14.3	14.3
7	1	0.5	0	0.5	0.9	19.0	1.0	0.9 393	.1 969.2	393	49402	81514	36.2	393.1	49402.4	81514	36.2	0	0	0	0	0	36.2	36.2
8	1	0.5	20.1	0.0	1.0	22.5	1.0	1.0 0.	969.2	355	15600	97113	43.2	177.3	7799.8	89314	39.7	20	19384	19384	27	27	43.2	39.7
9	1	0.5	16.75	0.0	1.0	31.0	1.0	1.0 0.	969.2	292	31157	128271	57.0	145.8	15578.6	104892	46.6	15	14538	14538	20	20	57.0	46.6
10	1	0.5	16.75	0.0	1.0	52.0	1.0	1.0 0.	969.2	292	76977	205248	91.2	145.8	38488.4	143381	63.7	15	14538	14538	20	20	91.2	63.7
	-									•								-						

												D	Drained Analysis (S cas	se)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	cial Capacity Qa*
Laver	к	к.	δ	Su/a.'	а.	L/B	<i>a</i> ,	a ac	gyo' avg	fs compression avg	Os compression	ΣOs compression	Qs allow	fstens avg	Os tension	ΣΩs tension	Os allow tension	Na	a at Top of Laver	a at Bottom of Laver	Qt allow at	Qt allow Bottom	Qa allow Compression	Qa allow Tension
			Ū	54/ 548	u,	2/0	••2			is compression ang	do compression	Eds compression	compression	interio ung	do tension	Eqs tension			q at rop of Layer	q di bottom or zayer	Top of Layer	of Layer	(Drained)	(Drained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	21.44	0.0	1.0	0.0	1.0	1.0 0.0	115.0	45	0	0	0.0	22.6	0.0	0	0.0	25	0	5750	0	8	0.0	0.0
3	1	0.5	14.74	0.0	1.0	0.5	1.0	1.0 0.0	280.0	74	0	0	0.0	36.8	0.0	0	0.0	0	0	0	0	0	0.0	0.0
4	1	0.5	0	0.0	1.0	0.5	1.0	1.0 0.0	330.0	0	0	0	0.0	0.0	0.0	0	0.0	0	0	0	0	0	0.0	0.0
5	1	0.5	14.74	0.0	1.0	9.0	1.0	1.0 0.0	649.6	171	13960	13960	6.2	85.5	6979.8	6980	3.1	0	0	0	0	0	6.2	3.1
6	1	0.5	0	0.0	1.0	9.0	1.0	1.0 0.0	969.2	0	0	13960	6.2	0.0	0.0	6980	3.1	0	0	0	0	0	6.2	3.1
7	1	0.5	14.74	0.0	1.0	19.0	1.0	1.0 0.0	969.2	255	32043	46002	20.4	127.5	16021.4	23001	10.2	0	0	0	0	0	20.4	10.2
8	1	0.5	20.1	0.0	1.0	22.5	1.0	1.0 0.0	969.2	355	15600	61602	27.4	177.3	7799.8	30801	13.7	20	19384	19384	27	27	27.4	13.7
9	1	0.5	16.75	0.0	1.0	31.0	1.0	1.0 0.0	969.2	292	31157	92759	41.2	145.8	15578.6	46380	20.6	15	14538	14538	20	20	41.2	20.6
10	1	0.5	16.75	0.0	1.0	52.0	1.0	1.0 0.0	969.2	292	76977	169736	75.4	145.8	38488.4	84868	37.7	15	14538	14538	20	20	75.4	37.7

Sheet No. 1 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: WGG Date: 4/11/2019



*Bearing capacity not included in allowable axial due to organic presence.







	St	ratificatio	n							Soil P	roperties			Vertical Soil Pro	essures at Bottor	m of Layer			
New Haven Southend Near I-95	Soil Type	Layer	Layer Top Elv.	Layer Bottom Elv.	Depth to Layer Bottom	Layer Thickness	N ₆₀	γ _t	Su	ф	c'	φ'	u	σ _{vo}	σ _{vo} '	$\sigma_{\nu\sigma}$ critical depth	$\sigma_{vo}^{}$ critical depth	Layer Thickness (Top 5 feet ignored)	Skin Friction Are A _s
			(ft)	(ft)	(ft)	(ft)	Blow Count	(pcf)	(psf)	(degrees)	(psf)	(degrees)	(psf)	(psf)	(psf)	(psf)	(psf)	(ft)	(ft²)
Final Grade	Sand trace silt (Fill)	1	6	6	0														
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill)	2	6	4	2	2	15	115	0	32	0	32	0	230	230	230	230	0	0
	Organic Silt (OH)	3	4	3	3	1	1	100	450	0	0	22	0	330	330	330	330	0	0.0
Ground Water Table		4	3	3	3	0							0	330	330	330	330	0	0.0
	Organic Silt (OH)	5	3	-14	20	17	1	100	450	0	0	22	1060.8	2030	969.2	2030	969.2	13	163.4
	Organic Silt (OH)	6	-14	-34	40	20	1	100	450	0	0	22	2308.8	4030	1721.2	4030	1721.2	20	251.3
Critical Depth		7	-34	-34	40	0							2308.8	4030	1721.2	4030	1721.2	0	0.0
	Medium to Fine Sand (SP)	8	-34	-41	47	7	10	125	0	30	0	30	2745.6	4905	2159.4	4030	1721.2	7	88.0
	Upper Silt trace Clay	9	-41	-58	64	17	12	128	0	25	0	25	3806.4	7081	3274.6	4030	1721.2	17	213.6
	Lower Silt trace Clay	10	-58	-100	106	42	20	132	0	25	0	25	6427.2	12625	6197.8	4030	1721.2	42	527.8
Pile Propertie	!S		Factor Of Saf	ety Criteria															
Pile Type	Drilled Shaft		Compression	Tension															
Pile Designation	: 4-foot dia		2.25	2.25	_								Common Values for Corrected	IK		-			
Diameter B (ft	: 4.00		From page 4-2	in EM 1110)-2-2906 assumes "Th	eoretical or empirical pre	diction not verifie	ed by load	l testing f	for Unusual Lo	ading"		Soil Type	Non Disp	lacemnt	-			
Cross Sectional Area (in^2)	: 1810						-							Compression	Tension	_			
Pile Weight (lb/ft	: 1885			C	critical Depth Criteria		-						Sand	1.5	0.5				
Effective Area of Pile Tip (ft^2)	: 12.57		Dc = 10B	40	loose silts	loose sands							Silt	1	0.35				
Perimeter	12.57		Dc = 15B	60	medium silts	medium dense sand							L Clay	1 1	0.7				
			Dc = 20B	80	dense silts	dense sand							From Table 4-5 in EM 1110-2-2	2906					

 Dc = 15B
 60
 medium silts
 medium dense sand

 Dc = 20B
 80
 dense silts
 dense sand

 From page 4-13
 in EM 1110-2-2906, applicable to both skin friction and end bearing

Adhesion	Factor δ
Steel	0.67¢ to 0.83 ¢
Concrete	0.9 ¢ to 1.0 ¢
Timber	0.80 φ to 1.0 φ
Factor For Calculations	0.9

Water Unit Weight (pcf): 62.4

												Ur	drained Analysis (Q c	ase)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	kial Capacity Qa*
Layer	K _c	ĸ	δ	Su/σ _{vo} '	α	L/B	α2	α α*c	σvo' avg	fs compression avg	Qs compression	ΣQs compression	Qs allow compression	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	q at Bottom of Layer	Qt allow at Top of Layer	Qt allow Bottom of Layer	Qa allow Compression (Undrained)	Qa allow Tension (Undrained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	28.8	0.0	1.0	0.0	1.0	1.0 0.0	115.0	63	0	0	0.0	31.6	0.0	0	0.0	25	0	5750	0	32	0.0	0.0
3	1	0.35	0	1.4	0.5	0.3	1.0	0.5 225.0	280.0	225	0	0	0.0	225.0	0.0	0	0.0	25	5750	8250	32	46	0.0	0.0
4	1	0.35	0	0.0	1.0	0.3	1.0	1.0 0.0	330.0	0	0	0	0.0	0.0	0.0	0	0.0	0	0	0	0	0	0.0	0.0
5	1	0.35	0	0.5	0.9	4.5	1.0	0.9 393.1	649.6	393	64223	64223	28.5	393.1	64223.1	64223	28.5	0	0	0	0	0	28.5	28.5
6	1	0.35	0	0.3	1.0	9.5	1.0	1.0 450.0	1345.2	450	113097	177320	78.8	450.0	113097.3	177320	78.8	0	0	0	0	0	78.8	78.8
7	1	0.35	0	0.0	1.0	9.5	1.0	1.0 0.0	1721.2	0	0	177320	78.8	0.0	0.0	177320	78.8	0	0	0	0	0	78.8	78.8
8	1	0.5	27	0.0	1.0	11.3	1.0	1.0 0.0	1721.2	877	77145	254465	113.1	438.5	38572.3	215893	96.0	20	34424	34424	192	192	113.1	96.0
9	1	0.35	22.5	0.0	1.0	15.5	1.0	1.0 0.0	1721.2	713	152305	406770	180.8	249.5	53306.8	269200	119.6	15	25818	25818	144	144	180.8	119.6
10	1	0.35	22.5	0.0	1.0	26.0	1.0	1.0 0.0	1721.2	713	376283	783053	348.0	249.5	131699.1	400899	178.2	15	25818	25818	144	144	348.0	178.2

Values of K for Driven Piles Soil Type Sand Silt

Clay From Table 4-5 4n EM 1110-2-2906

 Kc
 Kt

 1 to 2
 0.5 to 0.7

 1
 0.5 to 0.7

 1
 0.7 to 1.0

												D	rained Analysis (S cas	se)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	xial Capacity Qa*
Laver	к	к.	δ	Su/a.'	<i>a.</i>	I/B	<i>a</i> .	a a		fs compression avg	Os compression	ΣOs compression	Qs allow	fstens avg	Os tension	ΣOs tension	Os allow tension	Na	a at Top of Laver	a at Bottom of Laver	Qt allow at	Qt allow Bottom	Qa allow Compression	Qa allow Tension
		•••	U	54/ 546	w ₁	2/0	42	u u		is compression avg	di compression	Eq. compression	compression	istens ung	do tension	Eqs tension			q at rop or cayer	q di bottom or zayer	Top of Layer	of Layer	(Drained)	(Drained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	28.8	0.0	1.0	0.0	1.0	1.0 0.	115.0	63	0	0	0.0	31.6	0.0	0	0.0	25	0	5750	0	32	0.0	0.0
3	1	0.35	19.8	0.0	1.0	0.3	1.0	1.0 0.	280.0	101	0	0	0.0	35.3	0.0	0	0.0	25	5750	8250	32	46	0.0	0.0
4	1	0.35	0	0.0	1.0	0.3	1.0	1.0 0.	330.0	0	0	0	0.0	0.0	0.0	0	0.0	0	0	0	0	0	0.0	0.0
5	1	0.35	19.8	0.0	1.0	4.5	1.0	1.0 0.	649.6	234	38206	38206	17.0	81.9	13372.0	13372	5.9	0	0	0	0	0	17.0	5.9
6	1	0.35	19.8	0.0	1.0	9.5	1.0	1.0 0.	1345.2	484	121718	159924	71.1	169.5	42601.4	55973	24.9	0	0	0	0	0	71.1	24.9
7	1	0.35	0	0.0	1.0	9.5	1.0	1.0 0.) 1721.2	0	0	159924	71.1	0.0	0.0	55973	24.9	0	0	0	0	0	71.1	24.9
8	1	0.5	27	0.0	1.0	11.3	1.0	1.0 0.) 1721.2	877	77145	237069	105.4	438.5	38572.3	94546	42.0	20	34424	34424	192	192	105.4	42.0
9	1 1	0.35	22.5	0.0	1.0	15.5	1.0	1.0 0.	1721.2	713	152305	389374	173.1	249.5	53306.8	147852	65.7	15	25818	25818	144	144	173.1	65.7
10	1	0.35	22.5	0.0	1.0	26.0	1.0	1.0 0.) 1721.2	713	376283	765657	340.3	249.5	131699.1	279552	124.2	15	25818	25818	144	144	340.3	124.2

Sheet No. 3 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: WGG Date: 4/11/2019



*Bearing capacity not included in allowable axial due to organic presence.







	St	atification						Soil Pr	perties			Vertical Soil Pr	essures at Bottom	of Layer				4					
New Haven	Call Truna	1	Layer	Depth to Laye	Laura Thialanaa				-			_	- 1		- I autota al ale ante	Layer Thickness	Skin Friction Area	a					
Southend Near Shoreline	Son Type	Layer Layer top	Elv. Elv.	Bottom	Layer Thickness	1№60	γ _t 3 _u	Ψ	L	Ψ	ů	Uvo	Uvo			(Top 5 feet ignored)	A _s						
		(ft)	(ft)	(ft)	(ft)	Blow Count	(pcf) (psf)	(degrees)	(psf)	(degrees)	(psf)	(psf)	(psf)	(psf)	(psf)	(ft)	(ft ²)						
Final Grade	Sand trace silt (Fill)	1 6	6	0																			
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill) Sand trace silt (Fill)	2 6	4	2	2	15	115 0	32	0	32	0	230	230	230	230	0	0						
Ground Water Table	Sand trace sitt (Fill)	4 3	3	3	0	15	115 0	32	0	32	0	345	345	345	345	0	0.0						
	Sand trace silt (Fill)	5 3	0	6	3	15	115 0	32	0	32	187.2	690	502.8	690	502.8	0	0.0						
	Coarse to Fine Sand (SW)	6 0	-9	15	9	20	120 0	35	0	35	748.8	1770	1021.2	1770	1021.2	8	41.9						
o divel public	Organic Silt (OH)	7 -9	-11	17	2	1	100 450	0	0	22	873.6	1970	1096.4	1970	1096.4	2	10.5						
Critical Depth	Organic Silt (OH)	9 -11	-11	17	9	1	100 450	0	0	22	8/3.6	1970	1096.4	1970	1096.4	9	47.1						
	Organic Silt (OH)	10 -20	-37	43	17	1	100 450	0	0	22	2496	4570	2074	1970	1096.4	17	89.0						
	Sand	11 -37	-47	53	10	20	120 0	35	0	35	3120	5770	2650	1970	1096.4	10	52.4						
	Upper Silt trace Clay	12 -47	-75	81	28	12	128 0	25	0	25	4867.2	9354	4486.8	1970	1096.4	28	146.6						
	Lower Silt trace Clay	13 -75	-100	106	25	20	132 0	25	0	25	6427.2	12654	6226.8	1970	1096.4	25	130.9						
Pile Properties		Factor O	Safety Criteria	1																			
Pile Type:	Concrete Filled Steel Pipe Pile	Compress	ion Tension																				
Pile Designation:	PP 20x0.500	2.25	2.25								Common Values for Correcte	dК											
Diameter B (ft):	1.67	From page	4-2 in EM 1110	2-2906 assumes "	Theoretical or empirical p	prediction not verij	fied by load testing	for Unusual Loa	ding"		Soil Type	Non Disp	Tancian										
Pile Weight (lb/ft):	104		C	itical Depth Crite	ia						Sand	1.5	0.5										
Effective Area of Pile Tip (ft^2):	2.18	Dc = 10	3 17	loose silts	loose sands						Silt	1	0.35										
Perimeter:	5.24	Dc = 15	3 25	medium silts	medium dense sand						Clay	1	0.7										
		Dc = 20	3 33	dense silts	dense sand						From Table 4-5 in EM 1110-2-	2906											
		From page	4-13 IN ENVI 1110	-2-2906, <i>upplicub</i>	ie to both skin jriction and	ia ena bearing					Values of K for Driven Piles												
Adhesion Factor	δ	1									Soil Type	Kc	Kt										
Steel	0.67¢ to 0.83 ¢	1									Sand	1 to 2	0.5 to 0.7										
Concrete	0.9 φ to 1.0 φ										Silt	1	0.5 to 0.7										
Limber Factor For Calculations	0.80 φ to 1.0 φ										Clay From Table 4-5 4n FM 1110-2	-2906	0.7 to 1.0										
Table 4-3 in EM 1110-2-2906	0.07											2500											
		-																					
Water Unit Weight (pcf):	62.4																						
		-																					
		-																					
		-									Ur	ndrained Analysis (Q d	case)										
		-							Side Friction Qs		Ur	ndrained Analysis (Q (case)						Bearing Capacity Qt			Total Allowable Axia	ial Capacity Qa*
Layer	К.	 Κ _t δ	Su/σ _{vo} '	α ₁	L/B	α2	α α*c	σvo' avg	Side Friction Qs fs compression avg	Qs compression	Ur ΣQs compression	ndrained Analysis (Q o Qs allow compression	ase) fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	Bearing Capacity Qt q at Bottom of Layer	Qt allow at	Qt allow Bottom	Total Allowable Axia Qa allow Compression (Undrained)	ial Capacity Qa* Qa allow Tension ((Indrained)
Layer	К.	 Κ _τ δ	Su/σ _{vo} '	α ₁	L/B	α2	α α*c	σvo' avg	Side Friction Qs fs compression avg	Qs compression (lbs)	Ur ΣQs compression (lbs)	ndrained Analysis (Q o Qs allow compression (kips)	fstens avg	Qs tension (lbs)	ΣQs tension (lbs)	Qs allow tension (kips)	Nq	q at Top of Layer (psf)	Bearing Capacity Qt q at Bottom of Layer (psf)	Qt allow at Top of Layer (kips)	Qt allow Bottom of Layer (kips)	Total Allowable Axia Qa allow Compression (Undrained) (kips)	ial Capacity Qa* Qa allow Tension (Undrained) (kips)
Layer 1	Кс 1	- Κ _t δ 0.5	Su/σ _{vo} '	α ₁	L/B	α2	α α*c	σνο' avg	Side Friction Qs fs compression avg	Qs compression (lbs)	Ur ΣQs compression (lbs)	ndrained Analysis (Q Qs allow compression (kips)	fstens avg	Qs tension (Ibs)	ΣQs tension (Ibs)	Qs allow tension (kips)	Nq	q at Top of Layer (psf)	Bearing Capacity Qt q at Bottom of Layer (psf)	Qt allow at Top of Layer (kips)	Qt allow Bottom of Layer (kips)	Total Allowable Axia Qa allow Compression (Undrained) (kips)	ial Capacity Qa* Qa allow Tension (Undrained) (kips)
Layer 1 2	К _с	κ _t δ 0.5 0.5 21.44	Su/σ _{vo} ' 0.0	α1	L/B	α2	α α*c	σνο' avg 115.0	Side Friction Qs fs compression avg 45	Qs compression (lbs) 0	Ur EQs compression (lbs) 0	ndrained Analysis (Q Qs allow compression (kips) 0.0	fstens avg	Qs tension (Ibs) 0.0	ΣQs tension (lbs) 0	Qs allow tension (kips) 0.0	Nq 25	q at Top of Layer (psf) 0	Bearing Capacity Qt q at Bottom of Layer (psf) 5750	Qt allow at Top of Layer (kips) 0	Qt allow Bottom of Layer (kips) 6	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0
Layer 1 2 3 4	Ке 1 1 1	- Κ _ξ δ 0.5 0.5 21.44 0.5 21.44 0.5 21.44	Su/σ_{vo}'	α ₁	L/B 0.0 0.6	α ₂	α α*c	σνο' avg 115.0 287.5 245.0	Side Friction Qs fs compression avg 45 113	Qs compression (lbs) 0 0	Ur ΣQs compression (lbs) 0 0	drained Analysis (Q o Qs allow compression (kips) 0.0 0.0	fstens avg 22.6 56.5 0.0	Qs tension (lbs) 0.0 0.0	ΣQs tension (lbs) 0 0	Qs allow tension (kips) 0.0 0.0	25 25 25	q at Top of Layer (psf) 0 5750 9000	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 9675	Qt allow at Top of Layer (kips) 0 6	Qt allow Bottom of Layer (kips) 6 8	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0
Layer 1 2 3 4 5	К _с	- 	Su/σ_{vo}' 0.0 0.0 0.0 0.0	α ₁ 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4	α ₂ 1.0 1.0 1.0 1.0	α α*c	σνο' avg 115.0 287.5 345.0 423.9	Side Friction Qs fs compression avg 45 113 0 166	Qs compression (lbs) 0 0 0	Ur ΣQs compression (lbs) 0 0 0 0	Adrained Analysis (Q of Qs allow compression (kips) 0.0 0.0 0.0 0.0	fstens avg 22.6 56.5 0.0 83.2	Qs tension (lbs) 0.0 0.0 0.0 0.0	ΣQs tension (lbs) 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0	25 25 25 25	q at Top of Layer (psf) 0 5750 8625 8625	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570	Qt allow at Top of Layer (kips) 0 6 8 8	Qt allow Bottom of Layer (kips) 6 8 8 12	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0
Layer 1 2 3 4 5 6	К _с 1 1 1 1 1 1	κ, δ 0.5 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 23.45	Su/σ_{vo}' 0.0 0.0 0.0 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8	α ₂ 1.0 1.0 1.0 1.0 1.0	α α [*] c	σνο' avg 115.0 287.5 345.0 423.9 762.0	Side Friction Qs fs compression avg 45 113 0 166 331	Qs compression (lbs) 0 0 0 0 13845	Ur ΣQs compression (lbs) 0 0 0 13845	Adrained Analysis (Q of Qs allow Compression (kips) 0.0 0.0 0.0 0.0 0.0 6.2	fstens avg 22.6 56.5 0.0 83.2 165.3	Qs tension (lbs) 0.0 0.0 0.0 0.0 6922.7	ΣQs tension (lbs) 0 0 0 0 6923	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1	Nq 25 25 25 25 25 40	q at Top of Layer (psf) 0 5750 8625 8625 20112	Bearing Capacity Qt q at Bottom of Layer (psf) 8625 8625 8625 12570 40848	Qt allow at Top of Layer (kips) 0 6 8 8 8 20	Qt allow Bottom of Layer (kips) 6 8 8 8 12 40	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1
Layer 1 2 3 4 5 6 7	κ _ε 1 1 1 1 1 1 1	κ, δ 0.5 0.5 21.44 0.5 0 0.5 21.44 0.5 23.45 0.5 0.5 0	Su/σ _{vo} ' 0.0 0.0 0.0 0.0 0.0 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9	L/B 0.0 0.6 0.6 2.4 7.8 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0	α α*c	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8	Side Friction Qs fs compression avg 45 113 0 166 331 420	Qs compression (lbs) 0 0 0 0 13845 4399	Ur ΣQs compression (lbs) 0 0 0 13845 18244	Adrained Analysis (Q of Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1	fstens avg 22.6 56.5 0.0 83.2 165.3 420.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 6922.7 4398.6	ΣQs tension (lbs) 0 0 0 0 6923 11321	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0	Nq 25 25 25 25 25 40 0	q at Top of Layer (psf) 0 8625 8625 8625 20112 0	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 8 20 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1	ial Capacity Qa* Qa allow Tension (Undramed) (kips) 0.0 0.0 0.0 0.0 3.1 5.0
Layer 1 2 3 4 5 6 7 8 0	κ _ε 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 0 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0	Su/σ _{vo} ' 0.0 0.0 0.0 0.0 0.0 0.4 0.4	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 0	Qs compression (lbs) 0 0 0 0 13845 4399 0 0	Ur ΣQs compression (lbs) 0 0 0 13845 13845 13844 13844 13844	Ndrained Analysis (Q tr Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 55.5 0.0 83.2 165.3 420.0 0.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 6922.7 4398.6 0.0 10270 8	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0	25 25 25 25 25 40 0 0	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1 8.1 15.0	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 1.0
Layer 1 2 3 4 5 6 7 8 9 10	K _c 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0	Su/σ _{vo} ' 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.4 0.4	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9 0.9	L/B 0.0 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420	Qs compression (lbs) 0 0 0 13845 4399 0 19794 17388	Ur ΣQs compression (lbs) 0 0 0 0 13845 18244 18244 18244 18244 38038 75426	Ndrained Analysis (Q i Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 55.5 0.0 83.2 165.3 420.0 0.0 420.0	Qs tension (lbs) 0.0 0.0 0.0 6922.7 4398.6 0.0 19793.8 37388.3	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321 31115 66504	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 13.8 30.4	Nq 25 25 25 25 40 0 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1 8.1 8.1 16.9 33.5	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4
Layer 1 2 3 4 5 6 7 8 9 10 11	К. 1 1 1 1 1 1 1 1 1 1 1 1 1	K, 6 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0.4 0.5 0.4 0.5 0.4 0.5 0.4 0.5 0.5 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 2.3.45	Su/σ _{vo} ' 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.4	α ₁ 1.0 1.0 1.0 1.0 0.9 1.0 0.9 0.9 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 420 420 420 476	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 0.0 420.0 420.0 237.8	Qs tension (lbs) 0.0 0.0 0.0 0.0 6922.7 4398.6 0.0 19793.8 37388.3 12450.9	ZQs tension (lbs) 0 0 0 0 0 923 11321 11321 31115 68504 80954	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 1.3.8 30.4 36.0	Nq 25 25 25 25 40 0 0 0 0 0 0 40	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 0 0 0 0 43856	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 4 3	Qt allow Bottom of Layer (kips) 6 8 8 8 12 40 0 0 0 0 0 0 0 43	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 8.1 16.9 33.5 44.6	al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 36.0
Layer 1 2 3 4 5 6 7 8 9 10 11 12	κ. 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0.5 0.5 0.5 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75	Su/o _{vo} ' 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.4	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 0.9 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0 1.0 0.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 476 330	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377	Ur ΣQs compression (lbs) 0 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18248 18248 18248 18248 18248 18470 19278 192778 19278 19278 19278 19278 19278 19278 1	ndrained Analysis (Q u Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 237.8 165.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 6923 11321 11321 31115 68504 80954 105143	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 1.3.8 30.4 36.0 46.7	Nq 25 25 25 25 25 25 25 25 0 0 0 0 0 15	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 43856 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 0 43856 16446	Qt allow at Top of Layer (kips) 0 6 8 8 20 0 0 0 0 0 0 43 16	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1	ial Capacity Qa* Qa allow Tension (Undramed) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 13.8 30.4 36.0 46.7
Layer 1 2 3 4 5 6 7 8 9 10 11 12 13	K _c 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75	Su/σ ,, 0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4	α ₂ 10 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.0 1.0 0.0 9.420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 40.0 0.9 40.0 0.9 40.0 0.9 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 330 330 330	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194	Ur ΣQs compression (lbs) 0 0 0 13845 16244 18244 18244 18244 18244 18244 18244 18244 18245 100328 148706 191900	Ndrained Analysis (Q (Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 165.0 165.0	Qs tension (lbs) 0.0 0.0 0.0 6922.7 4398.6 0.0 19793.8 37388.3 12450.9 24188.7 21597.1	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321 31115 68504 80954 105143 126740	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3	Nq 25 25 25 25 25 25 25 0 0 0 0 15	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 43856 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 0 40848 0 0 0 0 43856 16446 16446	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 43 16 16	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 0 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1 8.1 16.9 33.5 44.6 66.1 85.3	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 13.8 30.4 36.0 46.7 56.3
Layer 1 2 3 4 5 6 7 8 9 10 11 12 13	Kc 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75	Su/σ _{cc}) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0 0.9 420.0 0.9 420.0 0.9 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 330 330 330	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18244 18245 10328 148706 191900	Ndrained Analysis (Q (Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 55.5 0.0 83.2 165.3 420.0 0.0 420.0 237.8 165.0 165.0	Qs tension (lbs) 0.0 0.0 0.0 6922.7 4398.6 0.0 19793.8 37388.3 12450.9 24188.7 21597.1	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321 11321 31115 66504 80954 105143 126740	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3	Nq 25 25 25 25 25 25 40 0 0 0 0 0 0 0 15 15	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 0 43856 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 0 0 40848 16446 16446	Qt allow at Top of Layer (kips) 0 6 8 8 20 0 0 0 0 0 0 0 0 43 16 16	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 0 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 8.1 16.9 33.5 44.6 66.1 85.3	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3
Layer 1 2 3 4 5 6 7 8 9 10 11 12 13	Ke 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75	5u/σ _w ² 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.4	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 40.0 0.9 0.0	ovoʻavg 115.0 287.5 345.0 1058.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 420 420 420 330 330 330	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18246 1905 1005 100	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	fstens avg 22.6 55.5 0.0 83.2 165.3 420.0 22.6 56.5 0.0 83.2 165.3 165.0 sep	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 6922.7 4398.6 0.0 19793.8 37388.3 12450.9 24188.7 21597.1	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321 31115 66504 80954 105143 126740	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3	Nq 25 25 25 25 40 0 0 0 0 0 0 0 15 15	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 43856 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 40848 0 0 0 0 43856 16446 16446 16446	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 4 3 16 15	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 43 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 5.0 13.8 30.4 36.0 46.7 56.3 ial Capacity Qa*
Layer 1 2 3 4 5 6 7 8 9 10 11 12 13 Layer	K.	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75	Su/a _e ² 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 3.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 166 331 420 0 420 420 420 420 420 420 420 420 4	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18244 18244 38038 75426 100328 148706 191900	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	rase) fstens avg fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 0.0 420.0 420.0 420.0 237.8 165.0 165.0 se) fstens avg	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 923 11321 11321 31115 68504 80954 105143 126740 ΣOs tension	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3	Nq 25 25 25 25 25 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 43856 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 0 43856 16446 16446 16446 16446 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 20 0 0 0 0 0 0 0 43 16 16 16 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 8 12 40 0 0 0 0 0 0 0 0 0 16 16 16 2 Qt allow Bottom	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia Qa allow Compression	al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 46.7 56.3 ial Capacity Qa* Qa allow Tension
Layer	K _c	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 Kt δ	Su/σ _{ee} ⁺ 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.0 <	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 420 420 331 420 331 420 5 5 Side Friction Qs fs compression avg	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbc)	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18245 10338 75426 10338 148706 191900	ndrained Analysis (Q u Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	rase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 0.0 420.0 420.0 237.8 165.0 165.0 165.0 sep fstens avg	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension	Nq 25 26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 15 15 15 15 15	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 43856 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 16446 16446 Bearing Capacity Qt q at Bottom of Layer	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 43 16 16 16 16 16	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 16 16 16 2 43 16 16 2 43 16 16 2 43 16 16 2 43 16 16 2 43 16 16 2 43 16 16 2 43 16 16 16 16 16 16 16 16 16 16 16 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia Qa allow Compression (Drained)	ial Capacity Qa* Qa allow Tension (Undramed) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	K _c	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 16.75 0.5 16.75 0.5 16.75 0.5 16.75	Su/σ _m ² 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 Su/σ _m ²	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.0 1.0 0.0 9 0.0 9 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 420 476 330 330 330 Side Friction Qs fs compression avg	Qs compression (lbs) 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs)	Ur ΣQs compression (lbs) 0 0 0 13845 16244 18244 18244 18244 18244 18244 18244 18244 18245 100328 100328 148706 191900 U ΣQs compression (lbs)	Ndrained Analysis (Q. Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	rase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 237.8 165.0 165.0 165.0 5ee fstens avg	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 6923 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 2054 80954 105143 126740 ΣQs tension (lbs)	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips)	Nq 25 26 0 0 0 0 0 0 0 0 0 0 0 0 15 15 15 15 16 17 18 19 10	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 0 0 43856 16446 16446 16446 16446 16446 q at Bottom of Layer (psf)	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 4 3 16 16 16 16 16 70 of Layer (kips)	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 3 16 16 16 16 2 43 16 16 2 43 16 16 2 43 43 43 43 44 40 0 0 0 0 0 0 0 0 0 0 43 43 46 16 4 9 17 12 12 12 12 12 12 12 12 12 12 12 12 12	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia Qa allow Compression (Drained) (kips)	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Kę	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0.5 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 0.5 0.5 0.5 0.5 16.75 0.5 16.75 0.5 0.5 0.5 16.75 0.5 0.5 0.5 16.75 0.5 0.5 0.5 0.5	Su/a _m ' 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 0.0 α αc 1.0 0.0	ovo' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 420 420 330 Side Friction Qs fs compression avg 45	Qs compression (lbs) 0 0 0 13845 4399 0 13738 24902 48377 43194 Qs compression (lbs) 0	Ur ΣQs compression (lbs) 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18245 100328 148706 191900 ΣQs compression (lbs) 0	ndrained Analysis (Q of Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ase) fstens avg 22.6 55.5 0.0 83.2 165.3 420.0 0.0 420.0 420.0 237.8 165.0 se) fstens avg 22.6 2.6 5.5 2.6 5.5 165.3 420.0 237.8 165.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 37388.3 37388.3 37388.3 37388.3 24188.7 21597.1 24189.7 24190.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24189.7 24190	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 31115 68504 80954 105143 126740 ΣQs tension (lbs) 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0	Nq 25 25 25 25 40 0 0 0 0 0 40 15 15 Nq 25	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 0 43856 16446 1645 1646 1646 1646 1646 1646 1647 1647 1647 1647 1647 16577 16577 16577 16577 16577 165777 16577 16577 165777	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 16 16 16 16 7 Cp of Layer (kips)	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia Qa allow Compression (brained) (bips) 0.0	al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 30.4 36.0 46.7 56.3 ial Capacity Qa* Qa allow Tension (Drained) (Kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Кс Кс Кс Кс Кс 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0.5 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 21.44 0.5 21.44	Su/σ _{ee} ' 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B 0.0 0.6	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 166 331 420 420 420 420 420 420 420 420 420 420	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0	Ur ΣQs compression (lbs) 0 0 0 0 0 13845 18244 18244 38038 75426 191900 2 ΣQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q or Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 237.8 165.0 165.0 se) 22.6 56.5	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 12450.9 24188.7 21597.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 11321 11321 31115 68504 80954 105143 126740 ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 30.4 36.0 46.7 56.3 9 0.0 0.0 0.0	Nq 25	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 43855 16446 16446 16446 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 43856 16446 16446 16446 16446 4 g at Bottom of Layer (psf) 5750 8625	Qt allow at Top of Layer (kips) 0 6 8 8 20 0 0 0 0 0 0 0 0 0 0 0 4 3 16 16 16 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 30.4 36.0 46.7 56.3 ial Capacity Qa* Qa allow Tension (Drained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	K _c	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 12.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0.5	Su/σ _e ⁻¹ 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	ανο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.5 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1056.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 420 420 420 4	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0	Ur ΣQs compression (lbs) 0 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18245 100328 148706 191900 ΣQs compression (lbs) 0 0	Ndrained Analysis (Q or Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Lase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 420.0 420.0 165.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 1.3.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 25 25 25 25 25 25 25 25 40 0 0 0 0 0 15 15 15 25 25 25 25 25 25 25 25 25	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 43856 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 43 16 16 16 16 16 20 0 0 0 0 43 16 16 16 16 8 8 8 8 8 8 8 8 9 0 0 0 0 0 0 8 8 8 8 8	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 43 16 16 16 2 40 0 0 0 0 43 16 16 2 6 8 8 8 8 8 5 4 5 4 5 6 8 8 8 8 8 9 7 8 8 8 8 8 8 8 8 8 8 8 8 8	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Ke	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 16.75 0.5 1.44 0.5 21.44 0.5 0 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 0 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44	Su/σ _m [*] 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B 0.0 0.6 0.6 0.6 0.6 2.4 7.8	α ₂ 10 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 287.5 345.0 423.9 762.0	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 420 420 5 330 330 330 330 5 ide Friction Qs fs compression avg 45 113 0 0 5 166 5 231	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 0	Ur ΣQs compression (lbs) 0 0 0 0 13845 18244 18244 38038 75426 100328 148706 191900 ΣQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q of Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Lase)	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 12450.9 24188.7 21597.1 24597.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 6923 11321 11351 1155 10574 105743 1057577 1057577 1057577 1057577 1057577 10575777 10575777 105757777777777	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 25 25 25 25 25 25 25 25 40 0 0 0 0 0 15 15 V V 25 25 25 25 25 25 25 25 25 25 25 25 40 0	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 0 0 43856 16446 16446 16446 16446 16446 16446	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 0 40848 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 12 40 0 0 0 0 0 0 0 3 16 16 16 16 16 2 Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 6.2 8.1 16.9 33.5 44.6 66.1 85.3 Total Allowable Axia Qa allow Compression (Drained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Ke Ke Ke Ke Ke Ke Ke	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 1.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 <td>Su/σ_e⁻ 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>α₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td> <td>L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B L/B 0.0 0.6 0.6 0.6 0.6 2.4 7.8 9.0</td> <td>α₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td> <td>α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0</td> <td>σvo' avg 115.0 287.5 345.0 423.9 762.0 1056.4 1096.8 1096.8 1097.5 345.0 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.</td> <td>Side Friction Qs fs compression avg 45 1113 166 331 420 420 420 420 420 420 420 420 420 420</td> <td>Qs compression (lbs) 0 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13845 4399 0 19794 37388 24902 48377 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Ur ΣQs compression (lbs) 0 0 0 0 0 0 13845 18244 1824 182</td> <td>ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td> <td>sase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 420.0 237.8 165.0 165.0 se) fstens avg 22.6 56.5 0.0 420.0 237.8 165.0 165.3 165.0 165.3 193.3 193.3 193.3 193.0 194.0</td> <td>Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 32450.9 24188.7 21597.1 2557.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td> <td>2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 11321 31115 68504 80954 105143 126740 2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 3.8 30.4 3.6 0 46.7 56.3</td> <td>Nq 25 25 25 25 40 0 0 0 0 40 15 15 Nq Nq 25 25 25 40 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446 16446 16445 1645 16</td> <td>Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 40848 0 0 0 0 43856 16446 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 15 16 16 16 16 16 20 43 43 16 16 5 8 8 8 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Total Allowable Axia Qa allow Compression ((Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td> <td>al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 36.0 46.7 56.3 al Capacity Qa* Qa allow Tension (Drained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td>	Su/σ _e ⁻ 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B L/B 0.0 0.6 0.6 0.6 0.6 2.4 7.8 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	σvo' avg 115.0 287.5 345.0 423.9 762.0 1056.4 1096.8 1096.8 1097.5 345.0 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.8 1058.	Side Friction Qs fs compression avg 45 1113 166 331 420 420 420 420 420 420 420 420 420 420	Qs compression (lbs) 0 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13845 4399 0 19794 37388 24902 48377 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Ur ΣQs compression (lbs) 0 0 0 0 0 0 13845 18244 1824 182	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	sase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 420.0 237.8 165.0 165.0 se) fstens avg 22.6 56.5 0.0 420.0 237.8 165.0 165.3 165.0 165.3 193.3 193.3 193.3 193.0 194.0	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 32450.9 24188.7 21597.1 2557.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 11321 31115 68504 80954 105143 126740 2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 3.8 30.4 3.6 0 46.7 56.3	Nq 25 25 25 25 40 0 0 0 0 40 15 15 Nq Nq 25 25 25 40 0 0 0 0 0 0 0 0 0 0 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446 16446 16445 1645 16	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 40848 0 0 0 0 43856 16446 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 15 16 16 16 16 16 20 43 43 16 16 5 8 8 8 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total Allowable Axia Qa allow Compression ((Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 36.0 46.7 56.3 al Capacity Qa* Qa allow Tension (Drained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Kç	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 21.44 0.5 21.44 <t< td=""><td>Su/σ_{ee}' 0.0</td><td>α₁ 1.0 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td><td>L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B 0.0 0.6 0.6 0.6 0.6 0.6 0.6 2.4 7.8 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0</td><td>α₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td><td>α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0</td><td>σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.8 1096.8 1096.8 1096.4</td><td>Side Friction Qs fs compression avg 45 113 0 166 166 331 420 0 420 420 420 420 420 420 420 420 4</td><td>Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 13845 2917 0</td><td>Ur ΣQs compression (lbs) 0 0 0 0 0 13845 18244 18244 38038 75426 100328 148706 191900 ΣQs compression (lbs) 0 0 0 13845 16763 16763</td><td>ndrained Analysis (Q or Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td><td>ase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 420.0 420.0 420.0 420.0 55.3 165.0 165.0 56.5 0.0 88.2 165.5 165.0 165.3 199.3 0.0 0 0 0 0 0 0 165.3 199.3 0.0 0 10 10 10 10 10 10</td><td>Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td><td>ΣQs tension (lbs) 0 0 0 0 6923 11321 11321 31115 68504 80954 105143 126740 ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 36.0 46.7 56.3 30.4 36.0 46.7 56.3 9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0</td><td>Nq 25 25 25 25 25 25 25 25 40 0 0 0 0 0 40 15 15 15 V Nq 25 25 25 25 25 25 25 25 25 25 25 25 40 0 0 0</td><td>q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 0 43856 16446 1646 16</td><td>Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 43856 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 16 16 16 16 16 20 43 43 16 16 6 8 8 12 40 6 8 8 12 40 0 0 0 0 0 0 0 0 16 16 16 16 16 16 16 16 16 16 16 16 16</td><td>Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td><td>ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td></t<>	Su/σ _{ee} ' 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B 0.0 0.6 0.6 0.6 0.6 0.6 0.6 2.4 7.8 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 0.9 420.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.8 1096.8 1096.8 1096.4	Side Friction Qs fs compression avg 45 113 0 166 166 331 420 0 420 420 420 420 420 420 420 420 4	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 13845 2917 0	Ur ΣQs compression (lbs) 0 0 0 0 0 13845 18244 18244 38038 75426 100328 148706 191900 ΣQs compression (lbs) 0 0 0 13845 16763 16763	ndrained Analysis (Q or Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 420.0 420.0 420.0 420.0 55.3 165.0 165.0 56.5 0.0 88.2 165.5 165.0 165.3 199.3 0.0 0 0 0 0 0 0 165.3 199.3 0.0 0 10 10 10 10 10 10	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 6923 11321 11321 31115 68504 80954 105143 126740 ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 36.0 46.7 56.3 30.4 36.0 46.7 56.3 9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Nq 25 25 25 25 25 25 25 25 40 0 0 0 0 0 40 15 15 15 V Nq 25 25 25 25 25 25 25 25 25 25 25 25 40 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 0 43856 16446 1646 16	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 43856 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 16 16 16 16 16 20 43 43 16 16 6 8 8 12 40 6 8 8 12 40 0 0 0 0 0 0 0 0 16 16 16 16 16 16 16 16 16 16 16 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	K _c	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 16.75 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 14.74 0.5 0	Su/σ _e ⁻¹ 0.0 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B 0.0 0.6 0.6 0.6 2.4 7.8 9.0 9.0 14.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0	σνο' avg 115.0 287.5 345.0 423.9 762.0 1058.8 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1088.8 1098.8 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 0 420 420 420 420 420 420 420 420 4	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 13845 2917 0 0 13593	Line ΣQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13845 18244 3038 75426 100328 148706 191900 C C C 0 13845 16763 30356	ndrained Analysis (Q u Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Lase)	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 5143 1151 68504 80954 105143 126740 ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 1.3.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 25 40 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446 16446 16446 16446 16445 16445 16445 16446 1646 166 16	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 43856 16446 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 43 16 16 16 16 16 16 20 0 0 0 43 16 16 16 16 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 0 0 0 43 16 16 16 16 2 40 0 0 0 43 16 16 2 6 8 8 8 12 40 0 0 0 0 0 0 0 0 16 16 2 16 16 16 16 16 16 16 16 16 16 16 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Ke Ke 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 23.45 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 16.75 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 14.74 0.5 0.5 0.5 14.74 0.5 14.74 0.5 14.74	Su/σ _w ⁻ 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.9 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 14.4 24.6 30.6 47.4 62.4 L/B 0.0 0.6 0.6 0.6 2.4 7.8 9.0 14.4 24.6 30.6 47.4 62.4 1/B 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 0.9 420.0 1.0 0.0	ovo' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4 1096.4	Side Friction Qs fs compression avg 45 113 0 166 331 420 420 420 420 420 420 476 330 330 330 330 5ide Friction Qs fs compression avg 45 113 0 166 331 330 330 279 0 288 288 288 288	Qs compression (lbs) 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 13845 2917 0 0 13593 25676	Ur ZQs compression (lbs) 0 0 0 0 0 13845 18244 18244 38038 75426 100328 18706 191900	ndrained Analysis (Q of Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ase) fstens avg 22.6 56.5 0.0 83.2 165.3 420.0 420.0 420.0 237.8 165.0 165.0 se) fstens avg 22.6 56.5 0.0 83.2 165.3 165.0 165.3 199.3 0.0 144.2	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 12450.9 24188.7 21597.1 21597.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ΣQs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 31115 68504 80954 105143 126740 2 ΣQs tension (lbs) 0 0 0 0 0 0 0 0 2 3 8381 8381 8381 8381 8381 8381 8381	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 36.0 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.1 3.7 6.7 12.5 5.7	Nq 25	q at Top of Layer (psf) 0 5750 8625 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 16446 16446 0 0 0 0 5750 8625 8625 8625 8625 8625 8625 8625 8625	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 12570 40848 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 16 16 16 16 16 16 2 40 0 0 0 43 16 16 16 16 16 16 16 16 16 16 16 16 16	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	ial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Layer	Kę 1 1 1 1 1 1 1 1 1 1 1 1 1	κ, δ 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 0 0.5 16.75 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 21.44 0.5 0 0.5 14.74 0.5 0 0.5 14.74 0.5 23.45 0.5 14.74 <	Su/σ _e ⁻ 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.4 0.0 0.4 0.0	α ₁ 1.0 1.0 1.0 1.0 1.0 0.9 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 2.4 7.8 9.0 9.0 14.4 24.6 30.6 47.4 62.4 L/B L/B L/B 0.0 0.6 0.6 0.6 0.6 2.4 7.8 9.0 9.0 14.4 2.4.6 30.6 47.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 420.0 0.9 420.0 1.0 0.0	ovo' avg 115.0 287.5 345.0 423.9 762.0 1096.4 1096.	Side Friction Qs fs compression avg 45 1113 166 331 420 420 420 420 420 420 420 420 420 420	Qs compression (lbs) 0 0 0 0 13845 4399 0 19794 37388 24902 48377 43194 Qs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Ur ΣQs compression (lbs) 0 0 0 0 0 0 13845 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18244 18245 16763 18190 0 0 13845 16763 1676 167 167 17 17 17 17 17 17 17 17 17 17 17 17 17	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	sase)	Qs tension (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 19793.8 37388.3 37388.3 37388.3 37388.3 37388.3 37388.3 324188.7 21597.1 24188.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 11321 126740 2Qs tension (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0 0.0 3.1 5.0 5.0 13.8 30.4 46.7 56.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 25 25 25 25 40 0 0 0 40 15 15 25 25 25 40 0 0 0 40 15 25 25 25 25 40 0 0 0 0 0 0 0 0 0 0 0 0 0	q at Top of Layer (psf) 0 5750 8625 8625 20112 0 0 0 0 43856 16446 16446 16446 16446 9 7750 8625 8625 8625 8625 8625 8625 8625 8625	Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 12570 40848 0 0 0 0 43856 16446 16446 16446 Bearing Capacity Qt q at Bottom of Layer (psf) 5750 8625 8625 8625 12570 40848 0 0 0 0 0 0 43856 12570	Qt allow at Top of Layer (kips) 0 6 8 8 8 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qt allow Bottom of Layer (kips) 6 8 8 12 40 0 0 0 0 43 15 16 16 16 16 16 0 0 0 0 0 43 16 5 8 8 8 12 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total Allowable Axia Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	al Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.1 5.0 13.8 30.4 35.0 13.8 30.4 36.0 46.7 56.3 Chrained) (kips) 0.0 0.0 0.0 0.0 3.1 3.7 3.7 3.7 12.5 18.0 28.7

Sheet No. 5 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: XXX Date: XXXX



*Bearing capacity not included in allowable axial due to organic presence.






	Si	ratification						Soil Pr	operties			Vertical Soil Pr	essures at Bottom	n of Layer									
New Haven	Soil Type	Layer Layer To	Laye p Elv. Botto	r Depth to Lay m Bottom	Layer Thickness	N ₆₀	γ _t S _u	ф	c'	φ'	u	σ _{vo}	σ,,,'	σ_{vo} critical depth	σ_{vo} ' critical depth	Layer Thickness	Skin Friction Are	a					
Northend Near Shoreline		(ft	Elv.	(ft)	(ft)	Blow Count	(ncf) (nsf)	(degrees)	(nsf)	(degrees)	(nsf)	(nsf)	(nsf)	(nsf)	(nsf)	(ff)	~s (ft ²)						
Final Grade	Sand trace silt (Fill)	1 6	6	0	(11)	biow count	. (per) (psr)	(ucgrees)	(1951)	(466,665)	(651)	(psi)	(001)	(psi)	(551)	(11)	(11)						
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill)	2 6	4	2	2	20	120 0	35	0	35	0	240	240	240	240	0	0						
Ground Water Table	Sand trace slit (Fill)	4 3	3	3	1	20	120 0	35	U	35	0	360	360	360	360	0	0.0						
	Sand trace silt (Fill)	5 3	-3	9	6	20	120 0	35	0	35	374.4	1080	705.6	1080	705.6	2	10.5						
Critical Depth	Sand trace silt (SP/SW)	6 -3 7 -1	-11	1/	8	15	115 0	32	0	32	8/3.6	2000	1126.4	2000	1126.4	8	41.9						
	Sand trace silt (SP/SW)	8 -1:	-14	20	3	15	115 0	32	0	32	1060.8	2345	1284.2	2345	1126.4	3	15.7						
	Organic Silt (OH) Modium to Fino Sand (SD)	9 -14	-40	46	26	1	100 450	0	0	22	2683.2	4945	2261.8	2345	1126.4	26	136.1						
	Silt trace Clay	11 -50) -100	106	50	25	134 0	27	0	27	6427.2	12845	6417.8	2345	1126.4	50	261.8						
Dilo Droportion	-	Easter	Of Safaty Critor	ia																			
Pile Type:	Concrete Filled Steel Pipe Pil	e Compre	ssion Tensio	na Nn																			
Pile Designation:	PP 20x0.500	2.2	5 2.25								Common Values for Correcte	ed K		-									
Diameter B (ft): Cross Sectional Area (in^2):	1.67	From pag	ie 4-2 in EM 11.	10-2-2906 assume:	"Theoretical or empirical p	prediction not verij	fied by load testing	for Unusual Loa	iding"		Soil Type	Compression	Tension	-									
Pile Weight (lb/ft):	: 104			Critical Depth Crit	eria						Sand	1.5	0.5	1									
Effective Area of Pile Tip (ft^2):	2.18	Dc =	LOB 17	loose silts medium silts	loose sands medium dense sand						Silt	1	0.35										
		Dc =	20B 33	dense silts	dense sand						From Table 4-5 in EM 1110-2	-2906	0.7	_									
		From pag	e 4-13 in EM 1.	110-2-2906, applic	able to both skin friction an	nd end bearing					Values of K for Driven Piles												
Adhesion Factor	rδ										Soil Type	Kc	Kt										
Steel	0.67¢ to 0.83 ¢										Sand	1 to 2	0.5 to 0.7										
Timber	0.80 φ to 1.0 φ										Clay	1	0.5 to 0.7 0.7 to 1.0										
Factor For Calculations	0.67										From Table 4-5 4n EM 1110-2	2-2906		-									
Table 4-3 In ENI 1110-2-2906																							
Water Unit Weight (pcf):	62.4																						
Water Unit Weight (pcf):	62.4																						
Water Unit Weight (pcf):	62.4								Side Friction Qs		U	ndrained Analysis (Q o	ase)				1		Bearing Capacity Ot			Total Allowable کم	xial Capacity Qa*
Water Unit Weight (pcf):	62.4	 К. б	Su/a.	-' αι	1/B	α,	a a*c	gvo' ave	Side Friction Qs	Os compression	U 20s compression	ndrained Analysis (Q o Qs allow	ase)	Ostension	ΣQs tension	Os allow tension	Ng	g at Top of Laver	Bearing Capacity Qt	Qt allow at	Qt allow Bottom	Total Allowable Av Qa allow Compression	xial Capacity Qa* Qa allow Tension
Water Unit Weight (pcf):	62.4	 Κ _t δ	Su/σ,	ο' α1	L/B	α2	α α*c	σvo' avg	Side Friction Qs fs compression avg	Qs compression (Ibs)	U ΣQs compression ((bs)	ndrained Analysis (Q o Qs allow compression (kins)	ase) fstens avg	Qs tension (lbs)	ΣQs tension (lbs)	Qs allow tension (kins)	Nq	q at Top of Layer (osf)	Bearing Capacity Qt q at Bottom of Laye (psf)	Qt allow at Top of Layer (kins)	Qt allow Bottom of Layer (kins)	Total Allowable A Qa allow Compression (Undrained) (kins)	xial Capacity Qa* Qa allow Tension (Undrained) (kins)
Water Unit Weight (pcf):	62.4	 Κ _t δ 0.5	Su/ơ,	α ₁	L/B	α2	<u>α</u> α*c	σvo' avg	Side Friction Qs fs compression avg	Qs compression (lbs)	υ ΣQs compression (lbs)	ndrained Analysis (Q c Qs allow compression (kips)	ase) fstens avg	Qs tension (Ibs)	ΣQs tension (lbs)	Qs allow tension (kips)	Nq	q at Top of Layer (psf)	Bearing Capacity Qt q at Bottom of Laye (psf)	, Qt allow at Top of Layer (kips)	Qt allow Bottom of Layer (kips)	Total Allowable A Qa allow Compression (Undrained) (kips)	xial Capacity Qa* Qa allow Tension (Undrained) (kips)
Layer	62.4	κ, δ 0.5 0.5 23.4	Su/σ _v	ο' α ₁	L/B	α ₂	α α*c	σνο' avg	Side Friction Qs fs compression avg	Qs compression (Ibs) 0	U IQs compression (lbs) 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0	fstens avg	Qs tension (lbs) 0.0	ΣQs tension (lbs) 0	Qs allow tension (kips) 0.0	Nq 40	q at Top of Layer (psf) 9600	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400	Qt allow at Top of Layer (kips) 0	Qt allow Bottom of Layer (kips) 14	Total Allowable As Qa allow Compression (Undrained) (kips) 0.0 0.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0
Water Unit Weight (pcf): Layer 1 2 3 4	62.4	κ, δ 0.5 0.5 23. 0.5 23. 0.5 0	Su/σ 15 0.0 15 0.0 0.0	o' α ₁ 1.0 1.0 1.0	L/8 0.0 0.6 0.6	α ₂ 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0	ovo' avg 120.0 300.0 360.0	Side Friction Qs fs compression avg 52 130 0	Qs compression (lbs) 0 0 0	U ΣQs compression (lbs) 0 0 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0	ase) fstens avg 26.0 65.1 0.0	Qs tension (Ibs) 0.0 0.0 0.0	ΣQs tension (lbs) 0 0 0	Qs allow tension (kips) 0.0 0.0 0.0	Nq 40 40 40	q at Top of Layer (psf) 9600 144400	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400	Qt allow at Top of Layer (kips) 0 9 14	Qt allow Bottom of Layer (kips) 9 14 14	Total Allowable Ab Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0
Layer 1 2 3 4 5 6	62.4	κ _t δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.3 0.5 23.3	Su/σ , 15 0.0 15 0.0 15 0.0 15 0.0	, α ₁ 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 4.2	α ₂ 1.0 1.0 1.0 1.0	α α*c	ovo' avg 120.0 300.0 360.0 532.8	Side Friction Qs fs compression avg 52 130 0 231 2 co	Qs compression (lbs) 0 0 0 2420 2420	U ΣQs compression (lbs) 0 0 0 2420 17429	drained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7 s	ase) fstens avg 26.0 65.1 0.0 115.6 170.0	Qs tension (lbs) 0.0 0.0 0.0 1210.1 1770.2	ΣQs tension (lbs) 0 0 1210 9744	Qs allow tension (kips) 0.0 0.0 0.0 0.5 2.0	40 40 40 40 35	q at Top of Layer (psf) 0 9600 14400 14400 17512	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28224 29160	Qt allow at Top of Layer (kips) 0 9 14 14 14	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27	Total Allowable Ab Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 1.1 7 °	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.5
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7	62.4	κι δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 21.4	Su/a, 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0	o' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 4.2 9.0 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0	α α*c	ovo' avg 120.0 300.0 360.0 532.8 916.0 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 0	Qs compression (lbs) 0 0 2420 15068 0	U ΣQs compression (lbs) 0 0 2420 17488 17488	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8	fstens avg 26.0 65.1 0.0 115.6 179.9 0.0	Qs tension (lbs) 0.0 0.0 0.0 1210.1 7533.8 0.0	ΣQs tension (lbs) 0 0 1210 8744 8744	Qs allow tension (kips) 0.0 0.0 0.0 0.5 3.9 3.9 3.9	Nq 40 40 40 40 25 25	q at Top of Layer (psf) 0 9600 14400 14400 14400 17640 28160	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28224 28160 28160	Qt allow at Top of Layer (kips) 0 9 14 14 14 17 27	Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27	Total Allowable As Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 1.1 7.8 7.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 3.9
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 0	62.4	κ, δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 21.4 0.5 21.4	Su/a, 5 0.0 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0	ο' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 4.2 9.0 9.0 10.8	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c	σνο' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442	Qs compression (lbs) 0 0 2420 15068 0 6948	U EQs compression (lbs) 0 0 0 2420 17488 17488 24436 27485	ndrained Analysis (Q o Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 10.9 20 c	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 -	Qs tension (lbs) 0.0 0.0 0.0 1210.1 7533.8 0.0 3474.1	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 8744	Qs allow tension (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4	Nq 40 40 40 40 25 25 25 25	q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28224 28160 28160 28160	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 27 27	Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27 27 27	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.0 1.1 7.8 7.8 10.9 10.5 5.5	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10	62.4	κt δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 21.4	Su/σ, 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0 14 0.0 14 0.0	ο' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/B 0.0 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c	ovo' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583	U 2Qs compression (lbs) 0 0 0 0 2420 17488 17488 24436 82362 107945	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3	Qs tension (lbs) 0.0 0.0 0.0 1210.1 753.8 0.0 3474.1 57925.5 12791.6	ΣQs tension (lbs) 0 0 1210 8744 12218 70144 82935	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9	Nq 40 40 40 25 25 25 0 40	q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160 0 45056	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28124 28160 28160 28160 0 45056	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 27 0 44	Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27 27 27 0 44	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11	62.4	Kt S 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 24.4 0.5 24.4 0.5 24.4 0.5 20.5 0.5 23.4 0.5 23.4 0.5 18.4	Su/σ, 15 0.0 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0 14 0.0 14 0.0 14 0.0 14 0.0 19 0.0	o' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/8 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0	ovo' avg 120.0 300.0 360.0 52.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328	U ΣQs compression (lbs) 0 0 0 2420 17488 17488 24436 82362 107945 204273	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8	26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1	ΣQs tension (lbs) 0 0 1210 8744 8744 8744 12218 70144 82935 131099	Os allow tension (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3	Nq 40 40 40 25 25 25 25 0 40 12	q at Top of Layer (psf) 0 9600 14400 17640 28160 28160 0 45056 13516.8	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160 28160 28160 28160 28160 0 45056 13516.8	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 0 44 13	Total Allowable As Qa allow Compression (Undrained) (kips) 0.0 0.0 0.1 7.8 7.8 10.9 36.6 48.0 90.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11	62.4	Kt δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 21.4 0.5 21.4 0.5 21.4 0.5 23.4 0.5 23.4 0.5 18.4	Su/σ , 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0 14 0.0 15 0.0 19 0.0	ο' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/8 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0	ovo' avg 120.0 300.0 360.0 512.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328	U ΣQs compression (lbs) 0 0 2420 17488 17488 24436 82362 107945 204273	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se)	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1	ΣQs tension (lbs) 0 0 1210 8744 8744 8744 12218 70144 82935 131099	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3	Nq 40 40 40 40 25 25 25 0 40 40 12	q at Top of Layer (psf) 9600 14400 14400 28160 28160 28160 0 45056 13516.8	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28224 28160 28160 28160 28160 28160 13516.8	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 0 44 13	Total Allowable Allowable Allow Qa allow Compression (Undrained) (kips) 0.0 0.0 0.1 7.8 7.8 10.9 36.6 48.0 90.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.9 3.9 5.4 31.2 36.9 58.3
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11	62.4	K, δ 0.5 23. 0.5 23. 0.5 23. 0.5 20. 0.5 21. 0.5 0 0.5 21. 0.5 21. 0.5 0 0.5 21. 0.5 18. 0.5 18.	Su/a, 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0 14 0.0 14 0.0 14 0.0 15 0.0 19 0.0	ο' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/8 0.0 0.6 0.6 4.2 9.0 9.0 108 26.4 32.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.9 0.0	ovo' avg 120.0 300.0 360.0 52.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328	U SQs compression (lbs) 0 0 0 0 2420 17488 17488 17488 24436 82362 107945 204273	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se)	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1	ΣQs tension (ibs) 0 0 1210 8744 8744 12218 70144 82935 131099	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3	Nq 40 40 40 40 25 25 25 25 0 40 12	q at Top of Layer (psf) 9600 14400 14400 17640 28160 28160 0 45056 13516.8	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 0 45056 13516.8 Bearing Capacity Qt	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 0 44 13	Total Allowable Ab Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 7.8 10.9 36.6 48.0 90.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 3.9 3.9 5.4 31.2 36.9 5.4 31.2 36.9 5.8 3
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11	62.4	К, б 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 21.4 0.5 21.4 0.5 23. 0.5 18.6	Su/σ, 15 0.0 15 0.0 15 0.0 14 0.0 0.4 15 0.0 99 0.0 5 0/σ, 5 0/σ, 5 0/σ, 5 0/σ, 5 0/0 15 0.0 15 0.0 16 0.0 10 0.0 16 0.0 10 0000000000	 α₁ 1.0 1.0	L/8 0.0 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4 62.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0	σνο' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 000 or	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 368 Side Friction Qs fs compression avg	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328	U IQs compression (lbs) 0 0 0 2420 17488 17488 24436 82362 107945 204273 IQS compression	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 Qs allow tension	Nq 40 40 40 40 40 40 25 25 25 25 0 40 12 12	q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160 0 45056 13516.8 q at Top of Layer	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28204 28160 28160 28160 13516.8 Bearing Capacity Qt q at Bottom of Laye	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 27 0 44 13 13 Qt allow at	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 0 44 13 27 0 44 13 27 27 0 44 4 13	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 10.9 36.6 48.0 90.8 Total Allowable Av Qa allow Compression (mpression)	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 xial Capacity Qa* Qa allow Tension
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 Layer	62.4	κ, δ 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 21.4 0.5 21.4 0.5 23. 0.5 18.6	Su/a, 15 0.0 15 0.0 14 0.0 0.4 14 0.0 0.4 15 0.0 19 0.0 Su/a,	 α₁ 10 <l< td=""><td>L/8 0.0 0.6 0.6 4.2 9.0 9.0 9.0 10.8 26.4 32.4 62.4 L/8</td><td>α₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td><td>α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425; 1.0 0.0 0.9 0.0</td><td>ovo' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 000' avg</td><td>Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs</td><td>Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328 Qs compression (lbs)</td><td>U EQs compression (lbs) 0 0 0 2420 17488 17488 17488 24436 82362 107945 204273 EQs compression (lbs)</td><td>ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips)</td><td>ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg</td><td>Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs)</td><td>ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs)</td><td>Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 58.3 Qs allow tension (kips)</td><td>Nq 40 40 40 40 40 40 40 40 40 40 40 40 40</td><td>q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160 0 45056 13516.8 q at Top of Layer (psf)</td><td>Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf)</td><td>Qt allow at Top of Layer (kips) 0 9 14 14 17 27 27 0 4 4 13 7 7 0 0 4 4 4 13</td><td>Qt allow Bottom of Layer (kips) 9 14 27 27 27 13 Qt allow Bottom of Layer (kips)</td><td>Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 10.9 36.6 48.0 90.8 Total Allowable Av Qa allow Compression (Drained) (kips)</td><td>xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.9 3.9 5.4 31.2 36.9 58.3 xial Capacity Qa* Qa allow Tension (Drained) (kips)</td></l<>	L/8 0.0 0.6 0.6 4.2 9.0 9.0 9.0 10.8 26.4 32.4 62.4 L/8	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425; 1.0 0.0 0.9 0.0	ovo' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 000' avg	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328 Qs compression (lbs)	U EQs compression (lbs) 0 0 0 2420 17488 17488 17488 24436 82362 107945 204273 EQs compression (lbs)	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips)	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs)	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs)	Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 58.3 Qs allow tension (kips)	Nq 40 40 40 40 40 40 40 40 40 40 40 40 40	q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160 0 45056 13516.8 q at Top of Layer (psf)	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf)	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 27 0 4 4 13 7 7 0 0 4 4 4 13	Qt allow Bottom of Layer (kips) 9 14 27 27 27 13 Qt allow Bottom of Layer (kips)	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 10.9 36.6 48.0 90.8 Total Allowable Av Qa allow Compression (Drained) (kips)	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 3.9 3.9 5.4 31.2 36.9 58.3 xial Capacity Qa* Qa allow Tension (Drained) (kips)
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2	62.4	Kt 6 0.5 23.0 0.5 23.0 0.5 23.0 0.5 23.0 0.5 23.0 0.5 21.4 0.5 23.0 0.5 23.0 0.5 23.0 0.5 18.0 Kt 6 0.5 0.5	Su/a, 500 500 500 500 500 500 500 50	ο' α ₁ 10 10 10 10 10 10 10 10 10 10	L/8 0.0 0.6 0.6 4.2 9.0 9.0 9.0 10.8 26.4 32.4 62.4 L/8	α ₂ 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0	ovo' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 126.4 126.4 126.4 126.4 126.4 126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328 Qs compression (lbs)	U EQs compression (lbs) 0 0 0 2420 17488 17488 24436 82362 107945 204273 EQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips)	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg fstens avg	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs)	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs)	Qs allow tension (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 Qs allow tension (kips)	Nq 40 40 40 40 40 40 40 40 40 40 40 25 25 25 0 40 12 12 12	q at Top of Layer (psf) 0 9600 14400 14400 17640 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160 28160 28160 0 45056 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf)	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 0 44 13 7 Qt allow at Top of Layer (kips)	Qt allow Bottom of Layer (kips) 9 14 17 27 27 27 27 27 Qt allow Bottom of Layer (kips)	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.0 0.1 7.8 7.8 36.6 48.0 90.8 Total Allowable Av Qa allow Compression (Kips) 0.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 10 11	62.4	κι δ 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 21.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 18.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4 0.5 23.4	Su/σ, 15 0.0 15 0.0 15 0.0 14 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	o' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/8 0.0 0.6 0.6 4.2 9.0 9.0 9.0 10.8 26.4 32.4 62.4 L/8 L/8	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0	σνο' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 120.0 300.0	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg 52 130	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328 Qs compression (lbs) 0 0	U ΣQs compression (lbs) 0 0 0 2420 17488 17488 24436 82362 107945 204273 204273 ΣQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0 21.2 24.5 24.3 184.0 55.2 24.5 5 24.5 24.5 5 24.5 5 24.5 24.5 5 26.0 65.1 5 5 26.0 7 7 7 7 7 7 7 7 7	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs) 0.0	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs) 0	Qs allow tension (kips) 0.0 0.0 0.0 0.5 3.9 5.4 3.9 5.4 3.2 36.9 58.3 3.9 5.4 31.2 36.9 58.3 9 58.3 0.0 0.0	Nq 40 40 40 40 40 25 25 25 0 40 12 Nq 40 40 40	q at Top of Layer (psf) 0 9600 14400 17640 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160 28160 28160 0 45056 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13 Qt allow at Top of Layer (kips) 0 9	Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27 0 44 13 Qt allow Bottom of Layer (kips) 9 14	Total Allowable Average Qa allow Compression (Undrained) (kips) 0.0 0.0 0.1 7.8 10.9 36.6 48.0 90.8 Total Allowable Average Qa allow Compression (Drained) (kips) 0.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.5 0.0 0.5 3.9 3.9 5.4 31.2 36.9 5.8 3.3 xial Capacity Qa* Qa allow Tension (brained) (kips) 0.0
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 7	62.4	Kt S 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 21.4 0.5 21.4 0.5 21.4 0.5 23.	Su/σ, 15 0.0 0.5 0.0 0.5 0.0 14 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.4 0.0 0.0 0.0 0.0 0.0	o' α ₁ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L/8 0.0 0.6 0.6 9.0 9.0 9.0 9.0 26.4 62.4 62.4 62.4 0.0 0.0 6 6.0 6 0.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.0 0.9 42.5 1.0 0.0 0.9 0.0 0.9 α αc 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	ovo' avg 120.0 300.0 360.0 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 1126.4 120.0 300.0 360.0	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg 52 130 0	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 96328 Qs compression (lbs) 0 0 0	U ΣQs compression (lbs) 0 0 0 0 2420 17488 24436 82362 107945 204273 ΣQs compression (lbs) 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs) 0.0 0.0 0.0	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs) 0 0	Qs allow tension (kips) 0.0 0.0 0.5 3.9 5.4 31.2 35.9 58.3 Qs allow tension (kips) 0.0 0.0 0.0	Nq 40 40 40 40 25 25 25 25 0 40 12 12 Nq 12 Nq 40 40 40 40	q at Top of Layer (psf) 0 9600 14400 14400 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600 14400	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 28160 28160 38160 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13 Qt allow at Top of Layer (kips) 0 9 14	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 27 27 27 0 44 13 Qt allow Bottom of Layer (kips) 9 14 14	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.0 0.11 7.8 7.8 10.9 36.6 48.0 90.8 Total Allowable Av Qa allow Compression (Drained) (kips) 0.0 0.0	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 5.4 31.2 36.9 58.3 xial Capacity Qa* Qa allow Tension (Drained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6	62.4	Kt δ 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 24. 0.5 24. 0.5 24. 0.5 21. 0.5 0. 0.5 23. 0.5	Su/σ, 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 15 0.0 19 0.0 15 0.0 15 0.0 15 0.0 15 0.0 0.0 0.0 0.5 0.0 0.5 0.0	 α₁ 1.0 	L/B 0.0 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4 62.4 L/B 0.0 6.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 2.9,0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 425.5 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	σνο' avg 120.0 300.0 360.0 532.8 916.0 1126.4 1126.4 1126.4 1126.4 1126.4 120.0 300.0 360.0 532.8 916.0	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs 52 130 0 231 368	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 Qs compression (lbs) 0 0 0 0 0 2420 15068	U ΣQs compression (lbs) 0 0 0 2420 17488 17488 24436 82362 107945 204273 204273 204273 204273 204273 202 202 202 202 202 202 202 202 202 20	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0 115.6 179.9	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs) 0.0 0.0 0.0 0.0 1210.1 7533.8	ΣQs tension (lbs) 0 0 1210 8744 8744 8744 82935 131099 ΣQs tension (lbs) 0 0 0 1210 8744	Os allow tension (kips) 0.0 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 Ogs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.9 3.9	Nq 40 40 40 40 25 25 25 25 25 0 40 12 12 Nq 40 40 40 40 40 40 25	q at Top of Layer (psf) 0 9600 14400 14400 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600 14400 14400 14400	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160 28160 28160 28160 28160 28160 28160 28160 28160 28160 28160 9600 14400 2824 28160	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13 Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 0 44 13 Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27	Total Allowable Av Qa allow Compression (Undrained) (kips) 0.0 0.0 0.11 7.8 7.8 90.8 Total Allowable Av Qa allow Compression (Varianed) (kips) 0.0 0.0 0.11 7.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.5 3.9 5.4 31.2 36.9 5.4 31.2 36.9 5.8 3 xial Capacity Qa* Qa allow Tension (Urained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7	62.4	K, δ 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 21. 0.5 21. 0.5 21. 0.5 0. 0.5 21. 0.5 0. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 21. 0.5 21. 0.5 21.	Su/σ, 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 15 0.0 16 0.7 17 0.0 15 0.0 15 0.0 15 0.0 15 0.0 0.0 0.0 0.15 0.0 0.0 0.0	 α¹ 1.0 	L/8 0.0 0.6 0.6 4.2 9.0 10.8 26.4 32.4 62.4 L/8 L/8 0.0 0.6 0.6 0.6 0.6 0.6 9.0 9.0	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	ovo' avg 120.0 300.0 360.0 52.8 916.0 1126.4 1126.4 1126.4 1126.4 126.4 126.4 126.4 532.8 916.0 126.4 120.0 300.0 532.8 916.0 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg 52 130 0 52 130 0 0 231 360 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 25583 96328 Qs compression (lbs) 0 0 0 2420 15068 0 0	U ΣQs compression (lbs) 0 0 0 0 2420 17488 24436 82362 107945 204273 204273 ΣQs compression (lbs) 0 0 0 0 2420 17488 17488 17488 17488	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 0.0 90.8	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0 211.2 425.5 244.3 184.0 Se)	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 48164.1 Qs tension (lbs) 0.0 0.0 0.0 1210.1 7533.8 0.0	ΣQs tension (lbs) 0 0 1210 8744 8744 8744 82935 131099 ΣQs tension (lbs) 0 0 0 1210 8744 8744	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 Qs allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 40 40 40 40 40 25 25 25 25 0 40 12 12 12 12 12 12 12 12 12 12 12 12 12	q at Top of Layer (psf) 0 9600 14400 14400 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600 14400 14400 14400 14400 14400 28160	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 28160 28160 9600 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13 Top of Layer (kips) 0 9 14 17 27 0 13 0 13	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 27 27 27 27 0 44 13 0 44 13 0 Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27 27 27 27 27 27 27 27 27 27	Total Allowable Allowable Allow Qa allow Compression (Undrained) (kips) 0.0 0.0 0.1 7.8 7.8 90.8 Total Allowable Allowable Allowable Allow Qa allow Compression (Vrained) 0.0 0.0 0.0 1.1 7.8 7.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.5 3.9 5.4 31.2 36.9 5.4 31.2 36.9 5.8 3 xial Capacity Qa* (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11	62.4	K, S 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.1. 0.5 2.1. 0.5 2.1. 0.5 0.0.5 0.5 2.1. 0.5 0.0.5 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.3. 0.5 2.4. 0.5 2.4. 0.5 2.4. 0.5 2.4.	Su/a, 5 0.0 5 0.0 5 0.0 4 0.0 4 0.0 9 0.0 5 0.0 5 0.0 5 0.0 5 0.0 5 0.0 6 5 0.0 6 5 0.0 6 5 0.0 6 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8	 α¹ 1.0 	L/8 0.0 0.6 0.6 4.2 9.0 9.0 108 26.4 32.4 62.4 62.4 L/8 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425: 1.0 0.0 0.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	ovo' avg 120.0 300.0 360.0 52.8 916.0 1126.4 1126.4 1126.4 1126.4 120.0 300.0 360.0 532.8 916.0 1126.4 122.0 300.0 360.0 532.8 916.0 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg 52 130 0 231 360 0 0 442 425 489 368 Side Friction Qs 130 0 231 360 0 0 442 425 435 368 Side Friction Qs 52 130 0 0 442 425 435 368 Side Friction Qs 52 130 0 0 442 425 435 368 Side Friction Qs 52 130 0 0 442 425 435 368 Side Friction Qs 52 130 0 0 0 442 425 435 368 Side Friction Qs 52 130 0 0 231 368 Side Friction Qs 52 130 0 0 231 360 0 0 0 231 368 Side Friction Qs 52 130 0 0 231 360 0 0 231 360 0 0 231 368 Side Friction Qs 52 130 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 231 360 0 0 252 130 0 0 231 360 0 0 0 0 252 130 0 0 0 0 252 130 0 0 0 0 0 0 0 0 0 0 0 0 0	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 0 Qs compression (lbs) 0 0 0 2420 15068 0 0 0 2420 15068 0 0 0 2420	U	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 0.0 90.8	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0 221.2 425.5 244.3 184.0 Sec) 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 194.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 21.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 185.0 195	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 0.0 0.0 1210.1 7533.8 0.0 0.0 1210.1 7533.8 0.0 0.0 1210.1 7533.8 0.0 0.0 1210.1 7533.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs) 0 0 0 1210 8744 8744 8744 8744 8744 8744	Os allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 58.3 0s allow tension (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Nq 40 40 40 40 40 25 25 25 25 0 40 12 12 12 12 12 12 12 12 12 12 12 12 12	q at Top of Layer (psf) 0 9600 14400 14400 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600 14400 14400 14400 14400 17640 28160 28160 28160	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 28160 28160 28160 0 45056 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 28224 28160 28160 28160 28160 28160 28160 28160 28160 28160 28160	Qt allow at Top of Layer (kips) 0 9 14 14 17 27 0 44 13 3 (kips) 0 9 14 17 27 0 44 13 (kips) 0 9 14 17 17 14 17 17 27 27 0 9 14 17 17 27 0 9 14 16 17 27 0 0	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 0 44 13 0 44 13 0 Qt allow Bottom of Layer (kips) 9 14 14 27 27 27 27 27 27 27 27 27 27 27 27 27	Total Allowable Allowable Allow Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 7.8 90.8 Total Allowable Allowable Allow Qa allow Compression (Unrined) (kips) 0.0 0.0 1.1 7.8 0.0 0.0 100 Compression (Drained) 0.0 0.1 7.8 7.8 10.9 7.8 10.9	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Water Unit Weight (pcf): Layer 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10	62.4	K, 6 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 18. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 23. 0.5 24. 0.5 21. 0.5 23. 0.5 24. 0.5 21. 0.5 21. 0.5 21. 0.5 21. 0.5 21. 0.5 23. 0.5 24. 0.5 24. 0.5 24.	54/a, 55 0.0 55 0.0 44 0.0 44 0.0 99 0.0 5 5 0.0 5 0.0 5 0.0 5 0.0 15 0.0 15 0.0 15 0.0 15 0.0 15 0.0 15 0.0 15 0.0 15 0.0 14 0.0 14 0.0	 α₁ 1.0 	L/8 0.0 0.6 0.6 4.2 9.0 9.0 10.8 26.4 32.4 62.4 L/8 U/8 0.0 0.6 0.6 4.2 9.0 9.0 9.0 10.8 26.4 32.4	α ₂ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	α α*c 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 0.9 425.5 1.0 0.0 0.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0	ovo' avg 120.0 300.0 360.0 522.8 916.0 1126.4	Side Friction Qs fs compression avg 52 130 0 231 360 0 442 425 489 368 Side Friction Qs fs compression avg 52 130 0 52 130 0 442 489	Qs compression (lbs) 0 0 2420 15068 0 6948 57926 25583 96328 Qs compression (lbs) 0 0 0 2420 15068 0 0 0 2420 15068 0 0 6948 40343 25583	U IQs compression (lbs) 0 0 0 2420 17488 24436 82362 107945 204273 VQs compression (lbs) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ndrained Analysis (Q c Qs allow compression (kips) 0.0 0.0 0.0 1.1 7.8 7.8 7.8 10.9 36.6 48.0 90.8 Drained Analysis (S ca Qs allow compression (kips) 0.0 0.0 1.1 7.8 7.8 90.8	ase) fstens avg 26.0 65.1 0.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 se) fstens avg 26.0 65.1 0.0 221.2 425.5 244.3 184.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 115.6 179.9 0.0 221.2 425.5 244.3 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 184.0 115.6 179.9 0.0 221.2 244.3 184.2 244.3 184.2 244.3 184.0 195.6 195.6 195.9 195.6 195.6 195.6 195.9 195.6 195.6 195.6 195.9 205.2 244.3 195.6 195.6 195.9 205.2 244.3 195.6 195.6 195.9 205.2 244.3 195.6 195.7 195.6 195.7 1	Qs tension (lbs) 0.0 0.0 1210.1 7533.8 0.0 3474.1 57925.5 12791.6 48164.1 Qs tension (lbs) 0.0 0.0 0.0 1210.1 7533.8 0.0 0.0 3474.1 2011.6 12791.6	ΣQs tension (lbs) 0 0 1210 8744 8744 12218 70144 82935 131099 ΣQs tension (lbs) 0 0 0 1210 8744 8244 12218 32390 45181	Qs allow tension (kips) 0.0 0.0 0.5 3.9 3.9 5.4 31.2 36.9 58.3 58.3 200 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Nq 40 40 40 40 40 40 25 25 25 0 40 12 12 12 12 12 12 12 12 12 12 12 12 12	q at Top of Layer (psf) 0 9600 14400 14400 28160 28160 28160 0 45056 13516.8 q at Top of Layer (psf) 0 9600 14400 14400 14400 14400 14400 14400 14400 0 9600 0 9600 0 14400 17640 28160 28160 28160 0 0 45056	Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 14400 14400 28160 28160 0 45056 13516.8 Bearing Capacity Qt q at Bottom of Laye (psf) 9600 14400 2824 28160 28160 28160 28160 28160 28160 28160 28160 28160 28160 28160 0 45056	Qt allow at Top of Layer (kips) 0 9 14 17 27 0 44 13 Colspan="2">Colspan="2"Colspan="2">Colspan="2"Colspan="2	Qt allow Bottom of Layer (kips) 9 14 14 14 27 27 27 27 0 44 43 3 0 44 4 3 0 44 4 14 27 (kips) 9 14 14 27 27 27 27 0 44 4 3 27 0 4 4 4 27 0 14 14 27 0 14 14 14 14 27 27 27 0 14 14 14 14 14 14 27 27 27 0 14 14 14 14 14 14 14 14 14 14 14 14 14	Total Allowable A3 Qa allow Compression (Undrained) (kips) 0.0 0.1 7.8 7.8 36.6 48.0 90.8 Total Allowable A3 Qa allow Compression (Drained) (kips) 0.0 1.1 7.8 10.9 36.7 90.8	xial Capacity Qa* Qa allow Tension (Undrained) (kips) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.

Sheet No. 7 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: WGG Date: 4/11/2019



	Bearing Capacity Qt			Total Allowable Axi	al Capacity Qa*
q at Top of Layer	q at Bottom of Layer	Qt allow at Top of Layer	Qt allow Bottom of Layer	Qa allow Compression (Drained)	Qa allow Tension (Drained)
(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
0	9600	0	9	0.0	0.0
9600	14400	9	14	0.0	0.0
14400	14400	14	14	0.0	0.0
14400	28224	14	27	1.1	0.5
17640	28160	17	27	7.8	3.9
28160	28160	27	27	7.8	3.9
28160	28160	27	27	10.9	5.4
0	0	0	0	28.8	14.4
45056	45056	44	44	40.2	20.1
13516.8	13516.8	13	13	83.0	41.5

*Bearing capacity not included in allowable axial due to organic presence.







	St	ratification	n							SOIL PL	opercies			Vertical Soli Pl	ressures at Bottor	fi of Layer			
New Haven Northend Near I-95	Soil Type	Layer	Layer Top Elv	Layer Bottom Elv	Depth to Layer Bottom	Layer Thickness	N ₆₀	γt	Su	ф	c'	φ'	u	σ _{vo}	σ _{νο} '	σ_{vo} critical depth	σ_{vo} ' critical depth	Layer Thickness (Top 5 feet ignored)	Skin Friction Area A _s
			(ft)	(ft)	(ft)	(ft)	Blow Count	(pcf)	(psf)	(degrees)	(psf)	(degrees)	(psf)	(psf)	(psf)	(psf)	(psf)	(ft)	(ft ²)
Final Grade	Sand trace silt (Fill)	1	6	6	0														
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill)	2	6	4	2	2	15	115	0	32	0	32	0	230	230	230	230	0	0
	Sand trace silt (Fill)	3	4	3	3	1	15	115	0	32	0	32	0	345	345	345	345	0	0.0
Ground Water Table		4	3	3	3	Ō							0	345	345	345	345	0	0.0
	Sand trace silt (Fill)	5	3	1	5	2	15	115	0	32	0	32	124.8	575	450.2	575	450.2	0	0.0
	Organic Silt (OH)	6	1	-14	20	15	1	100	450	0	0	22	1060.8	2075	1014.2	2075	1014.2	13	81.7
Critical Depth		7	-14	-14	20	Ō							1060.8	2075	1014.2	2075	1014.2	0	0.0
	Organic Silt (OH)	8	-14	-39	45	25	1	100	450	0	0	22	2620.8	4575	1954.2	2075	1014.2	25	157.1
	Medium to Fine Sand (SP)	9	-39	-50	56	11	30	125	0	35	0	35	3307.2	5950	2642.8	2075	1014.2	11	69.1
	Silt trace Clay	10	-50	-100	106	50	20	132	0	25	0	25	6427.2	12550	6122.8	2075	1014.2	50	314.2
		_			-														
Pile Propertie	25		Factor Of Sa	fety Criteria															
Pile Type	e: Concrete Filled Steel Pipe Pile	2	Compression	Tension															

i ne i jpe.	concrete rinea steer ripe ri
Pile Designation:	PP 24x0.500
Diameter B (ft):	2.00
Cross Sectional Area (in^2):	36.91
Pile Weight (lb/ft):	126
Effective Area of Pile Tip (ft^2):	3.14
Perimeter:	6.28

Adhesion Factor	δ
Steel	0.67¢ to 0.83 ¢
Concrete	0.9 ¢ to 1.0 ¢
Timber	0.80 ¢ to 1.0 ¢
Factor For Calculations	0.67
Table 4-3 in EM 1110-2-2906	

2.25 2.25 From page 4-2 in EM 1110-2-2906 assumes "Theoretical or empirical prediction not verified by load testing for Unusual Loading"
 Critical Depth Criteria

 Dc = 108
 20
 loose silts
 loose sands

 Dc = 158
 30
 medium silts
 medium dense sand

 Dc = 208
 40
 dense silts
 dense sand

 From page 4-13
 in EM 1110-2-2906, applicable to both skin friction and end bearing

Soil Type	Non Displa	acemnt
Jon Type	Compression	Tension
Sand	1.5	0.5
Silt	1	0.35
Clay	1	0.7
rom Table 4-5 in EM 1110-	2-2906	

Soil Type Sand Silt
 Kc
 Kt

 1 to 2
 0.5 to 0.7

 1
 0.5 to 0.7

 1
 0.5 to 0.7
 Clay From Table 4-5 4n EM 1110-2-2906 0.7 to 1.0

Water Unit Weight (pcf): 62.4

												U	ndrained Analysis (Q ca	ise)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	xial Capacity Qa*
Layer	Kc	Kt	δ	Su/σ _{vo} '	α1	L/B	α2	α α*c	σvo' avg	fs compression avg	Qs compression	ΣQs compression	Qs allow compression	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	q at Bottom of Layer	Qt allow at Top of Layer	Qt allow Bottom of Layer	f Qa allow Compression (Undrained)	Qa allow Tension (Undrained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																	_					
2	1	0.5	21.44	0.0	1.0	0.0	1.0	1.0 0.0	115.0	45	0	0	0.0	22.6	0.0	0	0.0	25	0	5750	0	8	0.0	0.0
3	1	0.5	21.44	0.0	1.0	0.5	1.0	1.0 0.0	287.5	113	0	0	0.0	56.5	0.0	0	0.0	25	5750	8625	8	12	0.0	0.0
4	1	0.5	0	0.0	1.0	0.5	1.0	1.0 0.0	345.0	0	0	0	0.0	0.0	0.0	0	0.0	25	8625	8625	12	12	0.0	0.0
5	1	0.5	21.44	0.0	1.0	1.5	1.0	1.0 0.0	397.6	156	0	0	0.0	78.1	0.0	0	0.0	25	8625	11255	12	16	0.0	0.0
6	1	0.5	0	0.4	0.9	9.0	1.0	0.9 403.4	1 732.2	403	32952	32952	14.6	403.4	32952.1	32952	14.6	0	0	0	0	0	14.6	14.6
7	1	0.5	0	0.0	1.0	9.0	1.0	1.0 0.0	1014.2	0	0	32952	14.6	0.0	0.0	32952	14.6	0	0	0	0	0	14.6	14.6
8	1	0.5	0	0.4	0.9	21.5	1.0	0.9 403.4	1014.2	403	63369	96321	42.8	403.4	63369.4	96321	42.8	0	0	0	0	0	42.8	42.8
9	1	0.5	23.45	0.0	1.0	27.0	1.0	1.0 0.0	1014.2	440	30406	126728	56.3	220.0	15203.1	111525	49.6	40	40568	40568	57	57	56.3	49.6
10	1	0.5	16.75	0.0	1.0	52.0	1.0	1.0 0.0	1014.2	305	95894	222621	98.9	152.6	47946.9	159471	70.9	15	15213	15213	21	21	98.9	70.9
													Drained Analysis (S cas	e)									-	
										Side Friction Qs				-						Bearing Capacity Qt			Total Allowable A	xial Capacity Qa*
Layer	Kc	Kt	δ	Su/σ _{vo} '	α1	L/B	α2	α ας	σvo' avg	fs compression avg	Qs compression	ΣQs compression	Qs allow	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Ng	q at Top of Layer	q at Bottom of Layer	Qt allow at	Qt allow Bottom	Qa allow Compression	Qa allow Tension
									_		(m.).	<i>(</i> 1)	compression	-	<i>(</i> 1)	<i>(</i> 1)					Top of Layer	of Layer	(Drained)	(Drained)
1	1	0.5							-		(IDS)	(IDS)	(kips)		(IDS)	(IDS)	(kips)		(pst)	(psr)	(kips)	(kips)	(KIPS)	(Kips)
2	1	0.5	21.44	0.0	1.0	0.0	1.0	10 00	115.0	45	0	0	0.0	22.6	0.0	0	0.0	25	0	5750	0		0.0	0.0
2	1	0.5	21.44	0.0	1.0	0.5	1.0	1.0 0.0	297.5	43	0	0	0.0	22.0	0.0	0	0.0	23	5750	3730		12	0.0	0.0
4	1	0.5	0	0.0	1.0	0.5	1.0	1.0 0.0	245.0		0	0	0.0	0.0	0.0	0	0.0	25	9625	9625	12	12	0.0	0.0
5	1	0.5	21.44	0.0	1.0	1.5	1.0	1.0 0.0	345.0	156	0	0	0.0	70.1	0.0	0	0.0	25	9625	11255	12	16	0.0	0.0
6	1	0.5	14 74	0.0	1.0	9.0	1.0	1.0 0.0	732.2	102	15725	15735	7.0	76.1 96.2	7867 4	7867	3.5	23	0023	11255	12	10	7.0	2.5
7		0.5	0	0.0	1.0	9.0	1.0	1.0 0.0	1014.2	195	13/33	15735	7.0	0.0	0.0	7867	3.5	0	0	0	0	0	7.0	3.5
	1 1	0.5		5.0	1.0	5.6	1.0	1.0 0.0	1014.2		5	13733	7.0	0.0	5.0	20024	12.0	0	0	0	5	5	25.6	12.0
	1	0.5	14 74	0.0	1.11	/15	10	10 00	111147	/6/	/1012	5/648	25.6	122 /	20056.6	/88/4	1/ 8						22.0	1/ 0
8	1	0.5	14.74 23.45	0.0	1.0	21.5	1.0	1.0 0.0	1014.2	267	41913	57648	25.6	133.4	20956.6	28824	12.8	10	40568	40568	57	57	25.0	12.8
8 9 10	1 1 1	0.5	14.74 23.45 16.75	0.0 0.0 0.0	1.0 1.0 1.0	21.5 27.0 52.0	1.0 1.0 1.0	1.0 0.0 1.0 0.0 1.0 0.0	1014.2 1014.2 1014.2	267 440 205	41913 30406 95894	57648 88054 183948	25.6 39.1 81.8	133.4 220.0 152.6	20956.6 15203.1 47946.9	44027 91974	12.8 19.6 40.9	40	40568	40568	57	57 21	25.6 39.1 81.8	19.6

Sheet No. 9 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: WGG Date: 4/11/2019

	Bearing Capacity Qt			Total Allowable Ax	al Capacity Qa*
op of Layer (psf)	q at Bottom of Layer (psf)	Qt allow at Top of Layer (kips)	Qt allow Bottom of Layer (kips)	Qa allow Compression (Drained) (kips)	Qa allow Tension (Drained) (kips)
0	5750	0	8	0.0	0.0
5750	8625	8	12	0.0	0.0
8625	8625	12	12	0.0	0.0
8625	11255	12	16	0.0	0.0
0	0	0	0	7.0	3.5
0	0	0	0	7.0	3.5
0	0	0	0	25.6	12.8
10568	40568	57	57	39.1	19.6
15213	15213	21	21	81.8	40.9

*Bearing capacity not included in allowable axial due to organic presence.







	Str	atificatio	n						Properties			Vertical Soil Pr	essures at Botton	m of Layer					
New Haven Northend Near I-95	Soil Type	Layer	Layer Top Elv.	Layer Bottom Elv.	Depth to Layer Bottom	Layer Thickness	N ₆₀	γ _t	S _u	ф	c'	φ'	u	σ _{vo}	σ _{vo} '	$\sigma_{\nu\sigma}$ critical depth	σ_{vo}' critical depth	Layer Thickness (Top 5 feet ignored)	Skin Friction Are A _s
			(ft)	(ft)	(ft)	(ft)	Blow Count	(pcf)	(psf)	(degrees)	(psf)	(degrees)	(psf)	(psf)	(psf)	(psf)	(psf)	(ft)	(ft ²)
Final Grade	Sand trace silt (Fill)	1	6	6	0														
Top of Piles (4 ft NGVD29)	Sand trace silt (Fill)	2	6	4	2	2	15	115	0	32	0	32	0	230	230	230	230	0	0
	Sand trace silt (Fill)	3	4	3	3	1	15	115	0	32	0	32	0	345	345	345	345	0	0.0
Ground Water Table		4	3	3	3	0							0	345	345	345	345	0	0.0
	Sand trace silt (Fill)	5	3	1	5	2	15	115	0	32	0	32	124.8	575	450.2	575	450.2	0	0.0
	Organic Silt (OH)	6	1	-34	40	35	1	100	450	0	0	22	2308.8	4075	1766.2	4075	1766.2	33	414.7
Critical Depth		7	-34	-34	40	0							2308.8	4075	1766.2	4075	1766.2	0	0.0
	Organic Silt (OH)	8	-34	-39	45	5	1	100	450	0	0	22	2620.8	4575	1954.2	4075	1766.2	5	62.8
	Medium to Fine Sand (SP)	9	-39	-50	56	11	30	125	0	35	0	35	3307.2	5950	2642.8	4075	1766.2	11	138.2
	Silt trace Clay	10	-50	-100	106	50	20	132	0	25	0	25	6427.2	12550	6122.8	4075	1766.2	50	628.3
Dile Dresention		1	Factor Of Caf	atu Caltania	1														
Pile Properties	Drillod Shaft		Factor Of Sal		-														
Pile Designation:	A-foot dia		2 25	2 25									Common Values for Correcte	ad K					
Diameter B (ft):	4 00		Erom page 4-2	in FM 1110-	■ 2-2906 assumes "Th	eoretical or empirical pre	diction not verifie	d hy load	testina fa	or Unusual La	adina"		common values for correcte	Non Disp	lacemnt				
Cross Sectional Area (in^2):	1810		rioni page 4 2		2500 05501105 11	concluded of chipmed pres	anection not verifie	<i>a by 1000</i>	cesting je	0/ 0//0/00/ 20	Juding		Soil Type	Compression	Tension	-			
Pile Weight (lb/ft):	1885			Cri	itical Depth Criteria		1						Sand	1.5	0.5				
Effective Area of Pile Tip (ft^2):	12.57		Dc = 10B	40	loose silts	loose sands							Silt	1	0.35				
Perimeter:	12.57		Dc = 15B	60	medium silts	medium dense sand							Clay	1	0.7				
		-	Dc = 20B	80	dense silts	dense sand							From Table 4-5 in EM 1110-2	-2906		-			
			From page 4-13	3 in EM 1110	-2-2906, applicable	to both skin friction and e	nd bearing												
		_											Values of K for Driven Piles			_			
Adhesion Factor δ													Soil Type	Kc	Kt				
Steel	0.67φ to 0.83 φ												Sand	1 to 2	0.5 to 0.7				
Concrete	0.9 φ to 1.0 φ												Silt	1	0.5 to 0.7				
Timber	0.80 φ to 1.0 φ	_											Clay	1	0.7 to 1.0				

	-
Steel	0.67¢ to 0.83 ¢
Concrete	0.9 φ to 1.0 φ
Timber	0.80 φ to 1.0 φ
Factor For Calculations	0.9
Table 4-3 in EM 1110-2-2906	

Water Unit Weight (pcf): 62.4

												Ur	drained Analysis (Q c	ase)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable A	kial Capacity Qa*
Layer	K _c	Kt	δ	Su/σ _{vo} '	α	L/B	α2	α α*c	σvo' avg	fs compression avg	Qs compression	ΣQs compression	Qs allow compression	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	q at Bottom of Layer	Qt allow at Top of Layer	Qt allow Bottom of Layer	Qa allow Compression (Undrained)	Qa allow Tension (Undrained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	28.8	0.0	1.0	0.0	1.0	1.0 0.0	115.0	63	0	0	0.0	31.6	0.0	0	0.0	25	0	5750	0	32	0.0	0.0
3	1	0.5	28.8	0.0	1.0	0.3	1.0	1.0 0.0	287.5	158	0	0	0.0	79.0	0.0	0	0.0	25	5750	8625	32	48	0.0	0.0
4	1	0.5	0	0.0	1.0	0.3	1.0	1.0 0.0	345.0	0	0	0	0.0	0.0	0.0	0	0.0	25	8625	8625	48	48	0.0	0.0
5	1	0.5	28.8	0.0	1.0	0.8	1.0	1.0 0.0	397.6	219	0	0	0.0	109.3	0.0	0	0.0	25	8625	11255	48	63	0.0	0.0
6	1	0.35	0	0.3	1.0	9.5	1.0	1.0 450.0	1108.2	450	186611	186611	82.9	450.0	186610.6	186611	82.9	0	0	0	0	0	82.9	82.9
7	1	0.35	0	0.0	1.0	9.5	1.0	1.0 0.0	1766.2	0	0	186611	82.9	0.0	0.0	186611	82.9	0	0	0	0	0	82.9	82.9
8	1	0.35	0	0.3	1.0	10.8	1.0	1.0 450.0	1766.2	450	28274	214885	95.5	450.0	28274.3	214885	95.5	0	0	0	0	0	95.5	95.5
9	1	0.5	31.5	0.0	1.0	13.5	1.0	1.0 0.0	1766.2	1082	149610	364495	162.0	541.2	74805.2	289690	128.8	40	70648	70648	395	395	162.0	128.8
10	1	0.35	22.5	0.0	1.0	26.0	1.0	1.0 0.0	1766.2	732	459668	824163	366.3	256.1	160883.7	450574	200.3	15	26493	26493	148	148	366.3	200.3

Sand Silt Clay From Table 4-5 4n EM 1110-2-2906

													Drained Analysis (S cas	se)										
										Side Friction Qs										Bearing Capacity Qt			Total Allowable Ax	ial Capacity Qa*
Layer	Kc	Kt	δ	Su/σ _{vo} '	α1	L/B	α2	α ας	σvo' avg	fs compression avg	Qs compression	ΣQs compression	Qs allow	fstens avg	Qs tension	ΣQs tension	Qs allow tension	Nq	q at Top of Layer	q at Bottom of Layer	Qt allow at	Qt allow Bottom	Qa allow Compression	Qa allow Tension
													compression	-							Top of Layer	of Layer	(Drained)	(Drained)
											(lbs)	(lbs)	(kips)		(lbs)	(lbs)	(kips)		(psf)	(psf)	(kips)	(kips)	(kips)	(kips)
1	1	0.5																						
2	1	0.5	28.8	0.0	1.0	0.0	1.0	1.0 0.0	115.0	63	0	0	0.0	31.6	0.0	0	0.0	25	0	5750	0	32	0.0	0.0
3	1	0.5	28.8	0.0	1.0	0.3	1.0	1.0 0.0	287.5	158	0	0	0.0	79.0	0.0	0	0.0	25	5750	8625	32	48	0.0	0.0
4	1	0.5	0	0.0	1.0	0.3	1.0	1.0 0.0	345.0	0	0	0	0.0	0.0	0.0	0	0.0	25	8625	8625	48	48	0.0	0.0
5	1	0.5	28.8	0.0	1.0	0.8	1.0	1.0 0.0	397.6	219	0	0	0.0	109.3	0.0	0	0.0	25	8625	11255	48	63	0.0	0.0
6	1	0.35	19.8	0.0	1.0	9.5	1.0	1.0 0.0	1108.2	399	165452	165452	73.5	139.6	57908.1	57908	25.7	0	0	0	0	0	73.5	25.7
7	1	0.35	0	0.0	1.0	9.5	1.0	1.0 0.0	1766.2	0	0	165452	73.5	0.0	0.0	57908	25.7	0	0	0	0	0	73.5	25.7
8	1	0.35	19.8	0.0	1.0	10.8	1.0	1.0 0.0	1766.2	636	39953	205405	91.3	222.6	13983.5	71892	32.0	0	0	0	0	0	91.3	32.0
9	1	0.5	31.5	0.0	1.0	13.5	1.0	1.0 0.0	1766.2	1082	149610	355015	157.8	541.2	74805.2	146697	65.2	40	70648	70648	395	395	157.8	65.2
10	1	0.35	22.5	0.0	1.0	26.0	1.0	1.0 0.0	1766.2	732	459668	814683	362.1	256.1	160883.7	307581	136.7	15	26493	26493	148	148	362.1	136.7

Sheet No. 11 of 12 COMPUTED BY: DPFransioli Date: 3/15/2019 CHECKED BY: WGG Date: 4/11/2019



*Bearing capacity not included in allowable axial due to organic presence.





ATTACHMENT B: BORING LOGS







Project						P	roject	No.						<u>.</u>					
-		Long Wharf Park				-					1400	3443	5						
Location		Loop Miles (D.)	New House	-		E	levatio	on an	d Da	itum	0 mm	-	7 140	20	NOVE	8			
Drilling Ag	jency	Long Whart Drive	e, New Haven, C	1		D	ate Si	arte	d		Abb	ox. 9.	/ (19	Da	te Finish	ed			
		Seaboard Drilling	i, Inc.						09	10 h	rs 7/	12/10				1400 h	rs 7/	12/10	
Drilling Eq	quipme	nt Mahila Daili D 60	T			c	omple	tion	Dept	ņ		52.0		Ro	ck Depth	1		NUT	
Size and	Type of	f Bit 4-1/4" Hollow Ste	m Auger, 2-15/1	6" Tri-c	one roller	N	lumba	roff	Came	Jac	Dist	rbed	i	1	Undistur	bed	0	Core	
Casing D	iameter	bit (in)		Ic	asing Depth (10	umbe		Searry	100	First		16		Complet	2 lion	2	4 HR.	
		4" OD Steel Casi	ing Misiahl (lha)		Dian (in)	20 1	Vater I	.eve	l (ft.)		Ā		7		Ţ			Ā	
Casing H	ammer	Auto	vveignt (ibs)	300	Drop (in)	30	rilling	rore	anan	Je	ff N	tsch							
sampier		2" OD Split Spoo	n, 3" OD Shelby	Tube	Dree (in)	Ir	spect	ing E	Ingin	eer		taon							
Sampler I	Hamme	er Auto	vveight (ibs)	140	Drop (in)	30	T -		1	Le	e C	nrisma	an						
1 No	Elev.		Comple Deser	allon			De	pth	Jec.		No.	E to S	N-V	alue			Rem	narks	
SYN	(ft) +9.7		Sample Descri	puon			Sc	ale	Numb	Typ	(in)	Pent RU6	(Blow	we/ft)	40	(Drilling Fluid Loss,	Drilling	g Resistance	ang. a, atc.)
****	+9.5	3-in Topsoil				9	卡	0 -	F	E		16		T	T	Boring s	starte	d at 0910) hrs
****		Light-brown f-SANE	D, tr. f-gravel, tr.	brick, tr	concrete.	sm. /	E.	1 - 3	1	S	12	22							
****		silt (FILL1 (dev)	S 87 8	1	61		111		1 "	ľ I		33							
****		Brown f-SAND, tr. I	brick, tr. f-gravel,	sm. sil	t		E	2 -				12							
*****		[FILL] (dry)					Ē.		N	S	6	21							
*****							Ē	1	S	SE	-	34							
*****		Light-brown m-f SA	ND tr. f-gravel.	tr. orani	ite, tr. aspha	it	E.	4	-		<u>)</u>	29				Auger 0	to 4-	ft	
****		[FILL] (dry)			,		Ē.		1.	L E	~	22				Light to	Heav	vy grindin	g
****							Ē	5	Ś	S	18	30			1				
*****		Links knows & CANI	Difference in the state	neural a	an an balt		E,	6 -	1	E	<u>[]</u>	19			/	Auger 4	to 6	5.ft	
****		[FILL] (wet)	D, tr. 100ts, tr. 1-g	ravei, s	im. asphait	24	F	1	١.			19		1		Augers	remo	ved from	E:
*****						7	4	7 -	2	SS	14	12	2	9/		Hamme	e r cas	ing to 8-f	t :
*****							E	e 2		E	<u>[.</u>]	12		1		Drill with hole to 8	n wate B-ft	er and cl	ean o
****		Black c-f SAND, sn [FILL] (wet)	n. f-gravel				5	8		1000	ara'u	22	/			Hamme	r cas	ing 8 to 1	12-ft
****							E.	9 -	25	SS	10	4	18			hole to 8	n waa 8-ft	er and ci	ean o
****	.0.9						1	<u>_</u>		E	2010	7							
	2154	Dark-grey c-f SANI	D, tr. shells			101 Barrier 2 Januar	Ē	0		E		15							
		found (mar)					E 1	1	95	SS	Ŧ	13	23						
							1.1		1	E C		10							
		Dark-grey c-f SANI	D, tr. shells				1	2				11				Hamme	r cas	ing 12 to	14-ft
		[SVV] (wet)					E-1	3 -	17	S	80	11	19			hole to 1	14-ft	er antu Ch	can 0
							1.1.1	100	(°)			8							
		Dark-grey c-f SANI	D, sm. shells, sm	. f-grav	rel		- 1	4 -	-			11				Hamme	r cas	ing 14 to	20-ft
		[SW] (wet)					1		- co	S		6				Drill with hole to 2	n wati 20-ft	er and cl	aan o
							E	0	Ś	SE		8	191						
		Dark-grev m-f SAN	D. sm. f-gravel	tr. shell	s		-1	6 -	-	E E		6							
		[SP] (wet)	-, on r-grator	ar whyle	~		11.1	_ 3	6			3							
							1	7	0	ŝ	11	5	81						
							1	8 -		E	<u></u>	3							
							100												
	-9,3		-?	?	~~?~		1	9								Wash tu	irned	grey at	19-ft
							5	- 8	1		1								

0.000		ENGINEERING & ENVIRONMENTAL SERVICES	og of Boring			L	B-1		Sheet	2	of	3
Project		Long What Park	Project No	9		14	0034436	6				
Location	1	Long what Park	Bevation a	ind D	atur	n 14	0004400					
		Long Wharf Drive, New Haven, CT		-		Ap	prox. 9.7	(1929 N	GVD)			
MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	1	Recov.	Penetr. Penetr. BL/6in BL/6in Day	N-Value (Biows/R) 10 20 30 40	(Or Fluid	Rer lling Fluid, Loss, Drilli	m arks Depth of Ca ng Resistand	sing, ;e, etc.)
		Dark-grey Organic Clayey SILT, tr. shells, tr. f-gravel [OH] (wet)	20-	S-10	SS	24	1 WOH		Cas Drili hole	ing rem: with wa to 22-ft	ains at 20 ter and c)-ft lean o
		Dark-grey Organic Clayey SILT, tr. shells [OH] (wet)	22	12			1 					
		Dark-gray Organic Clayov SILT to shells	24	1	5 00		2		Cas	ina rem	ains at 20)-ft
		[OH] (wet)	25	S-11	ss	24	WOH, WOH		Drill hole	with wa to 30-ft	ter and c	lean c
			26	-		E.	WOH					
			28									
			E 29	1111								
		Dark-grey Organic Clayey SILT, tr. shells [OH] (wet)	- 30 - 31	S-15	SS	24	1 1 1 1 2		Cas Drill hole	ing rema with wa to 35-ft	ains at 20 ter and c)-ft lean
			32	-			1					
			- 33			Constraint State						
	-	Grey Organic Clayey SILT, tr, shells, tr, wood	- 35			E	1		Cas	ing rema	ains at 20 ter and c)-ft lean
		Four (wer)	- 36	S-13	SS	24	i 1 *		hole	to 40-ft		
			- 38	1111								
			- 39	CALLED.								
		Grey Organic Clayey SILT, tr. shells [OH] (wet)	40	S-14	s ss	24	1		Cas Drill hole	ing rem with wa to 42-ft	ains at 20 ter and c)-ft lean
		Grey Organic Clayey SILT, tr, shells [OH] (wet)	42	ST.2	st s	24	HSN					
		Grey Clayey SILT, tr, shells [OH] (wet)	44	215	SS	10	1		Cas Drill	ing rema with wa	ains at 20 ter and c)-ft lean

Project			Project No.							- Charles and a starting	ise die
		Long Wharf Park		10.1	1	40034	435				
Location		Long Wharf Drive, New Haven, CT	Elevation and	d Datu	im 🗛	optox	97	(1929 N	(GVD)		
	_	Long What Drive, New Haven, OT				Sample	Dat	10201	1010)		
atman	Ellev. (ft)	Sample Description	Depth Scale	Number	Type	(in) Penetr.	BLGIN	N-Value (Blows/11) 10 20 30 4	e (Flu	Re Drilling Fluid id Loss, Dril	marks , Depth of ing Resist
			45	S-15	2	6 ³	3				
	-37.3_	, , , , ,	47		New York						
12.141.14			48								
			49					1			
		Brown m-f SAND, sm. silt [SP] (wet)	51	-16	2	8	13	26			
	-42.3	Bottom of Boring 52-ft 0-in		S		13	14		В	orehole b	ackfille
			- 53 -						gr	out and s mpletion	oil cut
			54								
			55								
			57								
			58								
			59								
			60						and the second s		
			62								
			63						the second se		
			64								
Υ.			65								
			67								
			÷ 13								

And in case of the local division of the loc	EN	GINEERING & ENVIRONMENTA	SERVICES		Log	of B	oring			LB~	4			Sheet	1	0
Project						Pro	ject No.									
location		Long Wharf Park				Be	vation a	nd Da	(LIM)	14003	443	5				_
		Long Wharf Drive New H	aven. CT							Acore	n A	75 (1	929 NG			
Drilling A	gency					Da	te Stane	d					Date Fi	nished		
		Seaboard Drilling, I nc.				- 22		0	900	hrs 7/	2/10			14	30 hrs	7/2/
Drilling E	upment					C	mpletio	n Dep	Ċ!			. 1	Rock I	Depth		
Size and	Type of E	Mobile Drill 8-53 1 MOK-n N 4-1/4" Hollow Stem Auge	100nted er. 2-15/16" T	ri-cone roller						Distu	o2 π rbed		TUne	disturbed	-	Core
_		bit		Teacies Ocol		N	umber o	Sam	oles			19	_		1	
Casing D	amotor (4" OD Steel Casing		Cooleg Ochi	22	w	ater Lev	el (ft.)		V		8	Cor	mpletion		24
Casing H		Auto	lbs) 30	O Drop (In)	30	D	illing Fo	remar	1	-						
Sampler		2" 00 Salit Soon 3" 01	Shelby Tub		•••		Dedice	Fasia	Je	ff Nits	ich	_				
Sampler	tammer	Z OU BUIL OPJULES OF	(bs) 1.4	Drop (in)	30	1"	Pocing	c yn	יהט	an Re	301.0					
		AUXO I	140	0 1	30	#		1	0.	Sam	ole D	ata				
BOL	Elev.	Sample	escription			the	Depth	ž	2	3-15	35	NV	aluo	(Dr=	Re	mar
S'NY	-8.6	ounipio i				Suns	SCR09	E Su	F	3000	53	10 20	30 40	Fluid L	DES, Drif	ng R
	·8 %	4-in Asphalt Pa vement			d	14	- 0 -	1	H	1	5	T		Bonn	g star	ed a
		ASPITAL LI (dry)	A'te shells	tr silt		14	E 1 -	4 -	S	4	5	10+				
		(FI LI(¢ry)				21		S	S I	- 1	5					
		Brown m (CAND In 4	ol la challe	da aik		-	2 -	4	1	_	5					
		(FILL(¢lay)	ei, ar. sneas,	17. SH		22	E		E	8	1	$ \Lambda $	111			
						-	3	S:	SS	2	0	17				
						30	F	3			13		111			
*****		Brown m-f SAND, tr. f-grav	el, tr. silt		- 3		4	1			3	11.		Ham	mer C	asin
		[FiLL] (wet)			- 1			2	ы		6			Drill v hole l	with wa to 4-ft	ter
*****					- 1			10	S	۳ e	5	TY .				
****							- 6 -	1	A		4					
*****		No Recovery					E	1								
*****					- 1		- 7 -	5	SS	0	4	5				
*****									1010		1					
*****		No Recovery			¥	1	- 8	1	-6		2			Ham	mer C	asin
						1	E _	- 5	5		1,			Drill v hole l	with wa to 8-ft	ter
****							E g	Ś	5	1	NOH					
*****	-1.5					2	- 10	1	111		1					
	1	Light Brown c -SAND, sm.	shells, tr. si	t			E	-	1111	1	3					
		[0,] (u))				11	- 11	S S	10	12	9	10)				
						1	-		1 mil		9	1				
		Light Brown m & SAND, tr.	silt				- 12	1	E		-			Ham	mer Ca	asin
		[SP] (dry)					E	1n	S		5			Drill v hale i	with water to 12-f	ater I
							- 13 -	s S	S	80	3	11				
							14	-	200		11					
		Brown m-f SAND, tr. sitt					E	-		1	3			Drill v	mesCi with wa	asin Mar
		[0.] (wei)				1	- 15 -	19	SS	•	8	17}		hole	to 14-1	1
							E	1 "		1		1				
	-7.3		T and f	and element to			- 16	1	E		11	1				
		shells	on⊾i, 8m. 1-\$:	and seams, ti	•		E	1								
		[OH] (moi st)					- 17	s,	SS	12	1					
	0.0						E da		1111		3					
	1	Brown/Grey Sitty m-I SAN), sm. f-sand	seams, tr.			18	-	I		0			Ham	mer Ca	asin ater
A CARL STREET, S.		STIGUES				1	-	10	1 6					CIER V	WALL W	aut l
		[SMI (moist]					- 10 -	비분	S	00	5	R		hole	to 18-1	t

Project			Pro	oject No.								
		Long Wharf Park					140	034435				
Location		Long Whad Drive New House OT	Ele	wation an	id Da	tum	Arr		E (1000 N			
		Long Whart Drive, New Haven, CT	_				App	rox. 8.	0 (1929 N	IGVD)		
BOL	Elev.	Controlo Description	Dhws/	Depth	5		58	∺ ± S	N-Value		Remark	S
SYM	(ft)	Sample Description	Buse	Scale	Nut	Typ.	Reco (in)	Pene	(Blows/ft)	(Drilin Fluid Lo	ng Fluid, Depth ss, Drilling Resi	of Ca stand
63666		Brownish-red m-f SAND, sm. gray silty clay, tr. shells	0	- 20 -		E		3				
		[SM] (wet)		- 24	=	SE	-	2				
				- 14 -	ŝ	S	-	4				
	-13.3		_	- 22 -			<u></u>	10		Home	an Capina	0.2
		Gray Organic Clayey SILT, sm. shells				E		1		Drill w	ith water an	nd c
				23	17	SS	10	1 ¹ 2		hole to	o 22-ft	
				1 1 2	0	E		2				
		Gray Organic Clayey SILT, tr. shells		- 24 -		f		WOH				
		[OH] (moist)		l	0			1				
				25	5	Si l	24	1				
				20		E	<u>}</u>	1				
		Gray Organic Clayey SILT, tr. shells		20			3			Casin	g Remains	at 2
		[OH] (moist)		- 27 -	Ξ	ED	4	HSI		hole to	o 26-ft	a c
				1 3	ŝ	1	.4	Ч				
		Oren Orenania Clauser SILT to aballa		- 28 -	-							
		[OH] (moist)		1 8		E	and	1				
				- 29 -	1-1	SS	21	, ¹ 2				
					"	B		· 1				
		Gray Organic Clayey SILT, tr. shells		- 30 -		-6		1		Casin	g Remains	at 2
		[OH] (moist)			10			<u>_</u> 1		Drill w	ith water an	nd c
<u></u>				- 31 -	5	SE	16	1 1		noie a	J 30-II	
22				- 22		E		1				
	6			- 32 -			1 1	1				
				- 33 -								
				- 34 -								
		Gray Organic Clayey SILT. tr. shells		- 35 -		Б	<u></u>	1		Casin	g Remains	at 2
		[OH] (moist)		E /	9	L E		<u>_</u>		Drill w	ith water an	nd c
				- 36 -	5	SS	24	1 2		noie ti	0 30-1(
H							i Nevi	1				
52				- 3/ -								
				38	1		ALC: N					
그그							1000 C					
				- 39 -								
97				1 1 2								
		Grav Organic Clavey SILT tr shells		- 40 -		Б	-	1		Casin	g Remains	at 2
		[OH] (moist)		1 3	~	E		1.1		Drill w	ith water an	id c
				- 41 -	5	SS	24	1 4		note te	o 40-tt	
				i i				` a				
				- 42 -								
				49								
	-34.8	<u> </u>		43								
1.1.2.												
1.54,572,673									(4) 100 101 101 101 101			

Ε	LANGAN
	ENGINEEDING & ENVIDONMENTAL SEDVICES

nograd	Elev. (ft)	Long Wharf Park	E	levation a			1400	J3443	5					
SMBOL	Elev. (ft)	Long Wharf Drive, New Haven, CT			nd Da	tum								
SMBOL SMBOL	Elev. (ft)						Арр	rox. 8	.75	(1929 N	(GVD)		9	
		Sample Description	f lawd press	Depth Scale	Number	Type	Sa (iii)	Penetr. resist BUEn D	0ata N (8	-Value lows/H) 20 30 40	- (Drili Fluid L	Rem ing Fluid, I oss, Drillin	n arks Depth of Ca g Resistand	sing, :e, etc.)
		Light Brown m-f SAND, sm. shells, tr. silt [SP] (wet)	, u	45 - 46 47 -	S-18	SS	16	1 3 9 11	12		Casir Drill v hole f	ng Rem with wat to 45-ft	ains at 2 er and c	2-ft lean (
				48 -										
		Brown c-f SAND, sm. silt, tr. shells [SP] (wet)		50 -	6		-	9 11			Casir Drill v	ng Remaind	ains at 2 er and c	2-ft lean
	-43.3_	Bottom of Boring 52 # 0 in		51 - 52 -	s-	S	12	14 11		25+	Bore	hole ba	ckfilled w	/ith s
8		Bottom of Boning 32-k own		53 -							cuttin patch comp	igs and ned with pletion.	grout an asphait	d upor
				54 -										
				55 -										
				- 57 -										
				- 58 -										
				60 -										
				61 -										
				62 -										
				63 - 64 -										
				- 65 -										
8				66 -				10 I all 10 I I I I I I I I I I I I I I I I I I						
				- 67 -										
				69 -										

Project		NOINZENING & ENVINO	NMENTAL SERVIC	.20		LUg	IP	niect No.	-	_		-			oneer	· ·	0	
riojoot		Long Wharf Parl	<				1	9001110.			1400	03443	5					
Location	1	Long Printing and					Ek	evation an	nd Da	atum	1400	10110	0					
		Long Wharf Driv	e, New Haven,	CT			-				Арр	rox. 1	0.5 (19	29 N	GVD)			
Drilling A	Agency						De	ite Starte	d					Date Fi	nished			
Drillina F	auipme	Seaboard Drillin	g, Inc.				Co	moletion	Dep	0930 th	hrs	7/6/10		Rock E	093 leath	30 hrs	7/7/10	
		Mobile Drill B-53	Truck-mounte	d			100					54 ft		0.000.1107			N/E	
Size and	i Type o	f Bit 4-1/4" Hollow St	em Auger, 2-15	/16" Tri	-cone roller		N	mber of	Sam	pies	Distu	urbed		Und	isturbed	1	Core	
Casing (Diamete	r (in)			Casing Depth	(ft)	-				First		17	Con	notetion	-	24 HR.	
		4" OD Steel Cas	ing		10.00	45	W	ater Leve	i (ft.)		Ţ		8				Ā	-
Casing H	Hammer	Auto	Weight (lbs)	300	Drop (in)	30	Dr	Illing Fore	eman	۱ ۱	- 65 8.12	in als						
Sampler		2" OD Split Spoo	n				Ins	specting E	Engir	Jeer	ett Ni	tscn						
Sampler	Hamme	er Auto	Weight (lbs)	140	Drop (in)	30				D	an B	earse						
불러	-						14 14	Dear	-	T	Sa	mple D	ata			Re	marks	
ATER	t≑iev. (ft)	S	ample Descri	ption			ng bh	Scale	mber	2b,	acov.	asist	N-Val (Blows	ue vft)	(Drilli	ng Fluid	Depth of Ca	asing,
200	+10.5	A in Tongell and					0 es	- 0 -	, Z	1	ž –	a = 8	10 20 3	0 40	Fillia La	~8, DNN	ng realistan	00, 003.)
	+10.2	4-in Topsoil, sm. g [TOPSOIL] (dry)	rass, sm. roots			ſ		E	1	I F		9			7/6/10	g begi).	ins at 093	so hrs on
****		Brownish-tan m-f S	SAND, tr. silt, tr	. f-grave	əl			E 1 -	5	SS	12	19	3	77				
****		(LULL) (all)						E	1			21						
****		Light Brown m-f S/	, tr. shells			2 -	1	1 E		22		$1 \mid 1$						
****		[FILL] (dry)				E a	N	S	4	18		$l \mid l$						
****						- 3	s,	SE	-	13	31							
****						E 4	1	L		12			A		(a.			
****		No Recovery				22	Ē	-			9			Auge	r to 4-1 rs rem	oved from	n	
****							5 -	3	SS	0	10	214		boreh	ole			
****					21	Ē	1	E		13	1							
****		No Recovery			-	6 -	1	E	\vdash	15								
****					13	E _ 3	4			9								
****					12	E 7 -	s,	ŝ	°	4	13							
****						∇	12	- 8 -	1			3		- 11		~		
****		Brown to Light Bro (FILL) (moist)	wn f-SAND, sn	n. silt			15	e i e		E		8			Drill v	ner Ca vith wa	asing to 8 iter and c	⊢π lean out
****		[······)					-	- 9 -	3	SS		5	13		hole t	o 8-ft		
****							33	E S		L'E		8	1					
~~~~	+0.5	Light Brown f-SAN	D, sm. silt, tr. s	hells				- 10 -	1			13	1					
		[SP] (moist)					15	Ε	1.0			12						
							10	11	S	ŝ	12	11	23					
							10	12	-			9	1					
		No Recovery								E		10			Hamr Drill v	ner Ca /ith wa	asing to 1 ater and c	∠-π lean out
								- 13 -	2-2	SS	0	7	13-		hole t	o 12-fi	t	
	1								1			0 7						
		No Recovery						- 14 -	1	1 F		6			Hamn	ner Ca	asing to 1	4-ft
												6			Drill w	vith wa	ter and c	lean out
830								- 15 -	5	Ś	0	5	11		noie (	0 14-11		
100								16		L F		5						
		Light Brown c-f SA	ND, sm. f-grav	el, tr. sil	it, tr. shells			- 10 -		F		4						
		[or] (wet)						- 17 -	6.	SS	9	4	8					
									0	ľ f		4						
		Light Brown m-f Si	AND, tr. f-grave	I. tr. silt	tr. shells			18	1	18		5			Hamn	ner Ca	asing to 1	8-ft
		[SP] (wet)	and an a grave	.,	, in otherine				0			Ű a			Drill w	vith wa	ter and c	lean out
	1							- 19 -	S-1	SS	-	3	6		note t	0 18-11	L	
3.345	+ I						L (	P 1		1 E								

oject			P	oject No.										
colion		Long Wharf Park	-	austian as	d De	1	1400	03443	5					
cauon		Long Wharf Drive, New Haven, CT	F	evaluon an	u Da	ium J	App	rox. 1	0.5	(1929 N	IGVD)			
MTERIAL SYMBOL	Elev. (ft)	Sample Description	IL JAMIN D	Depth Scale	umber	lype	Sar (II)	evert esist L/gin	iata N (B	l-Value lows/ft)	(Dril	Rem	narks Depth of Ca	sing,
		Light Brown m-f SAND, tr. f-gravel, tr. silt, tr.shells [SP] (wet)	8	20-	5-11 N	SS	16 ^R	4 5	10	20 30 40				
		Light Brown c-f SAND, sm. f-gravel, tr. silt, tr. shells [SP] (wet)		22	2 8			5 6 7			Ham Drill v	mer Cas with wat	sing to 2 er and c	2-ft Iean
		Light Brown c-f SAND, sm, f-gravel, tr, silt, tr, shells		23 - 24 -	S-1	SS	7	7 7	14-		noie	10 22-11		
		[SP] (wet)		25	S-13	ŝŝ	2	, 9 8	16					
		Light Brown m-f SAND, tr. f-gravel, tr. silt, tr. shells [SP] (wet)		26	-14	3	15	5 8	16		Ham Drill v hole	mer Cas with wat to 26-ft	sing to 2 er and c	6-ft lean
		Light Brown c-f SAND, sm. f-gravel, tr. silt, tr. shells		- 28 -	S			8 8 10						
		[SP] (wet)		- 29 -	S-15	SS	ŝ	10 9 8	19					
		Light Brown c-f SAND, tr. f-gravel, tr. silt, tr. shells [SP] (wet)		30 - 31 -	3-16	SS	16	9 9	16		Ham Drill v hole	mer Cas with wat to 30-ft	sing to 3 er and c	0-ft lean
				32	-	1mm		9			25			
				33										
		Light Brown m.f SAND tr eilt tr ehelle		- 35 -		F		40			Ham	mer Cas	sing to 3	5-ft
		[SP] (wet)		- 36 -	S-17	SS	2	13 11 12	2	3	Drill v hole	with wate to 35-ft	er and c	lean
				37		6	-	13						
	-28.5	9 9 7 a		38										
				40 -			_				Ham	mer Car	ting to 4	0.0
TH		[OH] (moist)		41	S-18	SS	8	8 6 7	13		Drill v	with wate to 40-ft	er and c	lean
				42		IIII	_	7						
				43										
				44							Loss	of drillin	ng fluid a	t

roject			Pro	ect No.									
ocation		Long Wharf Park	Elev	ation an	d Da	tum	140	03443	5				
0000000		Long Wharf Drive, New Haven, CT					Арр	rox. 1	0.5 (1929)	NGVD)			
₫त			45 ¥				Sa	mple D	ata	-	Ren	narks	
SMBR	(ft)	Sample Description	vd Buss	Scale	Numbe	Type	Recov.	Penetr resist BUBin	(Biows/ft)	(Dri Fluid L	ling Fluid, I oss, Drillin	Depth of Ca g Resistant	sing, a, atc.)
		Dark Grey Organic Clayey SILT, tr. shells	a	- 45		目		4		Casi	ng Rem	ains at 4	0-ft
		[on] (molet)		46	S-19	S	24	4	8-	hole	to 45-ft		o an i
-12				47				6					
1				<b>"</b>									
Ξ				- 48 -									
1				49 -									
1				3									
-		No Recovery		50				4		Ham Drill	mer Car with wat	sing to 4 er and c	5-ft lean
1	1			- 51 -	S-20	SS	0	7 14	21	hole	to 50-ft		
				- 52 -				24			hata ha	- Letter - Letter	
1		Brown Organic Clayey SILT, tr. shells [OH] (wet)			a,b			3		cutti	nole bai	grout up	on
	-42.6	Brown m-f SAND, sm. silt, tr. shells [SMI (wet)		53	S-21	SS	8	14	19•	com	pletion		
	-43.5	Bottom of Boring 54-ft 0-in		- 54		E		14					
				- 55									
				Ē									
				- 56 -									
				- 57 -									
				- 58 -									
				- 59 -									
				- 60 -						1.1			
				61 -									
				62									
				63									
				03									
				- 64 -									
				65									
				66									
				00									
				67									
				68									
				-									
				- 69 -									
				- 70 -				5-1		1			

	E	NGINEERING & ENVIRO	ONMENTAL SERVICES	6	Log	of I	Boring	-		LB	-6		c	She	eet	1	of	3
Project						P	oject No.											
Location	í.	Long Wharf Par	rk			E	evation ar	nd Da	atum	1400	3443	>						
		Long Wharf Driv	ve, New Haven, Cl	É			5+152 +7 5 + , + + +		917 D	Appr	ох. 9	(1929	) NO	GVD)				
Drilling A	Agency					D	ate Starte	d					Dat	e Finish	ed		Statement	
Drilling F	Guípme	Seaboard Drillin	ng, Inc.			C	ompletion	Dep	1015 th	hrs 7	/7/10		Roc	ck Depti	0900 h	hrs 7	/12/10	
or non the se		Mobile Drill B-5	3 Truck-mounted				014015600	100180			47 ft						N/E	
Size and	і Туре о	f Bit 4-1/4" Hollow St	tem Auger, 2-15/16	6" Tri-cone roller	9 - 11 1	N	umber of	Sam	ples	Distu	rbed	14	1	Undistu	rbed	4	Core	
Casing I	Diamete	r (in)		Casing Dept	h (ft)	10	later Leve	1.00.3		First			1	Complet	tion	1	24 HR.	
Casing	lammer	4" OD Steel Ca	Weight (lbs)	Drop (in	30	D	rilling Fore	emar	( 1	¥.		5.5		¥		*	Ā	
Sampler	1001101000	Auto	1	300	30	-			Je	eff Nit	sch							
Complet	Hamm	2" OD Split Spo	ion, 3" OD Shelby	Tube Drop /in	1	In	specting I	Engir	leer						*****			
sampier	riamma	er Auto	) (****g/n (/////	140	30	40	1	T	D	an Be	earse	ita		1				
ERIAL BOL	Elev.		Cample Descripti			bhvs/	Depth	10		18-1	5 1 5	N-V	alue		in the	Re	marks	-
8MM	(ft)		sample Descripti	on		Buse:	Scale	Num	Ę	Rec	E asi	(Blov	30 4	10	Fluid Los	g Fluid ss, Drill	ing Resistant	sa, etc.)
	+8.7	4-in Asphalt			-		E 0-	-	E		19		T					
****		Brown c-f SAND, (FILL1 (drv)	tr. silt, tr. f-gravel			- 2	E 1 -	17	S	6	24		4	4				
****		f. and (any)					E	1 "	10		20			N				
*****		Brown m-f SAND	tr silt				- 2 -	1	1 6		18			11				
*****		[FILL] (dry)					E	1			26							
****							- 3	ဟ်	S	ø	33			1				
****							E 4	1			23			И.				
****		Tan to Brown m-f	SAND, tr. silt			5	E C	1			7		X		Auger	10 4-	n,	
****		F. real (arit)				-	- 5 -	3	3	5	10 8	18						
****					¥	15	-	1			10							
*****		Brown c-f SAND,	tr. silt, tr. shells			1	E 6 -		TÊ		9							
****		[FILL] (wet)				13	E 7	1	S	0	10	18.						
*****						12	-	S	S	~	8	1						
****		Brown m-f SAND	tr eilt tr challe				- 8 -	-			7	1			Hamm	ier Ca	asing to 8	-ft
****		[FILL] (wet)	, u. on, u. onena			18		1.	LE		12				Drill w	th wa	ater and c	lean out
****							- 9 -	3	SS		5	10-			noie to	0-10		
*****						33	E 10	-			5							
*****		No Recovery				20	Ē		E		20							
*****	1						- 11 -	95	SS	0	30							
						22		-	E		16			И				
	-3.0	Brown m-f SAND,	, tr. silt, tr. shells, t	r. f-gravel			12 -	-			13		1	11	Hamn	er C	asing to 1	2-ft
		[SP] (wet)					E 13	5	SE		11	-	1		hole to	th was 12-f	ater and c t	lean out
							- 13	- v	S	~	11	29						
		Brown of SAND	em ehalle tr eilt	tr. f.gravel			- 14 -		1.5		11				Hamm	er C	asina to 1	4-ft
		[SW] (wet)	ann, anona, tr. ant,	u. i-graver			E	-	E		12	1			Drill w	ith wa	ater and c	lean out
							- 15 -	1 3	SSE	00	7	17			nole (	2 14-1	t	
							16	-	ETC.		10							
		Brown m-f SAND, (SPI (wet)	, tr. silt, tr. f-gravel,	tr. shells			E	1	100		5							
		[0.1(not)					- 17 -	6-5	SS	12	7	14-						
									CCCC.		í a							
							- 18 -	-	1 -									
							E	1										
							14	-	1									
1.1.1.	E - 1					÷	E. and	1	1	S								

Project		5. 	Proje	ect No.					_				
Location		Long Wharf Park	Eleva	ation an	d Datu	1 im	400	3443	5				ā.
		Long Wharf Drive, New Haven, CT				P	Appr	ox. 9	(1929 NG	GVD)			1.5
ತ್ವ			5		- 1	1	San	nple D	nta	_	Re	marke	
MATER	(ft)	Sample Description	Cashig biv	Scale	Number	Type	(in)	Penetr resist BUBin	N-Value (Blows/It) 10 20 30 4	•	(Drilling Fluid Fluid Loss, Drill	Depth of C ing Resistar	Casing, nce, et
		Brown c-f SAND, tr. silt, tr. f-gravel, sm. shells [SWI (wet)	1	20		I		6			Hammer Ca Drill with wa	asing to a	20-ft clear
				21	S-10	2	4	5 4	9		hole to 20-f	t	
			-	22		1	_	4					
			111										
	-140		-	23									
			-	24									
			E	26									
		Dark Grey Organic Clayey SILT, tr. shells [OH] (moist)	-	20		THE		1					
			-	26 -	S-11	22	5	1 12					
			Ē	27 -		E		2					
			E										
				28									
			E	29									
			-	-									
		Dark Grey Organic Clayey SILT, tr. shells	-	30 -		E		WOH			Hammer C: Drill with wa	asing to ater and	30-f
		[on] (noist)		31 -	S-12	22	24	1 2			hole to 30-f	t	
			1	32		THE .		1					
		Dark Grey Organic Clayey SILT [OH] (moist)	114	52		N		-			Clean out h Casing rem	ains at 3	2-ft 30-ft
==			-	33 -	ST-	2	24	PUSt					
		Ded Con Other CLAY to abolis	5	34		1							
22		[OH] (moist)	Ē	0.00	0	THEFT.		1					
				35 -	S-1	2	24	2	1				
			E	- 36 -		E	-	2					
22			E	37									
			E	3/									
			Ē	- 38 -									
			E	39									
ΞĒ			E										
		Dark Grey Organic Clayey SILT, tr. shells	Ē	40 -		T		1			Drill with wa	ater and	clea
		[On] (most)	E	41 -	5-14	20	24	, ¹ ,			Casing rem	ains at 3	30-ft
ΞŦ			E	12		HILL		2					
77			E	42									
ΞŦ				43									
	-35.0	0 0 0 0	E	. 44									
And in case of the local division of the loc	1 1				1 1	- 1	- 1						

Project	Long Wharf Park	P	roject No.	140	03443	5	
Location		E	evation ar	nd Datum		(4000 110)	
	Long Wharf Drive, New Haven, CT	at		App	MOX. 9	(1929 NG\	/D)
THEORY (ft)	Sample Description	'swit Brins'	Depth Scale	Number Type Racov. 5	Penetr resist BLI6in	N-Value (Blows/ft) 10 20 30 40	Corilling Fluid, Depti Fluid Loss, Drilling Re
	Dark Grey m-f. SAND, tr. shells [SP] (wet)		45 -	SS 11	10 10 12	22	Drill with water a hole to 45-ft Casing remains
38.	Bottom of Boring 47-ft 0-in		47 -		10		Borehole backfil cuttings and gro completion. Con
			- 49 -				installed at pave elevation.
	10		50 -				
			52				12
			53				
			54 - 55 -				
			- 56 -				
	<i>a</i>		- 57 -				
			- 59 -				15
	· ×		60				
			62				
			63				
	н. 		64 - 65 -				
0061347/1707			66 -				
	711		67 -				
			E	1			

<u> </u>				-			0044	0.01	1 60	1/71			
		T Doguette				F S	TATE O	F CON	INECTI	ICUT			SHEET 1 OF 4
	6	I. Paquette			(	DEPAR	TMENT	OF TR	ANSP	ORTAT	TION		LOCATION Long Wharf Drive
		CITED I CITEDINI				E	BUREA	UOFH	IGHWA	AYS			
	J.	Freitas/J. O'Brien					BOR	ING RE	EPORT	r			Guild Drilling Co.
		INSPECTOR		TOWN	6		Nev	v Hav	en, C	conne	ecticut		BORING CONTRACTOR
1		D. Destance		PROIP	CT NA	ME	1-951	New Ha	aven H	arbor	Program M	anagement	Parsons Brinckerhoff Quade & Douglas, Inc.
⊢		R. Borjeson		PROJE	ECT NO	)	1.001	9	2-505	5			CONTRACTING ENGINEER
LOCA	TION	Long Wharf Drive adja	cent t	o the l	Long	Wharf	Nature	Pres	erve	-			
SUR	FACE ELE	V. 18.6	-				AUG	GER	CAS	SING	SAMPLER	CORE BAR	HOLE NO. PB-5
DATE	E FINISHE	D 3/29/00		TYPE					н	W	SS	N/A	LINE & STATION
	GROUND	WATER OBSERVATIONS	3	SIZE I.	D.	_	_	-	4	-	1 3/8"	DIT	0FFSET N COOPDINATE 165.475.0
AT	8.8	FT. 48	HRS.	HAMM	ER WI			-	30	A"	30"		E. COORDINATE 551,963.2
	- 1	FI. SAA	MPLE	L b-swite		<u>.</u>		BLC	ws	-			
Ē	CASING						F	PER 6 I	NCHE:	s	STRATA		FIELD IDENTIFICATION OF SOIL,
P	BLOWS	DEPTHS		PEN.	REC.			0	N		CHANGE:		REMARKS (INCL. COLOR, LOSS OF
T	PER	CD011 TO	NO.	INCH	INCH	TYPE	0.6	SAM	PLER	18-24	ELEV		WART WATER, SEAMS IN ROOK, ETC.)
H	FOOT	FROM - TO	1	24	19	D	1	3	5	6	ELEV.	Red-brown	f SAND, trace c gravel, some slit, dry. (FILL)
		0,0 - 2.0	L.						1		1		
						_			1		1		
		1.01	-		17			-	15	45	1	Radibroum	(SAND some silt. (FILL)
5		4.0' - 6.0'	2	24	17	0	8	1	15	15		Neu-brown	i orarat aonio ann fi met
									Į.		1		
	-												
1									1		1		
10		9.0' - 11.0'	3	24	19	D	5	12	12	11	ł	Red-brown	r SAND, some silt. (FILL)
1	-		-										
						-					1		
1											1		
15		14.0" - 16.0"	4	24	13	D	10	12	14	15	1	Red-brown	m-c SAND, little f gravel, trace shells. (FILL)
1			-	-	-	-				-	-		
								_					
											19.0	Top 3": Gra	ay-brown f-c SAND, trace f-m gravel, little silt. (FILL)
20		19.0' - 21.0'	5	24	9	D	9	1	4	4	-0.4	Dark green	-gray OKGANIC CLAT, some sin, trace pear noers.
1			-	-					1		1		
											1		
1													
25		24.0' - 26.0'	6	24	13	D	3	7	17	12	4	Dark green	egray ORGANIC SILT, some r-c gravel, inder-m sand,
			-	-			-		++	-	1	sitens, org	
			+	1			-		1 1.		1	1	
					-				1	5		-	-
30		29.0' - 31.0'	7	24	12	D	1	0/	10	0/	11	Dark green	-gray ORGANIC SILT, trace f-c sand, little clay, trace
			-	-	-		-	-	-	-	-	shells, slig	nt organic odor, F
1	-		-		-	-	1	-		-	1	pp- 0.0 15	
1	-		-			-					1	1	
35	-	34.0' - 36.0'	8	24	7	D	WOR	WOR	WOH	WOH	4	Dark green	r-gray ORGANIC SILT, trace f-c sand, little clay, trace
										-	-	shells, slig	ht organic odor,
			-	-	-		-	-	-	-	1	pp= 0.4 TS	F
													3
			1			1				-	1		
6	ROM GRO	OUND SURFACE TO	33.5	FEET	USED	4	INCH	CASIN	ig the	N		OPEN HOL	E FOR 88.5 FEET
÷	OTACE H	LEADTH 422.0		OOTAC	FINE	OCK			TYPE	D	NO. OF S	AMPLES	25 HOLE NO. PB-5
H	ATAGE I	122.0	F	JOING	AL 1914	Jun	0				10.010		
s	AMPLET	YPE CODING:	D=D	RY		C=0	ORE		A=/	AUGEF	2	up=undistu	IRBED, PISTON V=VANE TEST
F	ROPORT	ONS USED: TRAC	E =0 -	10%	LITT	LE = 10	) - 20%	SO	ME = 2	0 - 359	6 AND	= 35 - 50%	
1													

T. Pagentin         STATE OF CONVECTION         SHEET         2         0         4           UDDRING FOREMANT         DURING FOREMANT         BURRADORT ALL         BURRADORT         BURRA	ĩ				-			5	ORM	NO SM	1 ED	1/71					
DOUBDE FOREMAR         DEPARTMENT OF TRANSPORTATION         LOCATION / Long Whard Date           J. Freitasij, OTERA         DUREAU OF PROMING         Surget of Property in the surget of the surget	I			T. Paquette				s	TATE	OF CON	INECT	TUCUT			SHEET 2 OF 4		
J. Freitaul. J. Offrien         DURBAU OF HIGHWINS         Guild Defiling Co.           NRFICTOR         TOWN         New Haven, Connecticut         BURNAUS           REPUECT NAME         PROJECT NAME         REPUECT NAME         REPUECT NAME         Paradots Brickhold Colling, Inc.           SOLIS DRAINER         PROJECT NAME         REPUECT NAME         REPUECT NAME         REPUECT NAME         REPUECT NAME         Connecticut         Paradots Brickhold Colling, Inc.           SOLIS DRAINER         HAUGEN         TAT         NAME         MALE         COMPACT NAME         PALE         PALE         COMPACT         PESS         COMPACT	ł	3		ORING FOREMAN		1		DEPAR	TMEN	T OF TR	RANSP	ORTA	TION		LOCATION Long Wharf Drive		
J. Freitaul, Ordina         BORING REPORT         Guide Onling Co.           J. Freitaul, Ordina         EOW         New Haven, Connecticut         Parosition	1							1	BUREA	U OF H	IGHW	AYS					
NEWFECTOR         TOWN         New Haven, Connecticut         DBURKO CONTRACTOR           SOLS DEGRINES         PROJECT NO         92.505         CONTRACTING DEGRINES         CONTRACTING DEGRINES           SOLS DEGRINES         HEADECT NO         92.505         CONTRACTING DEGRINES         CONTRACTING DEGRINES           DERING CONTRACTING         SZE ID         NN         SS         NA         MEE & STATION           GEOLING WATER COSENVATIONS         SZE ID         NN         SS         NA         MEE & STATION           GEOLING WATER COSENVATIONS         SZE ID         NN         SS         NA         MEE & STATION           GEOLING WATER COSENVATIONS         SZE ID         NN         SS         NA         MEE & STATION           GEOLING WATER COSENVATIONS         SZE ID         NN         SS         NA         MEE & STATION           GEOLING WATER COSENVATIONS         DE CONS         NEW HEIC         STATION         MEE & STATION         MEE & STATION           GEORING CONTO         PERINE         NEW HEIC         PERINE         PERINES         MEE & STATION           GEORING CONTO         PERINE         PERINES         PERINES         PERINES         PERINES           GEORING CONTO         PERINES         PERINES         PERINE	l		J.	Freitas/J. O'Brien					BO	RING R	EPOR'	Т			Guild Drilling Co.		
R. Borjson         PROJECT MANE         Less New Haven Hauber Program Management         Paradimeter Cluded & Douglas, Inc.           IDCATION         Long White Theirs adjacent's the Long What Mature Prosecut         SAMELER         CONTRACTNESS INCOMENT         PB-5           IDCATION         Long What Tables & Addaes         TYPE         VIM         SS         NAMELER CORE LAR         NALE & STATION           CROUND WATER GOSERVATIONS         SZE LD         -         4"         1.923         CONTRACTNESS INCOMENT         SS         SAMELER CORE LAR         NOLE NO.         PB-5           AT         AS         FT.         44         HS.         NAMELER         SS         SAMELER CORE LAR         NOLE NO.         PB-5           CROUND WATER GOSERVATIONS         SZE LD         -         4"         4"         CONTRACTNES         SSAMELER         CONTRACTNES         SSAMELER         SSAMELER         CONTRACTNES         SSAMELER         SSAMELER <td>I</td> <td></td> <td></td> <td>INSPECTOR</td> <td></td> <td>TOWN</td> <td>1</td> <td></td> <td>Net</td> <td>w Hav</td> <td>en, C</td> <td>Conne</td> <td>ecticut</td> <td></td> <td>BORING CONTRACTOR</td> <td></td>	I			INSPECTOR		TOWN	1		Net	w Hav	en, C	Conne	ecticut		BORING CONTRACTOR		
SOLIS EVANUER:         PROJECT NO         92.505         CONTRACTING ENGINEER           CONTON         CONTON         CONTRACTING ENGINEER         CONTRACTING ENGINEER           SUBFACT         14.0         AUGER         CASING         SAMPLER CORE BAR, HOLE NO.         PPS-           SUBFACT         14.0         AUGER         CASING         SAMPLER CORE BAR, HOLE NO.         PPS-           OFFICE         328         NA         SS         NA         UNE & STATION           ORDUND WATER CORSERVATIONS         SSCE ID.         MYK         SSCE ID.         MYK         SSCE ID.           AT         F.T.         HES, HVAMERY KAL         SSCE ID.         MYK         MYK         SSCE ID.         MYK	I			R. Borieson		PROJ	ECT NA	AME	1-95	New H	aven H	larbor	Program M	anagement	Parsons Brinckerhoff Quade & Douglas, In	IC.	
CICATION         CONTON         UNIT PROVE TO THE LONG WINT PROVE TO THE LONG SAMPLER CORE AR         INCLE NO         PESS           ONTE FINATION         STATION         SPES         NAME LIVE AS SAMPLER CORE AR         LOLE NO         SPES         NAME LIVE AS SAMPLER CORE AR         LOLE NO         SPES           ONTE FINATION SERVICE         SERVICE NO         SERVICE NO <th colsp<="" td=""><td>Ì</td><td></td><td></td><td>SOILS ENGINEER</td><td></td><td>PROJ</td><td>ECT NO</td><td>D.</td><td></td><td>9</td><td>2-50</td><td>5</td><td></td><td></td><td>CONTRACTING ENGINEER</td><td></td></th>	<td>Ì</td> <td></td> <td></td> <td>SOILS ENGINEER</td> <td></td> <td>PROJ</td> <td>ECT NO</td> <td>D.</td> <td></td> <td>9</td> <td>2-50</td> <td>5</td> <td></td> <td></td> <td>CONTRACTING ENGINEER</td> <td></td>	Ì			SOILS ENGINEER		PROJ	ECT NO	D.		9	2-50	5			CONTRACTING ENGINEER	
SURPACE         LUGER         CANNO         SAMPLER         CORE         MOLE         MOLE         PS-           GROUND WATER OBSERVATIONS         SOFE ID         32000         TOPE         NO         PARL         440         UT         440         UT         0000         VICE         00000         VICE         000000 <td>Ì</td> <td>LOCA</td> <td>TION</td> <td>Long Wharf Drive ad</td> <td>acent t</td> <td>o the</td> <td>Long</td> <td>Wharf</td> <td>Natur</td> <td>e Pres</td> <td>erve</td> <td></td> <td></td> <td></td> <td></td> <td>_</td>	Ì	LOCA	TION	Long Wharf Drive ad	acent t	o the	Long	Wharf	Natur	e Pres	erve					_	
OATE FRANCE         NAM         UNE ALTON           GROUND WATER OBSERVATIONS         SZEE ID         4         1 and         DPTRET           AT         AS         FT         44         1 and         DPTRET         DPTRET           AT         AS         FT         44         1 and         DPTRET         DPTRET         DPTRET           AT         AS         FT         44         1 and         DPTRET         DPTRET <td>I</td> <td>SURF</td> <td colspan="15">SULS ENGINEER         IPROJECT NO.         92-503         CONTRACTING ENGINEER           STION         Long Whatf Nature Preserve         AUGER         CASING         SAMPLER CORE BAR         HOLE NO.         PB-5           READE ELEV.         18.6         T         AUGER         CASING         SAMPLER CORE BAR         HOLE NO.         PB-5           BROWN         STELD         4"         1 3#"         OFFSET         OFFSET           GROUND WATER OBSERVATIONS         SIZE ID.         4"         1 3#"         OFFSET           BLOWS         STEATA         24"         30"         E. COORDINATE         165,475.0           CASING         DEPTHS         PEN, REC.         PEN, REC.         NO         NCHARCINE SCOUNT         REMARKE (NOL COLOR, LOSS OF           CASING         DEPTHS         PEN, REC.         NO         NO         NO         NCHARCINE SCOUNT         REMARKE (NOL COLOR, LOSS OF           FROM TO         VICIT FROM TO         VICIT FROM TO         VICIT FROM TO         SAMPLER         Dark green-gray ORGANIC SILT, trace f-c sand, little clay, trace shells, slight organic odor, per 0.15 TSF         Dark green-gray ORGANIC SILT, trace f-c sand, little clay, trace shells, slight organic odor, per 0.25, 0.25 TSF           S         S.0"         S.0"         S.0"         S.0"</td>	I	SURF	SULS ENGINEER         IPROJECT NO.         92-503         CONTRACTING ENGINEER           STION         Long Whatf Nature Preserve         AUGER         CASING         SAMPLER CORE BAR         HOLE NO.         PB-5           READE ELEV.         18.6         T         AUGER         CASING         SAMPLER CORE BAR         HOLE NO.         PB-5           BROWN         STELD         4"         1 3#"         OFFSET         OFFSET           GROUND WATER OBSERVATIONS         SIZE ID.         4"         1 3#"         OFFSET           BLOWS         STEATA         24"         30"         E. COORDINATE         165,475.0           CASING         DEPTHS         PEN, REC.         PEN, REC.         NO         NCHARCINE SCOUNT         REMARKE (NOL COLOR, LOSS OF           CASING         DEPTHS         PEN, REC.         NO         NO         NO         NCHARCINE SCOUNT         REMARKE (NOL COLOR, LOSS OF           FROM TO         VICIT FROM TO         VICIT FROM TO         VICIT FROM TO         SAMPLER         Dark green-gray ORGANIC SILT, trace f-c sand, little clay, trace shells, slight organic odor, per 0.15 TSF         Dark green-gray ORGANIC SILT, trace f-c sand, little clay, trace shells, slight organic odor, per 0.25, 0.25 TSF           S         S.0"         S.0"         S.0"         S.0"														
AT     AS     T     AS     T     T     AS     T       AT     AS     FT     4400 MARK VIL     300     128     0T     1 COMPARTS     195,475.0       AT     FT     4400 MARK VIL     300     1200     0T     1 COMPARTS     195,475.0       AT     FT     4400 MARK VIL     800     100     240     100     240     100       P     BLOWS     DEFTNS     NO     RCH NOCK     PER INCHES     NO     RCH NOCK     DEFTN       F     FOOT     FROM     NO     RCH NOCK     RCH NOCK     DEFTN     NO     RCH NOCK       64.0     64.0     64.0     64.0     64.0     64.0     64.0     64.0     64.0       64.0     64.0     1     1     1     1     1     1     1     1       64.0     64.0     1     1     1     1     1     1     1     1     1       65.0     65.0     67.0     1     1     1     1     2     1     1     1     2       66.0     69.0     69.0     69.0     69.0     69.0     69.0     69.0     69.0     69.0     69.0     69.0       70 <td< td=""><td>ł</td><td>DATE</td><td colspan="15">DURING FUNCTION         DUP FUNCTION         DUP FUNCTION         Local CM Hard NVRS         Guild Diffing Co.           J. Preitas/J. O'Brien         BORING REPORT         BORING REPORT         Guild Diffing Co.         Guild Diffing Co.           NNSPECTOR         PROJECT NAME         H46 New Haves Hartor Program Management         Parsons Brinckerhoff Guade &amp; Douglas, Inc.           SOLE ENGINEER         PROJECT NAME         H46 New Haves Hartor Program Management         Parsons Drinckerhoff Guade &amp; Douglas, Inc.           SOLE ENGINEER         PROJECT NO.         92-505         CONTRACTING ENGINEER           RAGE ELEV.         16.8         AUGER         AUGER         SAMPLER CORE DAR         HOLE NO.         PB-5           RAGE ELEV.         16.8         HAW REWT.         306         Lang Mark Drive         PB-5           FT.         446         H40K         H4         146         H40K ENT.         146         H40K ENT.         306         Lang Mark Drive         PB-5           GASING         David Tree OSERVATIONS         SIZE LD         44         134*         OPFRIT         HCORONATE         165,475.0         FELD DENTIFICATION OF SOIL           GASING DAVID NO         NO         INCL         NO         NO         NO         NO         NO         NO         NO</td></td<>	ł	DATE	DURING FUNCTION         DUP FUNCTION         DUP FUNCTION         Local CM Hard NVRS         Guild Diffing Co.           J. Preitas/J. O'Brien         BORING REPORT         BORING REPORT         Guild Diffing Co.         Guild Diffing Co.           NNSPECTOR         PROJECT NAME         H46 New Haves Hartor Program Management         Parsons Brinckerhoff Guade & Douglas, Inc.           SOLE ENGINEER         PROJECT NAME         H46 New Haves Hartor Program Management         Parsons Drinckerhoff Guade & Douglas, Inc.           SOLE ENGINEER         PROJECT NO.         92-505         CONTRACTING ENGINEER           RAGE ELEV.         16.8         AUGER         AUGER         SAMPLER CORE DAR         HOLE NO.         PB-5           RAGE ELEV.         16.8         HAW REWT.         306         Lang Mark Drive         PB-5           FT.         446         H40K         H4         146         H40K ENT.         146         H40K ENT.         306         Lang Mark Drive         PB-5           GASING         David Tree OSERVATIONS         SIZE LD         44         134*         OPFRIT         HCORONATE         165,475.0         FELD DENTIFICATION OF SOIL           GASING DAVID NO         NO         INCL         NO         NO         NO         NO         NO         NO         NO														
AT         B         HEI         UMBRE FALL         22         33*         E         COMMER         FALL         22*         33*         E         COMMER         FALL         FERLING         FE	ł	AT	GROUN	D WATER OBSERVATION		SIZE I	ED WI			_		4" 0.0#	1 3/8"	BIT	N COORDINATE 165.475.0		
D         SAMPLE         PERV NCE         STRATA         FIELD DENTIFICATION OF SOIL, NCHARGE NCL, COLOR, LOSS OF           PERV NCE         PERV NCE         NO         NCH NCT	ł	AT	0,0	FT.	HRS.	HAMN	IER FA	LL			2	4"	30"		E. COORDINATE 551,963.2	-	
E         CASIMUL BLOWS         DEPTHS NO         PERC NO         PERC NO         DEPTHS SOLUTION         PERC SOLUTION         STRATA CHANCES         STRATA STRATA         PERCATION OF SOL NOSH WASH WATER, SEAUSIN ROCK, ETC.)           I         POOT         PROM.TO         INCK INCK INCK INCK         INCK INCK INCK INCK INCK INCK INCK INCK	Ì	D		S	AMPLE					BLC	ws						
P         BLOWS         DEPTHS         PEN         PEN         PEN         NO         ECONS         DAME         CHANGE         DEPTHS         WASH WALL OLDSY, (DSS OF WASH WALLS SLAW, INSE SINK), WASH DEPTH           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I	I	Е	CASING							PER 6	NCHE	s	STRATA		FIELD IDENTIFICATION OF SOIL,		
PPR         PRO         NO         N	I	P	BLOWS	DEPTHS		PEN.	REC.	Depr		0	N CO		CHANGE:		REMARKS (INCL. COLOR, LOSS OF		
Image: Second	I		FOOT	EROM - TO	NO.	INCH	INCH	TYPE	0.6	6-12	12-18	18-24	ELEV.		WASH WATER, SEAMS IN ROCK, ETC.)		
45         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	i		1001	40.0' - 42.0'	9	24	14	D	WOH	WOH	1	0		Dark green-	-gray ORGANIC SIL I, trace I-c sand, little clay, trac	6	
45	I		40.0° - 42.0°       9       24       14       D       WOH       WOH       1       0         5														
45	I	1	_											pp= 0.15 TS	SF		
45         45.0° - 47.0°         10         24         10         WOH         WOH         1         1           50         45.0° - 47.0°         10         24         10         0         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 <th1< th=""> <th1< th="">         1</th1<></th1<>	I		j     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i     i														
No. 44.0         10         20         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100<	I	45	45.0° - 47.0°         10         24         16         D         WOH         1         1           1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1														
90         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	I	- 1	45.0° - 47.0°         10         24         16         D         WOH         1         1           A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A														
Solution	I		45.0° - 47.0°       10       24       16       D       WOH       1       1														
50       50.0° - 52.0°       11       24       20       0       1       1       2         55       55.0° - 57.0°       12       24       19       0       6       4       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	I		45.0° - 47.0°       10       24       16       D       WOH       1       1														
Bark State       Bark State <td>I</td> <td>50</td> <td colspan="15">Image: style style</td>	I	50	Image: style														
Image: Solution of the		2	Solution														
55	ĺ		50,0° - 52.0°     11     24     20     D     1     1     2       5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     5     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1														
55     55.0° - 67.0°     12     24     19     D     6     4     2     1       60     60.0° - 62.0°     13     24     20     D     4     3     4       60     60.0° - 62.0°     13     24     20     D     4     3     4       61     60.0° - 62.0°     13     24     20     D     4     4     3     4       65     60.0° - 62.0°     13     24     20     D     4     4     3     4       66     60.0° - 62.0°     13     24     20     D     4     4     4       67     68.0° - 67.0°     14     24     23     D     3     3     11       66     65.0° - 67.0°     14     24     23     D     3     3     11       67     65.0° - 67.0°     14     24     23     D     3     3     3     7       70     65.0° - 67.0°     14     24     21     D     3     3     3     7       71     65     24     21     D     3     3     3     7       75     24     21     D     3     3     3     6	I		)														
60       12       24       19       0       8       4       2       1         60       60.0'-62.0'       13       24       20       0       4       4       3       4       7         60       60.0'-62.0'       13       24       20       0       4       4       3       4       7         65       60.0'-62.0'       13       24       20       0       4       4       3       4       7         65       65.0'-67.0'       14       24       23       0       3       3       8       11         70       70.0'-72.0'       15       24       21       0       3       3       7         75       75.0'-77.0'       16       24       20       0       2       4       3       6         76       75.0'-77.0'       16       24       20       0       2       4       3       6         75       75.0'-77.0'       16       24       20       0       2       4       3       6         75       75.0'-77.0'       16       24       20       0       2       4       3       6	I	55	40.0° - 42.0°       9       24       14       D       WOH       WCH       1       0														
60       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	I		45.0° - 47.0°       10       24       16       D       WOH       1       1														
60       60.0       60.0       60.0       60.0         60       60.0 * 62.0*       13       24       20       D       4       4       3       4	I		Image: series and series														
60       60.0       60.0       60.0       60.0       60.0         60.0       13       24       20       D       4       4       3       4       41.4       Red-brown mottled with black SiLT, little f sand, trace black clay layer 1/16" thick.         65	I		main														
60.0° - 62.0°       13       24       20       D       4       4       3       4       41.4       Red-brown motified with black SLT, little f sand, trace black clay layer 1716" thick.         65       65.0° - 67.0°       14       24       23       D       3       3       8       11         70       65.0° - 67.0°       14       24       23       D       3       3       8       11         70       65.0° - 67.0°       14       24       23       D       3       3       7         70       70.0° - 72.0°       15       24       21       D       3       3       7         75       75.0° - 77.0°       16       24       20       D       2       4       3       6         75       75.0° - 77.0°       16       24       20       D       2       4       3       6         75       75.0° - 77.0°       16       24       20       D       2       4       3       6         75       75.0° - 77.0°       16       24       20       D       2       4       3       6         75       75.0° - 77.0°       16       24       20 <t< td=""><td>I</td><td>60</td><td colspan="15">Image: state in the state</td></t<>	I	60	Image: state in the state														
65       65.0° • 67.0°       14       24       23       0       3       3       61       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	I			60.0' - 62.0'	13	24	20	D	4	4	3	4	-41.4	Red-brown	mottled with black SILT, little f sand, trace black c	ay	
65       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -	I				-	-		-	-				1	layer 1/10	uice.		
65       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	I				-		-		-				1				
65.0° - 67.0°       14       24       23       D       3       3       8       11         0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	I	65											1				
70       70.0'-72.0'       15       24       21       D       3       3       3       7         70       70.0'-72.0'       15       24       21       D       3       3       3       7         70       70.0'-72.0'       15       24       21       D       3       3       3       7         75       75.0'-77.0'       16       24       20       D       2       4       3       6         75       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6	I			65.0' - 67.0'	14	24	23	D	3	3	8	11		Red-brown	SILT, little f sand, trace clay, rapid dilatancy.		
To       To <thto< th="">       To       To       <tht< td=""><td>I</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td>-</td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td></tht<></thto<>	I				-				-		_						
70       70.0' - 72.0'       15       24       21       D       3       3       3       7         75       75.0' - 77.0'       16       24       20       D       2       4       3       6         75       75.0' - 77.0'       16       24       20       D       2       4       3       6         76       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6         70       76.0' - 77.0'       16       24       20       D       2       4       3       6	I				-		-	<u> </u>	-				1				
70.0' - 72.0'       15       24       21       D       3       3       7         75       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	I	70											1				
75       75.0°-77.0°       16       24       20       D       2       4       3       6         75       75.0°-77.0°       16       24       20       D       2       4       3       6         76       75.0°-77.0°       16       24       20       D       2       4       3       6         76       76.0°-77.0°       16       24       20       D       2       4       3       6         76       76.0°-77.0°       16       24       20       D       2       4       3       6         77.0°       16       24       20       D       2       4       3       6         70       76.0°-77.0°       16       24       20       D       2       4       3       6         70       76.0°-77.0°       16       24       20       D       2       4       3       6         70       76.0°       76.0°       33.5       FEET       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	I			70.0' - 72.0'	15	24	21	D	3	3	3	7	1	Red-brown	a SILT, little f sand, trace clay, rapid dilatancy.		
75       75.0°-77.0°       16       24       20       D       2       4       3       6         75       75.0°-77.0°       16       24       20       D       2       4       3       6         75       75.0°-77.0°       16       24       20       D       2       4       3       6         76       75.0°-77.0°       16       24       20       D       2       4       3       6         76       75.0°-77.0°       16       24       20       D       2       4       3       6         76       76.0°-77.0°       16       24       20       D       2       4       3       6         76       76.0°-77.0°       16       24       20       D       2       4       3       6         70       76.0°       76.0°       76.0°       76       88.5       FEET         70       70       16       24       10       10       10       10       10         70       70       10       33.5       FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       88.5       FEET         7       70	I												1				
75       75.0'-77.0'       16       24       20       D       2       4       3       6         75.0'-77.0'       16       24       20       D       2       4       3       6         75.0'-77.0'       16       24       20       D       2       4       3       6         75.0'-77.0'       16       24       20       D       2       4       3       6         75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       75.0'-77.0'       16       24       20       D       2       4       3       6         70       GROUND SURFACE TO       33.5       FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       88.5       FEET         7-00TAGE IN EARTH       122.0       FOOTAGE IN ROCK       0       TYPE       D       NO. OF SAMPLES       25       HOLE NO.       PB-5         SAMPLE TYPE CODING:       D=DRY       C=CORE       A=AUGER       UP=UNDISTURBED, PISTON       V=VANE TEST <t< td=""><td>I</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	I				-			-	-								
75.0° - 77.0°       16       24       20       D       2       4       3       6         Image: Construction of the stand s	I	75			-				-								
TOTOM GROUND SURFACE TO         33.5         FEET           Image: State of the s	I			75.0' - 77.0'	16	24	20	D	2	4	3	6	1	Red-brown	SILT, little f sand, trace clay, rapid dilatancy.		
TOM GROUND SURFACE TO       33.5 FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       88.5       FEET         r . OTAGE IN EARTH       122.0       FOOTAGE IN ROCK       0       TYPE       D       NO. OF SAMPLES       25       HOLE NO.       PB-5         SAMPLE TYPE CODING:       D=DRY       C=CORE       A=AUGER       UP=UNDISTURBED, PISTON       V=VANE TEST         PROPORTIONS USED:       TRACE =0 -10%       LITTLE = 10 - 20%       SOME = 20 - 35%       AND = 35 - 50%	I						1						1				
TOM GROUND SURFACE TO       33.5 FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       88.5       FEET         r	I																
TOM GROUND SURFACE TO         33.5         FEET USED         4         INCH CASING THEN         OPEN HOLE FOR         88.5         FEET           1.00TAGE IN EARTH         122.0         FOOTAGE IN ROCK         0         TYPE         D         NO. OF SAMPLES         25         HOLE NO.         PB-5           SAMPLE TYPE CODING:         D=DRY         C=CORE         A=AUGER         UP=UNDISTURBED, PISTON         V=VANE TEST           PROPORTIONS USED:         TRACE =0 -10%         LITTLE = 10 - 20%         SOME = 20 - 35%         AND = 35 - 50%	I				-			<u> </u>	-				1		14		
Image: solution         Image: sol	ł		OM GRO	UND SURFACE TO	33.5	FEET	USED	4	INCH	CASIN	GTHE	N		OPEN HOLE	EFOR 88.5 FEET		
Image: Incomparing the control of the contr	ł																
SAMPLE TYPE CODING:     D=DRY     C=CORE     A=AUGER     UP=UNDISTURBED, PISTON     V=VANE TEST       PROPORTIONS USED:     TRACE =0 -10%     LITTLE = 10 - 20%     SOME = 20 - 35%     AND = 35 - 50%	l	1.	OTAGE IN	EARTH 122.0	FC	OOTAG	EINR	оск	0		TYPE	D	NO. OF S	AMPLES	25 HOLE NO. PB-5		
SAMPLE TYPE CODING: D=DRY C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST PROPORTIONS USED: TRACE =0 -10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%																	
PROPORTIONS USED: TRACE =0 -10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%	I	SA	MPLE T	PE CODING:	D=D	RY		C=0	ORE		A=A	UGER		P=UNDISTUR	IRBED, PISTON V=VANE TEST		
	I	PF	OPORTI	UNS USED; TRA	GE =0 •1	0%	um	LE = 10	- 20%	SON	#E = 20	u - 35%	AND	- 35 - 50%			

		T. Paquette				s	TATE	OF COM	INECT	ICUT			SHEET 3	OF	4	
	E	BORING FOREMAN				DEPAR	TMENT	OF TR	RANSP	ORTAT	TION		LOCATION Long	Wharf Driv	e	11111/ 1111/1000
							BUREA	UOFF	IGHW/	AYS			A second s	1.200 Mar	· · · ·	
	J.	Freitas/J. O'Brien		1			BOF	RINGR	EPORT	F.			Gu	ild Drilling	g Co.	
		INSPECTOR		TOWN			Nev	w Hav	en, C	onne	ecticut		BORI	NG CONTR	ACTOR	
		R. Borjeson		PROJ	ECT NA	ME	1-95	New H	aven H	arbor	Program M	anagement	Parsons Brincke	rhoff Qua	ide & Dou	iglas, Inc.
		SOILS ENGINEER		PROJ	ECT NO	<b>)</b> .		9	2-505	5			CONTR	ACTING E	NGINEER	
XCA	TION	Long Wharf Drive adj	jacent t	o the	Long	Wharf	Natur	e Pres	erve							
JRF	ACE ELE	V. 18.6					AUA	GER	CAS	ING	SAMPLER	CORE BAR	HOLE NO.	PB-5		
ATE	FINISHE	D 3/29/00	10	TYPE	0		<u>) 12000</u>		н	w	SS	N/A	DEESET			
۱T	GROUNI	FT 48	HRS	HAMM	ER W			Conception of the local distance of the loca	30	0.0	140#	BIT	N. COORDINATE	165.47	5.0	
T	0.0	FT.	HRS.	HAMN	IER FA	ш			2	4"	30"		E. COORDINATE	551,96	3.2	To Lot In Lineare
o I		S/	AMPLE					BLC	ws							
ΕÌ	CASING	and the second						PER 6	NCHE	S	STRATA		FIELD IDENTIFIC	ATION OF	SOIL,	
Р	BLOWS	DEPTHS		PEN.	REC.	1	j	C	N		CHANGE:		REMARKS (INCL.	COLOR, LO	OSS OF	
т	PER		NO.	INCH	INCH	TYPE		SAM	PLER	10.04	DEPTH,		WASH WATER, SEA	MS IN RO	CK, ETC.)	
н	FOOT	FROM - TO	17	24	20	n	0-6	6-12	12-18	18-24	ELEV.	Redbrown	Sil T trace clay 1/4" cl	av laver, r	anid dilita	nev.
		80.0 - 82.0	11	24	20	-		-		12		- Neu-Drown	Sici, daorolay, ire o	ay injet, i	upio unita	
		· · · · · · · · · · · · · · · · · · ·	-													
							1			1	i i					
35						·			Jump	in the second		2				
		85.0' - 87.0'	18	24	18	D	4	4	9	10	1	Red-brown	SILT, trace clay, 1/4" cl	ay layer, r	apid dilita	ncy.
			-													
				-				-	100000	e constant 1970-1970 - Se						
00			-		1			-	1	1						
~		90.0' - 92.0'	19	24	22	D	6	5	9	15		Red-brown	SILT, trace clay, 1/4" cl	ay layer, r	apid diilta	ncy.
				Sec.			1	- Sector	in the second	i.						
									·	<u>.</u>						
			1.0													
95				24		0			7	44		Radhmun	SII T little clay 1/4" ch	w lavar ra	nld dilitar	New York
		95.0" - 97.0"	20	24	21	0	0	3	-			rea-orown	Sici, inde ciay, int ci	ly layer, to	più annai	icj.
				1		1000					1					
00			1				-		2 - V	÷						
		100.0' - 102.0'	21	24	23	D	4	6	10	17		Red-brown	SILT, trace clay, rapid	dilatancy.		
			-	-			Larrent		_							
- 1						-										
05	2		-	-	-											
		105.0' - 107.0'	22	24	22	D	5	5	10	15	1	Red-brown	SILT, trace clay, few 1/	4" clay lay	ers, rapid	dilltancy.
			1	1.1.1	1	·			in the second	U.,	1					
				C	2											
10			_	-	-		-									
10		110.0' - 112.0'	29	24	24		1	6	9	11		Red-brown	SILT, trace clay, rankd	dilatancy		
- 1		110.0 - 112.0	2.3	24		1	-	-	-		1		( and ( and )			
					1				1		1					
	1				S											
15					2		1			(* 1997) 1997 - 1997 1997 - 1997	1 1					
		115.0' - 117.0'	24	24	21	D	7	9	13	17		Red-brown	SILT, trace clay, 1/4" c	lay layer, r	apid dilat	ancy.
	-		1 1000	-		-										
	-		-	-		-	-						4			
			-	-												
	ROM GRO	DUND SURFACE TO	33.5	FEET	USED	4	INCH	CASIN	GTHE	N	· · · · · · · · · · · · · · · · · · ·	OPEN HOLE	EFOR 88.5	FEET		
			50.0													
- ő		100 A	E	OTAG	EINR	OCK	0		TYPE	D	NO OF S	MPLES	25	HOLENO		PR.5
-0	OTAGE IN	NEARTH 122.0	F.	JUING	12 H 4 · · ·					_	110. 01 0	ann ceas	20	HOLL NO	1	100
-0	OTAGE II	NEARTH 122.0		JUING							110. 01 0		20	HOLL NO	•	100
-0 s/	OTAGE IN	YPE CODING:	D=D	RY		C=0	ORE		A=A	UGER		IP=UNDISTU	RBED, PISTON	V=VA!	NE TEST	100

		· · · · · · · · · · · · · · · · · · ·													
		-				F	ORM	10. SM	-1 ED.	1/71			SHEET 4	OF	4
2	F	T. Paquette	1			DEPAR	TMENT	OF TH	RANSP	ORTAT	TION		LOCATION Long	Wharf Drive	0
		Solution of Caller				ા	JUREA	UOFH	IGHW.	AYS					
	J.	Freitas/J. O'Brie	en				BOF	RINGR	EPORT	Ţ,			Gu	uild Drilling	g Co.
		INSPECTOR		TOWN	1		Nev	w Hav	en, C	Conne	ecticut		BORI	NG CONTR	ACTOR
		R. Borieson		PROJ	ECT NA	ME	1-95	New H	aven H	arbor l	Program M	anagement	Parsons Brincke	erhoff Qua	de & Douglas, Inc.
		SOILS ENGINEER		PROJ	ECT NO	<b>)</b> .	-	9	2-505	5	N ANNO 1997 Na kaominina mandri ma	· · · · · · · · · · · · · · · · · · ·	CONTR	RACTING EI	NGINEER
CA	TION	Long Wharf Driv	ve adjacent t	o the	Long	Wharf	Natur	e Pres	erve				LIGITING	00.5	
RF	ACE ELE	V. 18	3.6	TYPE			AUG	JER	CAS	SING	SAMPLER	N/A	LINE & STATION	FD-5	
110	GROUN	D WATER OBSERV	ATIONS	SIZE I	.D.	-			4	t"	1 3/8"	- Met	OFFSET		
Т	8.8	FT. 48	HRS.	HAMA	IER WI				30	00#	140#	BIT	N. COORDINATE	165,475	5.0
Т		FT.	HRS.	HAMN	IER FA	LL		DI (	2	4"	30"		E. COORDINATE	551,963	3.2
2	CASING	1	SAMPLE					PER 6	INCHE	s	STRATA	1	FIELD IDENTIFIC	ATION OF	SOIL.
5	BLOWS	DEPTHS		PEN.	REC.			C	NN .		CHANGE:		REMARKS (INCL.	COLOR, LC	DSS OF
ŕ	PER		NO.	INCH	INCH	TYPE		SAM	PLER	40.01	DEPTH,		WASH WATER, SEA	MS IN ROO	CK, ETC.)
+	FOOT	FROM - TO	0' 25	24	23	D	0-6	6-12	21	18-24	ELEV.	Red-brown	SILT, trace clay, few 1/	4" clay laye	ers, rapid dilitancy.
		120.0 - 122.			20	-					122.0				
											-103.4		Bottom of bo	ring at 122.	0 ft
25		5							-						
20		in a state in the second													
				(											
									-						
30									1.1.1						
				1	0010105051	Sector Sector				ritha kar					
										<u> </u>		ļ.			
35				1	1										
		·····			-					<u> </u>					
										1000	1				
40										3					
				-					-						
									-						
45					-										
		1								1					
						-				Section 1					
50					-	-		-	-						
		1									1				
											1				
				<u> </u>					-						
55					1		-	-		-	1				
											1				
		-									1				
				-			-						÷.		
											1				
-	ROM GRO	UND SURFACE TO	33.5	FEET	USED	4	INCH	CASIN	GTHE	N		OPEN HOLE	FOR 88.5	FEET	
	OT LOT .	1 EADTL 44	20 5		IN IN P	00%	-	1	TYPE		NO OF S	AMPI ES	25	HOLENO	PR-5
J	OTAGEIN	VEARIN 12	2.0 F	JUTAG	DE IN PO	oun	0	9	TIPE		NO. OF SA	MPLE0	2.5	TIOLE NO.	. 10-0

						1	FORM	NO. SM	I-1 ED.	1/71			
	-	T. Paquetto		4		S	TATE	DF CON	NNECT	ICUT	71001		SHEET 1 OF 4
185	e	ORING FOREMAN				DEPAR	ALIREA	UP	-ICHW	JAYS	ICIN		LOCATION LONG WITHIN OTHE
	J.	Freitas/J. O'Brien					BOI	AING R	EPOR	r			Guild Drilling Co.
-	_	INSPECTOR		TOWN	J		Ne	w Hav	von, C	Conne	acticut		BORING CONTRACTOR
		D. Barleson		2901	SCT N	AME	1.45	New H	wan H	lachor	Program N	Inement	Parsons Brinckerhoff Quade & Douglas
-		SOUS ENGINEER		PRO	ECT N	Q.	140	9	2-50!	5	Tegrent	dire generation.	CONTRACTING ENGINEER
CA	TION	Long Wharf Drive ad	acont	IO Exi	1 46 of	f ramp	from	1-95 N	orth				1
JRF	ACE ELE	V. 11.1					AUC	JER	CAS	SING	SAMPLER	CORE BAR	HOLE NO. PB-7
ATE	FINISHE	D 3/30/00	-	TYPE			-		н	W I	SS	N/A	LINE & STATION
T	E.1	FT 24	HRS	HAMI	HER W	Τ.	-		X		1 3/8	BIT	N COORDINATE 166.379.9
NT		FT.	HRS.	HAMA	JER FA	aL			2	1	30-		E COORDINATE 552,603.9
0		SA	MPLE					BLC	ws	-			
E P	BLOWS	DEPTHS		PEN	REC		1	PER 61	INCHES	5	CHANGE		FIELD IDENTIFICATION OF SOIL. REMARKS (INCL. COLOR, LOSS OF
т	PER		NO.	INCH	INCH	TYPE		SAM	PLER		DEPTH,		WASH WATER, SEAMS IN ROCK, ETC.)
н	FOOT	FROM - TO	+				0-6	6-12	12.18	18-24	ELEV.		
1	-	0.0 + 2.0		24	13	U	-	8	8	$\vdash$	6 /	Bottom 10"	rk brown SILT, some f sand. (TUPSUIL) * Red-brown f SAND. come silt. (FILL)
1			1							$\square$	E 7	Dottom 10	THE REAL CALMENT AT THE COMPANY
											4 /		
5	-	5 0' - 7 0 ¹	12	24	15		5		-	$\square$	6. 7	Top 16" R	A home of CAMP some site
1		0.1 - 0.0	+-			-	-	<b>H</b>	1-1	P-	1 1	Bottom 1":	Dark gray ORGANIC SILT.
1											1 1		
						-					£ _ ?		
10		10.0' - 12.0'	13	24	10	D	4	2	3	-	1 1	Red-grav-b	rown fet SAND, trace silt, trace shells, (FILL)
-			+	-	<u> </u>		-						
1											0.9		
15			+-	-	-	-	$\vdash$	$\vdash$	-	$\square$	1 /		
1		15.0' - 17.0'	4	24	20	D	WOH	1	2	1	1 1	Dark green	-gray ORGANIC SILT, organic odor.
										$\square$	4 1	pp= 0.75, 0.	.4, 0,5 TSF
	-		+	-	-	-		$\vdash$		$\vdash$	1 /		
20											1 1		
1		20.0'- 22.0'	5	24	6	D	3	2	1		1 /	Dark gray-b	rown f SAND, little slit, petroleum odor.
	-		-	-	-					$\square$	1 1		
1			+		1			H	$\vdash$		1 /		
25											1 1		
		25.0' - 27.0'	6	24	18	0	· ·	-	$[\cdot]$		4 /	Dropped ro	xds to 26.5 ft.
	-		+		-		-	$\vdash$		$\square$	1 1	shells, orga	gray Oktowned Sill I, trake precisively, Bric odor.
			i								1 /	pp= 0,35, 0.	.25, 0.35 TSF
30			1.								4 /	I	
		30.0" - 32.0"	+-	24	24	0	WOR	WOH	WOH	WOR	4 /	shefts org:	-gray ORGANIC SILT, trace peak filters,
	-		-	-	-	-		$\vdash$		$\square$	1 1	pp= 0.25 TS	SF
			1								1 1		
35		15 0' - 37 M	1.	24	77		WIN	H		F.	4 /		
	-	3300 - 31.0	+				I	H	H	H	1 /	shells, orga	anic odor.
1			1								( 7	pp= 0.25 TS	3F
			Ţ							$\square$	1 1		-
	OM GRO	A INFO SI IRFACE TO	39	FEET	INED	4	INCH	CASIN	GIHE		<u> </u>	OPENHOLE	FOP 83 FEET
		UNU SURFACE TO	23	T LLC	6.00		4141.411	~	3	<u> </u>		Of Latinote	TVR 05 TUET
3	TAGEIN	EARTH 122.0	FC	DOTAG	ENR	DCK	0		TYPE	Ð	NO. OF SJ	WIPLES	25 HOLE NO. PB-7
			And and a second					_	_				
			0-0	-		~							

I	_						F	ORMIN	IO. SM	1 ED.	1/71			SHEET 2	OF	4	
I	-		T. Paquette				S COAD			ANCO	OPTAT	ION		LOCATION Long W	harf Drive	e	
		E	ORING FOREMAN				EFAR			IGHW/	AYS						
			Factore (1 CiB.dos				6	BOR		EPORT				Guil	d Drilling	g Co.	
		J.	Freitas/J. O'Brien		TOMM			New	v Hav	en C	onne	ecticut		BORIN	G CONTR	ACTOR	
			INSPECTOR		TOWN			Her	Tiav	011, 0	- Critic	otiout					
			R. Borjeson		PROJE	CT NA	ME	1-95	New H	aven H	arbor I	Program M	anagement	Parsons Brincker	nott Qua	de & Doi	iglas, inc.
		_	SOILS ENGINEER		PROJE	CT NO			9	2-505	5			CONTRA	CTING E	NGINEER	
	LOCA	TION	Long Wharf Drive adj	acent t	o Exit	46 off	ramp	from	-95 No	orth			0005.040	LICIENO	DB.7		
	SURF	ACE ELE	V. 11.1					AUG	GER	CAS	SING	SAMPLER	COREBAR	LINE & STATION	10-1		
	DATE	FINISHE	D 3/30/00		TYPE	-				н	w	55	NIA	OFFSET			
		GROUN	D WATER OBSERVATION	IS	SIZE I.	D.				- 4	0.0	140#	BIT	N. COORDINATE	166,37	9.9	
	AT	8.1	FT. 24	HRS.	HAMM	ER FAI			_	2	4"	30"		E. COORDINATE	552,60	3.9	
			SA SA	MPLE			-	-	BLC	ws	-						
	E	CASING						1	PER 61	NCHE	s	STRATA		FIELD IDENTIFICA	TION OF	SOIL,	
	Р	BLOWS	DEPTHS		PEN.	REC.			C	N		CHANGE:		REMARKS (INCL. C	OLOR, LO	DSS OF	
				NO	INCH	INCH	TYPE		SAM	PLER		DEPTH.		WASH WATER, SEAN	AS IN ROO	CK, ETC.)	
	н	FOOT	FROM - TO					0-6	6-12	12-18	18-24	ELEV.	Dark anan	OPCANIC SILT to	co neat f	ibers	
			40.0' - 42.0'	9	24	18	D	WOH	WOH	WOH	1		shelle orea	gray or GANIG SILT, tra	the hear i		
				-	-	-							pp= 0.5.0 5	. 0.5 TSF			
							-	-			-	1					
	45			-	-	-						1					
	40		45.0' - 47.0'	10	24	24	D	1	0	0	1	1	Top 18": Da	ark green-gray ORGANIC	SILT, as	above.	
						[]				-		]	Bottom 6":	Dark green-gray SILT, s	some f sa	nd, trace	peat fibers,
		shelis, organic odor.															
ł									-			-					
	50					-	-				6	60.6	Ton 6": Day	k oreen oray SILT, as al	hove		
			50.0' - 52.0'	11	24	24	0	WOR	1	<u>'</u>	l °	-39.4	Bottom 18"	Dark brown PEAT and	ORGAN	C SILT, fi	brous,
						-		-	-	-	-		organic od	or.			
	E			+	-	-	-	-	-	-	-	54.0					
	55			-	-		-					-42.9					
		-	55.0' - 57.0'	12	24	16	D	8	10	14	11	1	Red-brown	f SAND, trace slit.			
		-				-											
						_				-	-	4					
				-				-	-	-	-	4					
	60		80.01.02.01	- 12	24	42	- D	6	7	6	3	-	Red-brown	m-c SAND, little f grave	I, trace sl	lt.	
		-	60.0 - 62.0	13	24	12	<u>ــــــــــــــــــــــــــــــــــــ</u>	Ť	+ ·	-	<u> </u>	1					
		-		-	-	-	-	-		-	1	1					
				-	-	-	-					64.0					
	65										-	-52.9					
			65.0" - 67.0"	14	24	20	D	5	8	11	12		Red-brown	SILT and f SAND, trace	clay, 1/4	" gray cla	y layer, rapid
					-		-	-	-	-	-	-	dilatancy.				
	1						-	-	-	-	-	-					
	70			-	-	-	-	-	-	-	1	1					
	10		70.0' - 72.0'	15	24	16	D	5	5	12	15	1	Red-brown	SILT and f SAND, trace	clay, rap	id dilatan	cy.
	1	-			1	-		1	1	1		1					
	1			-	1				1	· · · ·							
	1																
	75											-	D. J. D.	CII T come frond too	a clav 4	d" clav la	ver rankt
	1		75.0' - 77.0'	16	24	22	D	6	3	1	8	-	dilatance:	i oir i, some i sand, trad	Je ciay, 1/	- ciay la	lost cabio
	1			-	-	-	-	-		-	-	-	Guadancy.				
	1	-		_	-	-	-	-	-	-	+	-		84.			
	1			-	-	-	-	-	-	-	+	-	1	×			
	-	ROM GR	OUND SURFACE TO	39	FEET	USED	4	INCH	CAS	IG THE	N N	-	OPEN HOL	E FOR 83	FEET		
		- On On															
	1	OTAGE	IN EARTH 122.0	F	OOTAC	GE IN F	OCK		0	TYPE	E D	NO. OF S	SAMPLES	25	HOLE NO	D.	PB-7
																NE TEST	
	s	AMPLE 1	YPE CODING:	D=C	DRY		C=	CORE		A=	AUGE	R	UP=UNDISTL	IRBED, PISTON	V=VA	NE (EST	
	F	ROPORT	TIONS USED: TR/	ACE =0 -	10%	LITT	ILE = 1	0 - 20%	so	ME = 2	20 - 35	S AND	= 35 - 50%				
															_		

						F	ORMIN	O. SM	-1 ED.	1/71			
		T. Paquette				ST	TATE O	FCON	NECTI	CUT			SHEET 3 OF 4
	B	ORING FOREMAN			C	EPAR	MENT	OF TR	ANSP	ORTAT	ION		LOCATION Long Wharf Drive
						E	UREA	UOFH	IGHWA	AYS			
	3.3	Freitas/J. O'Brien					BOR	ING R	EPORT				Guild Drilling Co.
-		INSPECTOR		TOWN			Nev	v Hav	en, C	onne	octicut		BORING CONTRACTOR
							LOCI	Leur Li	aven H	arbor	Program M	anagement	Parsons Brinckerhoff Quade & Douglas, In
		R. Borjeson		PROJ	ECT NA	ME	1-921	New Ha	2 505	arbor	rogram m	anagement	CONTRACTING ENGINEER
	1011	SOILS ENGINEER	acout t	PROJ	AE off	ramn	from I	95 N	2-303				
CAT	ION I	Long whart Drive adj	acenti	O EXIL	40 011	ramp	ALIC	ER	CAS	ING	SAMPLER	CORE BAR	HOLE NO. PB-7
ATES	CE ELE	D 3/30/00	-	TYPE			1000		н	W	SS	N/A	LINE & STATION
(	GROUND	WATER OBSERVATION	S	SIZE	.D.				4	-	1 3/8"		OFFSET
T	8.1	FT. 24	HRS.	HAMN	IER WT		-		30	0#	140#	BIT	N. COORDINATE 166,379.9
\T		FT.	HRS.	HAMN	ER FA	L			24	5"	30"		E. COORDINATE 552,603.9
D		SA	MPLE					BLC	)WS				FIELD IDENTIFICATION OF SOIL
E	ASING	· · · · · · · · · · · · · · · · · · ·			1.000		F	PERGI	NCHE	S	STRATA		FIELD IDENTIFICATION OF SOIL,
PE	BLOWS	DEPTHS		PEN.	REC.	TYPE		CAL			DEPTH		WASH WATER, SEAMS IN ROCK, ETC.)
T	PER	EPON TO	NO.	INCH	INCH	TTPE	0.6	6-12	12-18	18-24	ELEV		the second second second second
н	1004	PROM - 10	17	24	21	P	3	6	11	16		Red-brown	SILT, some f sand, trace clay, rapid dilatancy.
		00.0 - 02.0	1 "		-								
F		· · · · · · · · · · · · · · · · · · ·										Ś	
									1				
85												-	our ways from a tensor story and allows
- E		85.0' - 87.0'	18	24	15	D	5	5	9	12		Red-brown	i Sit, i , some i sand, trace clay, rapid dilatancy.
			-	Sec.					-	i series and		1	
1													
~ F										1	1	1	
90 F		90.0' - 92.0'	19	24	21	D	5	8	11	19		Red-brown	SILT, trace clay, few 1/4" clay layers, rapid
÷		00.0 - 02.0	1.	-							1	dilatancy.	
1	1.1		-							S	1		
- H		and the second				Contraction of the local division of the loc					1		
95			- C						1 1			lans and	
		95.0' - 97.0'	20	24	22	D	9	8	11	11		Red-brown	SILT, trace clay, 1/8" clay layer, rapid dilatancy.
- 1			A Carrier										
- 1			-	-			-			-			
			-	-			-	-			1		
-		100.0' - 102.0'	21	24	21	D	6	9	13	16		Red-brown	SILT, trace clay, 1/4" clay layer, rapid dilatancy.
-		100.0 - 102.0		-				-					
- H				-						1000	1		
t					1								
105	·····								a contrado		1	-	
	-	105.0' - 107.0'	22	24	19	D	5	6	8	18	-	Red-brown	n Sil. I, trace clay, 1/4" clay layer, rapid dilatancy.
- E	-			-			-	-			-		
			_		-		-		-	-	-		
Int			10000	-	-	Sector of	-		-	-	1		
10		110.0' - 112.0'	23	24	23	D	2	6	10	20	1	Red-brown	n SILT, little clay, few 1/4" to 1/8" clay layers,
- 1		11000 0 11000				-					1	rapid dilata	ancy.
									-		1		
t													
115		· · · ·											
1		115.0' - 117.0'	24	24	21	D	4	7	10	21		Red-brown	n SILT, trace clay, 1/8" clay layer, rapid dilatancy.
- [						1		-	-		4		
- [			-		-	-			-	-	4		ъ.
- 1			-		-	-	-		-	-	-	1	
_	041.000	NIND SUDEACE TO	20	ECCT	LISED	4	INCH	CASE	GTHE	N	1	OPEN HOL	E FOR 83 FEET
R	UM GRO	JUND SURFACE TO	39	reel	USED	4	atori	United	as the			5. 211100	
100	TAGE I	N EARTH 122.0	F	OOTAG	ge in r	оск	0		TYPE	D	NO. OF S	AMPLES	25 HOLE NO. PB-7
. 00													
							0000			110000	- i	ID-I INDICT:	IDDCD DISTON V=VANE TEST
SA	MPLET	YPE CODING:	D=0	DRY		C=0	CORE		A=/	AUGER	2 1	UP=UNDISTU	URBED, PISTON V=VANE TEST

BON II	T. Paquette ORING FOREMAN Freitas/J. O'Brien INSPECTOR R. Borjeson SOILS ENGINEER Long Wharf Drive adj V. 11.1 D. 3/30/00 WATER OBSERVATION FT. 24 FT. SJ DEPTHS FROM - TO 120.0" - 122.0"	NS HRS. HRS. AMPLE NO.	TOWN PROJE PROJE TYPE SIZE 1 HAMM HAMM	ECT NA ECT NO 46 off D. ER WI IER FA	ST DEPART 8 ME 0. ramp	ATE O MENT UREAU BOR Nev I-95 I	OF TR OF TR U OF H U OF	NECTI ANSPO IGHW/ PORT PORT IVEN H 2-505 orth CAS	CUT ORTAT AYS Conne arbor I	ION cticut Program Ma	anagement	LOCATION Long G BOR Parsons Brinck CONTI	Wharf Drive wild Drilling Co. ING CONTRACTOR erhoff Quade & Dor RACTING ENGINEER PB-7	ıglas, inc.
J. F	ORING FOREMAN  Freitas/J. O'Brien INSPECTOR  R. Borjeson Solls ENGINEER Long Wharf Drive adj V. 11.1 D 3/30/00 WATER OBSERVATIOP FT. 24 FT. 24 FT. 5 DEPTHS FROM - TO 120.0' - 122.0'	iacent ( NS HRS. HRS. AMPLE NO.	TOWN PROJE PROJE O Exit TYPE SIZE I HAMN HAMN	ECT NA ECT NG ECT NG 46 off .D. .ER WI IER FA	ME ). ramp	I-95	U OF H ING RE V Hav New Ha 90 1-95 No 3ER	PORT PORT en, C wen H 2-505 orth CAS	arbor I	cticut Program M	anagement	Gi BORI Parsons Brinck CONTI	uild Drilling Co. ING CONTRACTOR erhoff Quade & Dor RACTING ENGINEER PB-7	uglas, Inc.
J. F	Freitas/J. O'Brien INSPECTOR R. Borjeson Solls ENGINEER Long Wharf Drive adj V. 11.1 D 3/30/00 WATER OBSERVATION FT. 24 FT. 24 FT. SJ DEPTHS FROM - TD 120.0' - 122.0'	iacent ( NS HRS. HRS. AMPLE NO.	TOWN PROJE PROJE o Exit TYPE SIZE I HAMM HAMN	ECT NA ECT NO 46 off D. IER WI IER FAI	ME namp	I-95 I	New Have	PORT en, C wen H 2-505 orth CAS	arbor I	octicut Program Ma	anagement	Gi BORI Parsons Brinck CONTI	uild Drilling Co. ING CONTRACTOR erhoff Quade & Dou RACTING ENGINEER PB-7	uglas, Inc.
J. F	reitas/J. O'Brien INSPECTOR R. Borjeson Solls ENGINEER Long Wharf Drive adj V. 11.1 D. 3/30/00 WATER OBSERVATION FT. 24 FT. 24 FT. SJ DEPTHS FROM - TO 120.0" - 122.0"	NS HRS. HRS. AMPLE NO.	TOWN PROJE PROJE o Exit TYPE SIZE I HAMM HAMM	ECT NA ECT NO 46 off D. ER WT	ME ramp	Nev I-95 I from I	v Hav New Ha 90 1-95 No GER	en, C aven H 2-505 orth CAS	arbor I	cticut Program Ma	magement	BORI Parsons Brinck CONTI	ING CONTRACTOR enhoff Quade & Dou RACTING ENGINEER PB-7	uglas, Inc.
S DN L E ELEV NISHEE ROUND 8.1 F F ASING LOWS PER COOT	INSPECTOR           R. Borjeson           SOILS ENGINEER           Long Wharf Drive adj           V         11.1           D         3/30/00           WATER OBSERVATION           FT.         24           FT.         S/           DEPTHS           FROM - TO           120.0" - 122.0"	NS HRS. HRS. AMPLE NO.	PROJE PROJE O Exit TYPE SIZE I HAMM HAMM	ECT NA ECT NO 46 off D. ER WT	ME ramp	I-95 I	New Ha 90 I-95 No 3ER	ven H 2-505 orth CAS	arbor I	Program Ma	magement	Parsons Brinck	erhoff Quade & Doo RACTING ENGINEER PB-7	uglas, Inc. t
SON L CE ELEN NISHED ROUND 8.1 F F ASING LOWS PER FOOT	R. Borjeson SOLS ENGINEER Long Wharf Drive adj V. 11.1 D. 3/30/00 WATER OBSERVATION FT. 24 FT. DEPTHS FROM - TO 120.0° - 122.0°	NS HRS. HRS. AMPLE NO.	PROJE PROJE o Exit TYPE SIZE 1 HAMM HAMM	ECT NA ECT NO 46 off D. ER WT	ME ramp	from I AUC	New Ha 90 I-95 No GER	ven H 2-505 orth CAS H	ING	Program Ma	anagement	CONT	PB-7	lugias, inc.
SE ELEN NISHED ROUND 8.1 F ASING LOWS PER COOT	SOILS ENGINEER Long Wharf Drive adj V. 11.1 0 3/30/00 WATER OBSERVATION FT. 24 FT. 24 FT. 5/ DEPTHS FROM - TO 120.0" - 122.0"	NS HRS. HRS. AMPLE NO.	PROJE o Exit TYPE SIZE I HAMM HAMM	D. ER WI	namp	from I AUG	95 No 3ER	CAS	ING			CONT	PB-7	
DN L CE ELEX NISHED ROUND 8.1 F ASING LOWS PER COOT	Long Wharf Drive adj V. 11.1 D. 3/30/00 WATER OBSERVATION FT. 24 FT. 24 FT. 5/ DEPTHS FROM - TO 120.0° - 122.0°	NS HRS. HRS. AMPLE NO.	TYPE SIZE I HAMM HAMN	.D. IER WI	ramp : :	AUG	SER	CAS	ING	319-140-110-00			PB-7	
ROUND 8.1 F ASING LOWS PER COOT	V. 11.1 0 3/30/00 WATER OBSERVATION FT. 24 FT. 24 FT. SJ DEPTHS FROM - TO 120.0° - 122.0°	NS HRS. HRS. AMPLE NO.	TYPE SIZE I HAMM HAMM	D. IER WT	:			H		SAMPLER	CORE BAR	HOLE NO.		
ROUND 8.1 F ASING LOWS PER FOOT	9 WATER OBSERVATION FT. 24 FT. 24 FT. 5/ DEPTHS FROM - TO 120.0° - 122.0°	HRS. HRS. AMPLE NO.	SIZE I HAMN HAMN	.D. IER WI IER FA	: LL				w i	SS	N/A	LINE & STATION		
8.1 F ASING LOWS PER COOT	FT. 24 FT. S. DEPTHS FROM - TO 120.0° - 122.0°	HRS. HRS. AMPLE NO.	HAMN HAMN PEN.	IER WI	: L		the second se	- 4	-	1 3/8"		OFFSET		
ASING LOWS PER COOT	FT. SJ DEPTHS FROM - TO 120.0' - 122.0'	HRS. AMPLE NO.	PEN.	IER FA	ц.			30	0#	140#	BIT	N. COORDINATE	166,379.9	
ASING LOWS PER FOOT	5/ DEPTHS FROM - TO 120.0' - 122.0'	NO.	PEN.			in an		24	t	30"		E. COORDINATE	552,603.9	
ASING LOWS PER COOT	DEPTHS FROM - TO 120.0' - 122.0'	NO.	PEN.				BLC	WS		STRATA		FIELD IDENTIE	CATION OF SOIL.	
PER COOT	FROM - TO 120.0' - 122.0'	NO.	F Cite	REC			0	NGRE:		CHANGE:		REMARKS (INCL.	COLOR, LOSS OF	
TOOT	FROM - TO 120.0' - 122.0'		I INCH	INCH	TYPE		SAM	PLER		DEPTH,		WASH WATER, SE	AMS IN ROCK, ETC.)	Ê
	120.0' - 122.0'					0-6	6-12	12-18	18-24	ELEV.				
	l and the second	25	24	15	D	2	6	13	18		Red-brown	SILT, trace clay, 1/4"	clay layer, rapid dilat	ancy.
							-		-	122.0		Bottom of by	oring at 122.0 ft	
										-110.0		Dottom of De		
		-							· · · · · ·		Note:			
							()				Hole g	grouted to 23', observ	ation well installed,	
											scree	ned from 10° to 20°.		
-			-			-		i						
		-	-											
					1000					1				
-			-	-					· · · · · · · · · · ·					
					Annean					-				
			-	-										
										1				
									1	1				
					1. J				·					
								_			1			
					-					-				
<u></u>				-	-	1				1				
		-												
											t í			
	2							-	-	4				
	· · · · · · · · · · · · · · · · · · ·		-	-	-	-	-	-	-	4				
			-	-	-									
										1				
										]				
										-	1			
		1.1	-	-	-	-	-	-	-	-				
			-	-		-	+	-	-	-				
			+		-	1	1			1				
										]				
			-							-	1	7.23		
			-	-	-		-	-	-	-				
NICE		-	-	TUSET		INCH	CAS	IG THE	EN .	1	OPEN HOL	E FOR 83	FEET	
JM GRO	JUND SURFACE TO	39	PEE	, uset	- 4	ntor								
TAGE	NEARTH 122.0	1	FOOTA	GEINF	ROCK		0	TYP	E D	NO. OF S	AMPLES	25	HOLE NO.	PB-7
											······			_
MPLE T	YPE CODING:	D=	DRY		C=	CORE		A=	AUGE	R	UP=UNDISTI	URBED, PISTON	V=VANE TEST	Ê.
	MM GRO	M GROUND SURFACE TO TAGE IN EARTH 122.0 APLE TYPE CODING:	MI GROUND SURFACE TO 39 TAGE IN EARTH 122.0	MI GROUND SURFACE TO 39 FEE TAGE IN EARTH 122.0 FOOTA MPLE TYPE CODING: D=DRY	M GROUND SURFACE TO 39 FEET USE TAGE IN EARTH 122.0 FOOTAGE IN F PD-DRY	M GROUND SURFACE TO 39 FEET USED 4 TAGE IN EARTH 122.0 FOOTAGE IN ROCK	M GROUND SURFACE TO 39 FEET USED 4 INCK	Image:	MI GROUND SURFACE TO 39 FEET USED 4 INCH CASING THE MI GROUND SURFACE TO 39 FEET USED 4 INCH CASING THE MI GROUND SURFACE TO 39 FEET USED 4 INCH CASING THE CONTRACT TO 39 FEET USED 4 INCH CASING THE CASE IN EARTH 122.0 FOOTAGE IN ROCK 0 TYPE	MI GROUND SURFACE TO 39 FEET USED 4 INCH CASING THEN TAGE IN EARTH 122.0 FOOTAGE IN ROCK 0 TYPE D	MIGROUND SURFACE TO 39 FEET USED 4 INCH CASING THEN	Note: Hole is scree Hole is sc	Note: Hole grouted to 23°, observ screened from 10° to 20°. Hole grouted to 23°, observ screened from 10° to 20°.	Note:       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well installed, screened from 10° to 20°.       Hole grouted to 23°, observation well

ſ		A. Mason				F	ORM N	O. SM.	1 ED. 1	1/71 CUT			SHEET 1 OF 4		
1	e	ORING FOREMAN			2	BPART 8	MENT UREAL 80R	of tr Jof H Ing Re	ANSPO GHWA	ORTAT	IVON		Guild Drilling Co.		
H	-	INSPECTOR		TONN			New	Have	en, C	onne	cticut		BORING CONTRACTOR		
		R Borieson		PROJE	CT NA	ME	1-951	low Ha	ven Hi	arbori	Program M.	anagement	Parsons Brinckerhoft Quade & Douglas, Inc.		
		SOILS ENGINEER		PROJE	CT NO	),		92	2-505				CONTRACTING ENGINEER		
LOCA	NOIT	Long Wharf Drive		_	_				CAS	INC	SALIDI CO	CODE BAD	HOLE NO PB-9		
SUR	FINISHE	V. 10.0 O 4/5/00	-	TYPE	-	-	100		- H	W	SS	N/A	LINE & STATION		
-	GROUN	WATER OBSERVATIONS		SIZE I.	D.			1	4	-	1 3/8"		OFFSET		
AT	-	FT.	HRS.	HAM	ER WI	-	_	-	30	01	140#	BIT	E COORDINATE 553.108.3		
AT O		FT. SAA	IPLE	- PPG/104		-		BLO	WS						
E P T	CASING BLOWS PER	DEPTHS	NO.	PEN. INCH	REC.	TYPE	F	ER 6 II O	NCHES	10.74	STRATA		FIELD IDENTIFICATION OF SOL, REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)		
H	FOOT	FROM - 10 0.0' - 2.0'	T	24	20	D	2	2	4	7	cutv.	Top 5": Bro	wn SILT, trace f sand, some organic matter-grass.		
												roots. (TO	PSOL		
								-	-			(FILL)	Red-brown I SAND and SiL I, trace I gravel, dry.		
5		4.0' - 6.0'	2	24	20	D	7	9	11	14	1	Red brown	m-c SAND, trace fgravel, trace silt, wet (FILL)		
							-			-		ļ			
	9.0 State Shells:														
	9.0         9.0           9.0'-11.0'         3         24         24         D         2         1         1         1.0         Green-gray ORGANIC SiLT, trace f sand, trace shells; top Z" black with slight sheer.														
10	0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.														
ŧ.			-		-						1				
											1				
15	-	14.0'- 15.0'	-	24	24	0	1	0	WOH	WOH		Black ORG	ANIC SILT, trace shells, slight organic odor,		
1.2		14.0 - 14.0	-								1	elight petro	aleum odor.		
											1	pp= 0.0, 0.0	0.00 TSF		
			-	-	-	-				-	1	1			
20		19.0' - 21.0'	5	24	24	D	WOR	WOH	WOH	WOH	1	Black ORG	ANIC SILT, trace shells, slight organic odor,		
			-		-			-		-	4	pp= 0.0, 0.0	) TSF		
		22.0' - 24.0'	11	24	24	UP		PU	SH		1	Black ORG	ANIC SILT, slight organic odor,		
1											1	pp= 0.3, 0.5	5, 0.4 TSF		
25		24.0' - 25.0'	6	24	24	0	I WOH	1	1	1 1	-	pp= 0.0, 0.2	25 TSF		
	-		+	-	1					1	1	. · ·			
			1		-	1				<u> </u>					
20		29.0'-31.0'	7	24	24	0		1	1	1	1	Black ORG	ANC SILT, slight organic ador.		
1 30			1						-	1		pp= 0.25, 0	.3, 0.25 TSF		
			-			1			1	1	-				
			-	-	1	1		1		-	1				
35	-	34.0' - 36.0'	1.	24	24	D	WOH	WOH	WOH	2	1	Black ORG	ANEC SILT, slight organic odor.		
											-	pp= 0.25 T	SP		
			+	-	-	-	1		-	1					
			1	1	1	1	1			1	1	Black COC			
-	DOM COL	39.0'- 41.0'	19	24	24		I WOH	WOH	G Inte	1 1	1	CHEM NORG	ETOR 73 TEL		
1	NUM GR		43	reet		-									
L	OTAGE	NEARTH 122.0	۶	OOTAC	E IN R	OCK	0		TYPE	DIU	P NO. OF S	AMPLES	25/1 HOLE NO. PB-9		
S	AMPLE T	YPE CODING: KONS USED: TRAC	D=0	18Y	யா	C⊶( 1£ = 10	20RE	SO	A=1 WE = 2	UGB 0-397	R AND	UP=UNDISTU ) = 35 - 50%	ROED. PISTON V=VANE TEST		

A. Maion         DOTING CREMAN         DEATTORNE OF CONNECTICUT         SHEET         2         0         4           DOTING CREMAN         DEATTORNE OF TIMAGRONTATION BUREAU OF HOMMAYS         DOTING CONTRACTOR         Guida Diffing Co.           NERFECTOR         TOWN         New Haven, Connecticut         BORING CONTRACTOR         BORING CONTRACTOR           R. Bordeson         PROJECT NO.         92.505         CONTRACTOR ENGLISH         BORING CONTRACTOR           VIT         PROJECT NO.         92.505         CONTRACTOR ENGLISH         Parsons Binkcherford Coulds & Dougles           VIT         PROJECT NO.         92.505         CONTRACTOR ENGLISH         Parsons Binkcherford Coulds & Dougles           VIT         PROJECT NO.         92.505         CONTRACTOR ENGLISH         Parsons Binkcherford Coulds & Dougles           VIT         PROJECT NO.         92.505         CONTRACTOR ENGLISH         Parsons Binkcherford Coulds & Dougles           VIT         PROVE         NAM         STATCON         CONTRACTOR ENGLISH         Parsons Binkcherford Coulds & Dougles           VIT         PROVE         NAM         STATCON         PARSON         CONTRACTOR ENGLISH           VIT         PROVE         PROVE         CAND         CANDER CONSE CONCOUNT COUNTRACTOR         PARSON           VIT<				-	-		F	ORM N	O. SM	-1 ED. 1	1/71				
BORING FOREMANI         DEPENDING TO TRANSPORTATION         LOCATION         Long Whart Take           J. Frittins         J. Frittins         BUREAU OF HOMMATS         BUREAU OF HOMMATS         BUREAU OF HOMMATS           BORING REFORT         TOWN         New Haven, Connecticut         Parsons Brink-chrieff Quade & Douglas, Connecticut         Parsons Brink-chrieff Quade & Douglas, Connecticut         Parsons Brink-chrieff Quade & Douglas, Connecticut           BORING DERGONER         TOWN         New Haven, Connecticut         Parsons Brink-chrieff Quade & Douglas, Connecticut           DOUTLOW MAIL         Town         NUCER CONFIGURATION         92-505         Control March Town           CONTROCTOR         Wind Town         Town         No. And Stattorn         Parsons Brink-chrieff Quade & Douglas, Control March Mar	_		A. Mason				S	TATE O	FCON	INECTI	CUT			SHEET 2 OF 4	
J. Freitas         DURING GERGER         DURING GERGER         DURING GERGER         DURING CONTRACTOR           R. Borlson         PROJECT NAME         148 New Haven, Connecticut         Parsons Bindschord Guade & Dougle           SULS EXGMETR         PROJECT NAME         148 New Yaven, Konnecticut         Parsons Bindschord Guade & Dougle           URFACE LEW         10.9         NA LOGR         CAMPLER CORE DAR, Magement         CONTRACTING ENGINEER           URFACE LEW         10.9         NA LOGR         CAMPLER CORE DAR, Magement         PB-9           URFACE LEW         10.9         NA         NA         LR & STATION         CONTRACTING ENGINEER           URFACE LEW         10.9         TYPE         AUGER         CAMPLER CORE DAR, Magement         ESTAN           GROUND WATER OBSENATIONS         SSTELD         44.0         BT         COORDANTE         65.106.3           OASING         SARFLE         PERS MARKER         PERS MARKER         CHANGE         PERS MARKER         CHANGE           1         PERS MARKER         PERS MARKER         PERS MARKER         CHANGE         PERS MARKER           1         PERS MARKER         PERS MARKER         PERS MARKER         CHANGE         PERS MARKER           1         PERS MARKER         PERS MARKER	_	E	BORING FOREMAN		1	1	DEPAR	TMENT	OF TR	ANSPO	DRTAT	TION		LOCATION Long Wharf Drive	
J. Fritas         DOUMO REPORT         Count							E	BUREAU	U OF H	IGHWA	YS			Culld Delling Co	
INSPECTOR         TOWN         New Haven, Loc Program Management         Paraos Brinchou Cox           SOLS BORNEER         PROJECT NO.         92-505         CONTRACTING ENGINEER           SOLS BORNEER         PROJECT NO.         92-505         CONTRACTING ENGINEER           CONTROL Long Whatf Drive         ALCER         CASING SAMPLER CORE MR. HOLE NO.         PB-9           CASING         SAMPLER CORE MR. HOLE NO.         PB-9           GROUND WATER COSENVATIONS         SIZE LD.         AH         1.38*         ALCER         CRIMING CONTRE         657,179.4           AT         FT.         HRS         HAMMER WIT.         2.30*         IN E.COCRIDINTE         653,106.3           CONSTRUCT ON CONTRE         CONTRACT CONTRE         PER         PER <td></td> <td></td> <td>J. Freitas</td> <td></td> <td></td> <td></td> <td></td> <td>BOR</td> <td>ING R</td> <td>EPORT</td> <td></td> <td></td> <td></td> <td>Guild Drilling Co.</td>			J. Freitas					BOR	ING R	EPORT				Guild Drilling Co.	
R. Bojason         PROJECT NAME         Jask New Haven Handro Program Management         Parcoma Brinckentoff Quade & Douglas, CONTROM Long Whart Fibrle           DOLTET NUL         Long Whart Fibrle         100         ALCER         CASING         SAMPLER CORE BAR         HOLE NO.         PB-9           DATE FINISHED         4500         17FE         HW         SS         NA         LURE R TATION           DIR FINISHED         4500         17FE         HW         SS         NA         LURE R TATION           OTTOME CELEX         160         440         344         OFFSET         655,106.3           OTTOME COMENT         187         HR         HAMMER PALL         24*         30*         E. COORDINATE         167,179.4           D         SAMPLE         PER INCES         THE REAL         24*         30*         E. COORDINATE         167,179.4           F. F. HRS         HAMMER PALL         24*         0         1         2         3         FELD DENTIFICATION OF SOLL           CASING         DEDTIS         PER INFC         PER INCES         STRATA         FELD DENTIFICATION OF SOLL         REMARKS (NNLOC) CLOSS OF           FIGUR TO WHAT         160         1         2         2         3         OEVPTI         NASH WAIRS			INSPECTOR		TOWN	1		Nev	v Hav	en, C	onne	ecticut		BORING CONTRACTOR	
SOLS BOOMEER         PROJECT NO.         92-505         CONTRACTING BORINEER           URFACE LEV         19.0         ALIGER         CASING SAMPLER CORE BAR         HOLE NO.         P6.9           URFACE LEV         19.0         ALIGER         CASING SAMPLER CORE BAR         HOLE NO.         P6.9           GROUND WATER COSERVATIONS         SIZE LD.         AV         1.987         ALIGER         CASING SAMPLER CORE BAR         HOLE NO.         P6.9           AT         FT.         HSB JMAMER WT.         2004         1.987         NO. COREDUNTE         653,106.3           Control NOMPER         OSTING         OSTING         OSTING         STRATA         PER         PER ADADS SINCCOLOR,LOSS OF           E CASING         OSTING         OSTING         OSTING         OSTING         OSTING         STRATA           PER         POOL         PROVECT NO.         OSL         ONARTE         PERADONS (INCL COLOR,LOSS OF           1         POOL         PERADONS (INCL COLOR,LOSS OF         PERADONS (INCL COLOR,LOSS OF         PERADONS (INCL COLOR,LOSS OF           45         44.07 - 46.07         10         24         0         1         2         3           56         56.07         11         24         0         1			R Borieson		PROJ	ECT NA	ME	1-95	New Ha	aven Ha	arbor	Program M	anagement	Parsons Brinckerhoff Quade & Douglas, Inc	
DOCATION         Long What Portve           UPFACE ILEY         10           ATTE FINSHED         4560           ATT FINSHED         138*           ATTE FINSHED         4560           CASING         5000           ATT         FIN           PR         HAMME RALL           2         2           2         55           44.0*         10           45         44.0*           44.0*         10           45         44.0*           46.0         10           45         44.0*           48.0         11           45         44.0*           48.0         12           45         44.0*           48.0         12           45         44.0*           48.0         12           45         44.0*           48.0         12           45         12           46.0         12           470         12	_		SOILS ENGINEER		PROJ	ECT NO	<b>)</b> ,		9	2-505				CONTRACTING ENGINEER	
NURRACE ELEV.         10.0         AUGER         ALGER         CASING         SAMPLE CORE BAR HOLDS.         PB-3           GRUND WATER OBSERVATIONS         SIZE LD         44         13.8         MOFSET         MOFSET           GRUND WATER OBSERVATIONS         SIZE LD         44         13.8         MOFSET         MOFSET           AT         FT.         HRS. HAMMER FALL         24         13.8         MOFSET         167,179.4           AT         FT.         HRS. HAMMER FALL         24         30°         E.COORDINITE GS3,106.3         FILE OLDENTFICATION OF SOIL           CASING         PEN         BEOMS         PEN         BEOMS         TRATA         PILE OLDENTFICATION OF SOIL           E GASING         DEPTHS         DAMALER         DEICONS         STRATA         PILE OLDENTFICATION OF SOIL           E GASING         DEPTHS         DAMALER         DO         CHANGE         STRATA         PILE OLDENTFICATION OF SOIL           E GOMS         PER INCLUS TO THE COLL COLOR, LOSS OF         ORIVER-GREATING AND COLL COLOR, LOSS OF         PILE OLDENTFICATION OF SOIL           E GOMS         FROM-TO         NO. IRCH INCH INCH TYPE         SAMALER         DEICONS         FILE OLDENTFICATION OF SOIL           E GOMS         FROM-TO         NO.IRCH INCH	OCA	TION	Long Wharf Drive												
NTE FINSHED       4500       TYPE       HW       SS       NAL       Like S STATICH         OROUMD WATER OBSENTATION STEE ID       4*       1 34*       OFFSET       OFFSET       OFFSET         AT       FT       HRS, HAMMER WT.       300#       140#       BIT       N. CORRINC 163, T70.4         D       SAMPLE       PEN       BE       30*       E. COCKRIANTE       553, T00.8.3         D       CASING       DE       SAMPLE       PEN       BE       PEN       BC         COND       DEPTH       PEN       BEC       OFFSET       PEN/       BCOCKROW       PEN/       BC       STATICH         COND       DEPTH       PEN       BEC       PEN       BC       STATICH       PEL/       PEN/       BC       STATICH       PEN/       BC	URF	ACE ELE	EV. 10.0					AUG	SER	CAS	ING	SAMPLER	CORE BAR	HOLE NO. PB-9	
GROUND WATER OBSERVATIONS         SIZE LD.         4*         1 JM*         P         P         N         CONCOMULATE         633,106.3           AT         FT.         HR3, HVAMMER W/L.         24*         30*         E. COORDIMATE         633,106.3         E.           CASING         D         ISAM*LE         PER         NO.00         FR.         633,106.3           E         OSSING         DEDTIS         PER         NO.00         FR.         DEDISTIST.         PER.         PER.         PER.         NO.00         FR.         PER.	ATE	FINISHE	ED 4/5/00		TYPE					H	N	SS	N/A	LINE & STATION	
NT         FT.         HRS (FAMMER VAL.         3008         Dir.         E. COCRONATE         553,106.3           D         SAMPLE         BLOWS         PER. DISCHES         FIRATA         PER. DISCHES         PER. DISCHES <t< td=""><td></td><td>GROUN</td><td>D WATER OBSERVATION</td><td>S</td><td>SIZE</td><td>.D.</td><td>_</td><td>-</td><td></td><td>4</td><td></td><td>1 3/8"</td><td>DIT</td><td>N COOPDINATE 167 179 4</td></t<>		GROUN	D WATER OBSERVATION	S	SIZE	.D.	_	-		4		1 3/8"	DIT	N COOPDINATE 167 179 4	
NI         FI.         MINDLE (POWNER PRACE)         PROVE         PROVES	AT	-	FT.	HRS.	HAMN	AED EA	2			30	0#	3408	DII	E COORDINATE 553.106.3	
Construct         Destruct         PER         REC.         PER         NO         PER         DEPTR         DEPTR         PER         DEPTR         DEPTR           45         44.0 * 10         2         2         1	AT D		FL. SA	MPLE	PLANIN	IER PA	u	-	BLC	WS 24	-	- 30			
Display         DEPTINE         PERL         REC.         ON         CHANGE         REMARKS (NCL COLOR, LOSS OF           H         FOOT         FROM TO         NO         NCH INCH TYPE         SAMPLEN         DEPTINE         VARIA WATER, SLAMS (INCL COLOR, LOSS OF           H         FOOT         FROM TO         NO         NCH INCH TYPE         SAMPLEN         DEPTINE         VARIA WATER, SLAMS (INCL COLOR, LOSS OF           45         44.0° - 48.0°         10         24         24         D         1         2         2.3           45         44.0° - 48.0°         10         24         24         D         1         2         2.3           50         49.0° - 48.0°         11         2         2         3         48.0           50         49.0° - 51.0°         11         24         10         12         15         17           55         54.0° - 56.0°         12         24         10         12         15         17           60         99.0° - 61.0°         13         24         19         D         10         13         16         23           70         69.0° - 71.0°         15         24         10         12         16	E	CASING	0/1		1			F	PER 6	NCHES	6	STRATA		FIELD IDENTIFICATION OF SOIL,	
T         PER         NO         INCH         INCH         TYPE         SAMPLER         DEPTH, ISAMPLER         WASH WATER, SEAMS IN NOCK, EUS)           4         FROM. TO         4         4         6         6-12         12-16         16-24         ELEV.         WASH WATER, SEAMS IN NOCK, EUS)           45         44.0° - 48.0°         10         24         24         D         1         2         2         3           45         44.0° - 48.0°         10         24         24         D         1         2         2         3           50         49.0° - 51.0°         11         24         10         D         16         12         15         17         -48.0           55         54.0° - 56.0°         12         24         16         D         9         12         15         17           60         69.0° - 61.0°         13         24         10         D         10         13         16         23           60         69.0° - 71.6°         13         24         10         12         16         17         -98.0           61         69.0° - 71.6°         13         24         10         13         16	51	BLOWS	DEPTHS		PEN	REC			0	N		CHANGE:		REMARKS (INCL. COLOR, LOSS OF	
H       FROM - TO       -       0.06       6-12       12-16       10-24       ELEV.         45       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       <	т	PER		NO.	INCH	INCH	TYPE	-	SAM	PLER		DEPTH,		WASH WATER, SEAMS IN ROOK, ETC.)	
45         44.0°-48.0°         10         24         24         D         1         2         2         3           60         48.0°-51.0°         11         24         24         D         15         17         30.0         Brown 1-C SAND, little 1 gravel, trace shells.           55         54.0°-51.0°         11         24         10         D         16         12         15         17           60         48.0°-51.0°         11         24         10         D         16         12         15         17           60         59.0°-61.0°         11         24         10         D         10         12         15         17           60         59.0°-61.0°         13         24         10         D         10         13         16         23         -         49.1         Bottom 16: SAND, little 1 gravel, trace silt.           60         59.0°-61.0°         13         24         10         D         10         13         16         23         -         49.1         Bottom 16: SAND, little 1 gravel, trace silt.           70         66.0°         14         24         14         D         22         17         24	н	FOOT	FROM - TO		-			0-6	6-12	12-18	18-24	ELEV.			
45         44.0*-48.0*         10         24         24         0         1         2         2         3           65         44.0*-48.0*         10         24         24         0         1         2         2         3           60         48.0*-51.0*         11         24         10         0         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14				-			-	-			-				
45       44.0° - 46.0°       10       24       24       D       1       2       2       3         50       49.0° - 51.0°       11       24       10       16       12       15       17       49.0         55       54.0° - 56.0°       12       24       14       D       9       12       15       17       -39.0       Brown 1-C SAND, little 1 gravel, trace silt.         60       55.0° - 66.0°       12       24       14       D       9       12       15       17         60       58.0° - 61.0°       13       24       19       10       13       18       23       -49.1         60       58.0° - 61.0°       13       24       19       10       13       18       23       -49.1         60       58.0° - 61.0°       13       24       19       10       13       18       23       -49.1         60       64.0° - 66.0°       14       24       14       D       22       17       22         70       66.0°       14       24       14       D       22       12       17       22         75       74.6° - 76.0°       16       24 <td></td> <td></td> <td></td> <td>+</td> <td>-</td> <td>-</td> <td>-</td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td>				+	-	-	-		_						
45       44.0° - 48.0°       10       24       24       D       1       2       2       3         50       49.0° - 51.0°       11       24       10       D       16       12       15       17         50       49.0° - 51.0°       11       24       10       D       16       12       15       17         50       49.0° - 56.0°       12       24       14       D       9       12       15       17         55       54.0° - 56.0°       12       24       14       D       9       12       15       17         60       58.0° - 61.0°       13       24       10       D       16       13       16       23       -49.1       Bottom 16°: Red-brown f SAND and SiLT, rapid dilatancy.         61       64.0° - 66.0°       14       24       14       D       22       12       17       22         70       68.0° - 71.0°       15       24       20       D       12       46       16       20         70       68.0° - 71.0°       15       24       20       D       12       46       16       20       49.1       Bottom 18".7, trace f sand, medium dilatancy. </td <td></td> <td></td> <td></td> <td>+</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td>				+								1			
50         43.0°-51.0°         11         24         10         D         16         12         15         17         -39.0         Brown FC SARD, Ittle T gravel, trace sit.           55         54.0°-56.0°         12         24         14         D         9         12         15         17           60         59.0°-61.0°         13         24         19         D         10         13         14         23         -49.1         Brown FC SAND, little f gravel, trace sit.           60         59.0°-61.0°         13         24         19         D         10         13         14         23         -49.1         Bottom FC SAND, little f gravel, trace sit.           61         64.0°-66.0°         14         24         14         D         22         17         22           70         65.0°-71.0°         15         24         20         D         12         16         16         20           71         74.0°-76.0°         16         24         23         D         5         7         16         22           75         74.0°-76.0°         16         24         23         D         5         7         16         22         17	45		44.0' - 46.0'	10	24	24	D	1	2	2	3	1	Olive-gray	ORGANIC SILT, little f sand, trace shells.	
So         43.0*-S1.0*         11         24         10         D         16         12         15         17         -39.0         Brown FC SAND, little f gravel, trace bit.           55         54.0*-56.0*         12         24         14         D         9         12         15         17           60         59.0*-61.0*         12         24         14         D         9         12         15         17           60         59.0*-61.0*         13         24         19         D         10         13         14         23           60         59.0*-61.0*         13         24         19         D         10         13         14         23         49.1         Bottom 16*: Red-brown 15 AND and SiLT, trace silt.           66         64.0*-66.0*         14         24         14         D         22         17         22           70         68.0*-71.0*         15         24         20         D         12         46         10         10         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14         14				1											
50       49.0 - 51.0'       11       24       10       D       16       12       15       17       -90.0       Brown T-2 SAND, little T gravel, trace sit.         55       54.0' - 56.0'       12       24       14       D       9       12       15       17         60       59.0' - 61.0'       13       24       10       D       13       18       22															
50       49.0° - 51.0°       11       24       10       D       16       12       17       73.0       Brown T-C SAND, little Y gravel, trace sitc.         55       54.0° - 66.0°       12       24       14       D       9       12       15       17         60       59.0° - 61.0°       13       24       10       D       10       13       18       23       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       - </td <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td></td> <td></td> <td>_</td> <td>_</td> <td>49.0</td> <td></td> <td></td>				-	-	-	-			_	_	49.0			
30       48.0 * 31.0       11       12       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       11       10       10       11       10       10       11       10       10       11       10       10       11       10       11       10       11       10       10       11       10       11       10       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       11       10       10       11       10       10       10       11       10       10       10       10       10       10       10       10       10       10 <th10< th=""> <th10< th="">       10</th10<></th10<>	50	_	40.0' 51.0'	11	24	10		16	12	15	17	-39.0	Brown I-C S	SAND, little I gravel, trace Sil	
55       54.0° - 56.0°       12       24       14       D       9       12       15       17         60       59.0° - 61.0°       13       24       14       D       9       12       15       17         60       59.0° - 61.0°       13       24       14       D       10       13       18       23       -49.1       Bottom 18°: Red-brown 1c SAND, little f gravel, trace silt.         60       59.0° - 61.0°       13       24       14       D       13       18       23       -49.1       Bottom 18°: Red-brown 1c SAND, little f gravel, trace silt.         65       64.0° - 66.0°       14       24       14       D       22       12       17       22         70       68.0° - 71.0°       15       24       20       D       12       16       16       20         75       74.6° - 76.0°       16       24       20       D       5       7       16       22       D       5       7       16       22         75       74.6° - 76.0°       16       24       20       D       5       7       16       22       D       5       7       16       22         7	50		49.0 - 51.0	+ "	24	10	۲, P	10	12	10					
55         54.0° - 56.0°         12         24         14         D         9         12         15         17           60         59.0° - 61.0°         13         24         19         D         10         13         18         23           60         59.0° - 61.0°         13         24         19         D         10         13         18         23           61         62         64.0° - 66.0°         14         24         14         D         22         12         17         22           70         69.0° - 71.0°         15         24         20         D         12         16         16         20           70         69.0° - 71.0°         15         24         20         D         12         16         16         20           75         74.0° - 76.0°         16         24         23         D         5         7         16         22           74.0° - 76.0°         16         24         23         D         5         7         16         22           73         78.0° - 76.0°         16         24         23         D         5         7         16         22				-	-		-					1			
55         54.0° - 56.0°         12         24         14         D         9         12         15         17           60         59.0° - 61.0°         13         24         19         D         10         13         18         23         -49.1         Bottom 16°: Red-brown f SAND, little f gravel, trace silt.           60         59.0° - 61.0°         13         24         19         D         10         13         18         23         -49.1         Bottom 16°: Red-brown f SAND and SiLT, rapid dilatancy.           61         64.0° - 66.0°         14         24         14         D         22         12         17         22           70         69.0° - 71.0°         15         24         20         D         12         16         16         20           71         69.0° - 71.0°         15         24         20         D         12         16         16         20           75         74.8° - 76.0°         16         24         23         D         5         7         16         22         Red-brown SiLT, little clay, few 1/8° clay layers, rapid dilatancy.           76         74.8° - 76.0°         16         24         23         D         5					-							1			
55       54.0° - 58.0°       12       24       14       D       9       12       15       17         60       59.0° - 61.0°       13       24       19       D       10       13       18       23       -49.1       Bown 1-C SAND, little f gravel, trace sitt.         60       59.0° - 61.0°       13       24       19       D       10       13       18       23       -49.1       Bottom 18°: Red-brown f SAND and SiLT, rapid dilatancy.         61       64.0° - 66.0°       14       24       14       D       22       12       17       22         70       69.0° - 71.0°       15       24       20       D       12       16       16       20       -49.1       Bottom 18°: Red-brown f SAND and SiLT, rapid dilatancy.         70       69.0° - 71.0°       15       24       20       D       12       16       16       20       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -											_			a state that a second damage all the	
60       59.0° - 61.0°       13       24       19       D       10       13       18       23       -49.1       Bottom 18°: Red-brown fc SAND, little f gravel, trace silt.         60       59.0° - 61.0°       13       24       19       D       10       13       18       23       -49.1       Bottom 18°: Red-brown fc SAND and SiLT, rapid dilatancy.         65       64.0° - 66.0°       14       24       14       D       22       17       22         70       65.0° - 71.0°       15       24       20       D       12       16       16       20         71       69.0° - 71.0°       15       24       20       D       12       16       16       20         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         76       74.0° - 76.0°       16       24       23       D       5       7       16       22	55		54.0' - 56.0'	12	24	14	D	9	12	15	17	4	Brown f-c s	SAND, little f gravel, trace silt.	
60         59.0° - 61.0°         13         24         19         10         13         18         23         -49.1         Bottom 16°: SAND, little f gravel, trace silt.           60         59.0° - 61.0°         13         24         19         D         10         13         18         23         -49.1         Bottom 16°: Red-brown f SAND and SiLT, rapid dilatancy.           65         64.0° - 66.0°         14         24         14         D         22         12         17         22           70         69.0° - 71.0°         15         24         20         D         12         16         16         20           71         69.0° - 71.0°         15         24         20         D         12         16         16         20           75         74.0° - 76.0°         16         24         23         D         5         7         16         22           75         74.0° - 76.0°         16         24         23         D         5         7         16         22           76         70.0° - 81.0°         17         24         20         D         7         9         11         19           78.0° - 81.0°         17				-	-	-			_		_	4			
60         59.0* - 61.0*         13         24         19         D         10         13         18         23         -49.1         Bottom 18*: Red-brown f SAND and SiLT, rapid dilatancy.           65         64.0* - 66.0*         14         24         14         D         22         12         17         22           70         69.0* - 71.0*         15         24         20         D         12         16         16         20           70         69.0* - 71.0*         15         24         20         D         12         16         16         20           70         69.0* - 71.0*         15         24         20         D         12         16         16         20           75         74.6* - 76.0*         16         24         23         D         5         7         16         22           75         74.6* - 76.0*         16         24         23         D         5         7         16         22           76.0*         16         24         23         D         5         7         16         22           79.0* - 81.0*         17         24         20         D         7				-	+	+		-	-		-	1			
60       59.0°-61.0°       13       24       19       D       10       13       18       23       -49.1       Bottom 18": Red-brown f SAND and SiLT, rapid dilatancy.         65       64.0°-66.0°       14       24       14       D       22       12       17       22         70       69.0°-71.0°       15       24       20       D       12       16       16       20         70       69.0°-71.0°       15       24       20       D       12       16       16       20         70       69.0°-71.0°       15       24       20       D       12       16       16       20         75       74.0°-76.0°       16       24       23       D       5       7       16       22         75       74.0°-76.0°       16       24       23       D       5       7       16       22         79.0°-81.0°       17       24       20       D       7       9       11       19       Red-brown SiLT, little clay, rapid dilatancy.         FROM GROUND SURFACE TO       49       FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       73       FEET <td co<="" td=""><td></td><td>-</td><td></td><td>-</td><td>+</td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td>59.1</td><td>Top 1": Bro</td><td>own f-c SAND, little f gravel, trace slit.</td></td>	<td></td> <td>-</td> <td></td> <td>-</td> <td>+</td> <td>-</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>59.1</td> <td>Top 1": Bro</td> <td>own f-c SAND, little f gravel, trace slit.</td>		-		-	+	-	-					59.1	Top 1": Bro	own f-c SAND, little f gravel, trace slit.
65       64.0° - 66.0°       14       24       14       D       22       12       17       22         70       69.0° - 71.0°       15       24       20       D       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       12       16       16       20       16       16       20       16       16       20       16       16       20       16       16       20       16       16       22       16       16       22       16       16       22       16       16       22       16       16       22       16       16       22	60		59.0" - 61.0"	13	24	19	D	10	13	18	23	-49.1	Bottom 18	": Red-brown f SAND and SILT, rapid dilatancy.	
65       64.0°-66.0°       14       24       14       D       22       12       17       22         70       69.0°-71.0°       15       24       20       D       12       16       16       20         70       69.0°-71.0°       15       24       20       D       12       16       16       20         75       74.0°-76.0°       16       24       23       D       5       7       16       22         75       74.0°-76.0°       16       24       23       D       5       7       16       22         78.0°-81.0°       16       24       23       D       5       7       16       22         79.0°-81.0°       16       24       23       D       5       7       16       22         79.0°-81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, few 1/8° clay layers, rapid dilatancy.       Red-brown SiLT, little clay, rapid dilatancy.       PEET         70.0°-81.0°       17       24       20       D       7       9       11       19          122.0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>															
65       64.0° - 66.0°       14       24       14       D       22       12       17       22         70       69.0° - 71.0°       15       24       20       D       12       16       26       64.0° - 66.0°       14       24       20       D       12       16       20       16       24       20       D       12       16       26       16       20       16       24       23       D       5       7       16       22       11       19       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14       14				-	-		-	-		-		-			
65       64.0° - 66.0°       14       24       14       D       22       17       22         70       69.0° - 71.0°       15       24       20       D       12       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       20         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         76       79.0° - 81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, few 1/8" clay layers, rapid dilatancy.         78.0° - 81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, few 1/8" clay layers, rapid dilatancy.         TROM GROUND SURFACE TO       49       FEET USED       4       INCH CASING THEN       OPEN HOLE FOR       73       FEET         JOTAGE IN EARTH       122.0       FOOTAGE IN ROCK       0       TYPE D/UP NO. OF SAMPLES       25/1       HOLE				+	-					-	-	-			
Commentation       Commentation <th< td=""><td>65</td><td><u> </u></td><td>64.0' - 66.0'</td><td>14</td><td>24</td><td>14</td><td>D</td><td>22</td><td>12</td><td>17</td><td>22</td><td>1</td><td>Red-brown</td><td>SILT, trace f sand, medium dilatancy.</td></th<>	65	<u> </u>	64.0' - 66.0'	14	24	14	D	22	12	17	22	1	Red-brown	SILT, trace f sand, medium dilatancy.	
70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       16       20         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         76       79.0° - 81.0°       16       24       23       D       5       7       16       22         79.0° - 81.0°       17       24       20       D       7       9       11       19       Red-brown SiLT, little clay, repid dilatancy.         79.0° - 81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, rapid dilatancy.       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, rapid dilatancy.       16       22       16	~		01.0 - 00.0				-	-	-	-		1			
70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       16       20         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         76       79.0° - 81.0°       16       24       23       D       5       7       16       22         79.0° - 81.0°       17       24       20       D       7       9       11       19       Red-brown SiLT, little clay, few 1/8° clay layers, rapid dilatancy.         79.0° - 81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, rapid dilatancy.       OPEN HOLE FOR       73       FEET         JOTAGE IN EARTH       122.0       FOOTAGE IN ROCK       0       TYPE D/UP NO. OF SAMPLES       25/1 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td>1</td><td></td><td></td><td></td><td></td></td<>								_		1					
70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       69.0° - 71.0°       15       24       20       D       12       16       16       20         70       15       24       20       D       12       16       16       20         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         75       74.0° - 76.0°       16       24       23       D       5       7       16       22         76       74.0° - 76.0°       16       24       23       D       5       7       16       22         79.0° - 81.0°       17       24       20       D       7       9       11       19       Red-brown SiLT, little clay, few 1/8° clay layers, rapid dilatancy.         79.0° - 81.0°       17       24       20       D       7       9       11       19         Red-brown SiLT, little clay, rapid dilatancy.       16       20       D       7       9       11       19         FROM GROUND SURFACE TO       49       FEET USED       4       INCH CASING THEN       OP							_	-				-	1		
TO         TO <thto< th="">         TO         TO         TO<!--</td--><td>70</td><td></td><td>60.61 74.61</td><td>40</td><td>24</td><td></td><td>1</td><td>12</td><td>46</td><td>46</td><td>20</td><td>-</td><td>Red-brown</td><td>t SAND and SILT, medium to rapid dilatancy.</td></thto<>	70		60.61 74.61	40	24		1	12	46	46	20	-	Red-brown	t SAND and SILT, medium to rapid dilatancy.	
75         74.6° - 76.0°         16         24         23         D         5         7         16         22           75         74.6° - 76.0°         16         24         23         D         5         7         16         22           1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	10	<u> </u>	69.0* • 71.0*	15	24	20	1	14	1.0	1		1			
75         74.0° - 76.0°         16         24         23         D         5         7         16         22           75         74.0° - 76.0°         16         24         23         D         5         7         16         22           1         1         1         1         1         16         24         23         D         5         7         16         22           1         1         16         24         23         D         5         7         16         22           1         1         16         24         23         D         7         16         22           1         16         24         20         D         7         9         11         19           Red-brown SiLT, little clay, few 1/8° clay layers, rapid dilatancy.         17         24         20         D         7         9         11         19           PROM GROUND SURFACE TO         49         FEET USED         4         INCH CASING THEN         OPEN HOLE FOR         73         FEET           JOTAGE IN EARTH         122.0         FOOTAGE IN ROCK         0         TYPE D/UP NO. OF SAMPLES         25/1         HOLE NO.         PB<		<u> </u>		-	+	1	-	1	1		-	1	1		
75         74.0° - 76.0°         16         24         23         D         5         7         16         22           1         1         2         23         D         5         7         16         22           1         1         16         24         23         D         5         7         16         22           1         16         24         23         D         5         7         16         22           1         16         24         23         D         5         7         16         22           1         16         24         23         D         5         7         16         22           1         16         24         20         D         7         9         11         19           Red-brown SiLT, little clay, rapid dilatancy.         17         24         20         D         7         9         11         19           Red-brown SiLT, little clay, rapid dilatancy.         17         24         10         7         9         11         19           Red-brown SiLT, little clay, rapid dilatancy.         17         16         17         9         11				-	1	-				1		1	1		
75       74.0° - 76.0°       16       24       23       D       5       7       16       22         1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1															
FROM GROUND SURFACE TO     49     FEET USED     4     INCH CASING THEN     OPEN HOLE FOR     73     FEET       JOTAGE IN EARTH     122.0     FOOTAGE IN ROCK     0     TYPE DAUP NO. OF SAMPLES     25/1     HOLE NO.     PB-	75		74.0' - 76.0'	16	24	23	D	5	7	16	22	-	Red-brown	n SILT, little clay, few 1/8" clay layers, rapid	
FROM GROUND SURFACE TO     49     FEET USED     4     INCH CASING THEN     OPEN HOLE FOR     73     FEET       JOTAGE IN EARTH     122.0     FOOTAGE IN ROCK     0     TYPE Drup NO. OF SAMPLES     25/1     HOLE NO.     PB-				-	-	-	-	-	-	-	-	-	dilatancy.		
FROM GROUND SURFACE TO     17     24     20     D     7     9     11     19     Red-brown Sill, little clay, rapid dilatancy.       FROM GROUND SURFACE TO     49     FEET USED     4     INCH CASING THEN     OPEN HOLE FOR     73     FEET       JOTAGE IN EARTH     122.0     FOOTAGE IN ROCK     0     TYPE D/UP NO. OF SAMPLES     25/1     HOLE NO.     PB-				-	-	-	-	-	-	-	-	-			
79.0° - 81.0°         17         24         20         D         7         9         11         19         Red-brown Sil T, little clay, rapid dilatancy.           FROM GROUND SURFACE TO         49         FEET USED         4         INCH CASING THEN         OPEN HOLE FOR         73         FEET           JOTAGE IN EARTH         122.0         FOOTAGE IN ROCK         0         TYPE D/UP NO. OF SAMPLES         25/1         HOLE NO.         PB-		-		-	-	-	-	-	-	+	-	1		*	
FROM GROUND SURFACE TO 49 FEET USED 4 INCH CASING THEN OPEN HOLE FOR 73 FEET JOTAGE IN EARTH 122.0 FOOTAGE IN ROCK 0 TYPE DAUP NO. OF SAMPLES 25/1 HOLE NO. PB			79.0' - 81.0'	17	24	20	D	7	9	11	19	1	Red-brown	n SILT, little clay, rapid dilatancy.	
JOTAGE IN EARTH 122.0 FOOTAGE IN ROCK 0 TYPE DAUP NO. OF SAMPLES 25/1 HOLE NO. PB	F	ROM GR	OUND SURFACE TO	49	FEET	USED	4	INCH	CASE	GTHE	N		OPEN HOL	E FOR 73 FEET	
JOTAGE IN EARTH 122.0 FOOTAGE IN ROCK 0 TYPE DUP NO. OF SAMPLES 25/1 HOLE NO. PB															
	. 3	OTAGE	IN EARTH 122.0	F	OOTA	GE IN F	OCK	0	)	TYPE	D/U	P NO. OF S	AMPLES	25/1 HOLE NO. PB-9	
A VIEW DE DOUV COOPE A-AUCED LID-LINUSTLIDBED PISTON VEVANE TEST					2025		~	0000					IP-I MOVET	IRBED PISTON V=VANE TEST	
SAMPLE TYPE CODING: DEDKY CHOCKE ANALOSK OF ONLOT ON ONLOT THE TEOT	s	AMPLE 1	TYPE CODING:	Da(	JKY			CORE		A-4	0.000				

	E	A. Mason				F S DEPAR	TATE O	NO. SM	I-1 ED. NNECT RANSP	1/71 ICUT ORTAT	TION		SHEET 3 OF 4 LOCATION Long Wharf Drive
~		J. Freitas		TOWN		1	BUREA BOF	UOFH RINGR	EPORT	AYS F Conne	ecticut		Guild Drilling Co. BORING CONTRACTOR
		R. Borjeson		PROJ	ECT NA	ME	1-95	New H	aven H	larbor	Program M	anagement	Parsons Brinckerhoff Quade & Douglas, Inc.
		SOILS ENGINEER		PROJ	ECT NO	).		9	2-505	5			CONTRACTING ENGINEER
OCA	TION	Long Wharf Drive						250	0.10	10.00	CANDI CO	CODE DAD	NOLENO PB-9
URF	ACE ELE	V. 10.0		TYPE			AUG	JER	CAS H	w	SAMPLER	N/A	LINE & STATION
AIE	GROUNI	D WATER OBSERVATION	VS	SIZE	.D.				-		1 3/8"		OFFSET
AT	-	FT.	HRS.	HAMN	IER WI	la i	έ		30	10#	140#	BIT	N. COORDINATE 167,179.4
AT		FT.	HRS.	HAMN	IER FA	LL	-		2	4"	30"		E. COORDINATE 553,106.3
D E P	CASING BLOWS	DEPTHS	AMPLE	PEN.	REC.			PER 6	INCHE	s	STRATA CHANGE:		FIELD IDENTIFICATION OF SOIL, REMARKS (INCL. COLOR, LOSS OF WASH WATER SEAMS IN POCK FTC.)
т Н	PER FOOT	FROM - TO	NO.	INCH	INCH	TYPE	0-6	5AM 6-12	PLER 12-18	18-24	ELEV.	i ose	WASH WATER, SEAMS IN KOCK, ETC.)
85		84.0' - 86.0'	18	24	22	D	6	9	14	22		Red-brown dilatancy.	SILT, trace f sand, trace clay, rapid
90		89.0' - 91.0'	19	24	16	D	7	10	15	18		Red-brown	SILT and f SAND, medium dilatancy.
95		94.0' - 96.0'	20	24	20	D	5	9	13	21		Red-brown	SILT, trace f sand, trace clay.
100		99.0' - 101.0'	21	24	18	D	10	15	16	27		Red-brown	SILT, trace f sand, trace clay, rapid dilatancy.
105		104.0' - 106.0'	22	24	16	D	9	13	17	22		Red-brown	SILT, trace f sand, trace clay, rapid dilatancy.
110		109.0' - 111.0'	23	24	16	D	10	14	16	23		Red brown	SILT, trace f sand, trace clay.
115		114.0' - 116.0'	24	24	20	D	8	11	17	23		Red brown	SILT, trace f sand, trace clay.
												10	N (1 - 2)
c	ROM GRO	OUND SURFACE TO	49	FEET	USED	4	INCH	CASE	IG THE	EN .		OPEN HOL	E FOR 73 FEET
. ა	OTAGE I	N EARTH 122.0	F	OOTAC	e in R	OCK	0	)	TYPE	i davui	P NO. OF S	AMPLES	25/1 HOLE NO. PB-9
S/ Pl	AMPLE T	YPE CODING: IONS USED: TRA	D=0	DRY 10%	uTT	C=1	CORE	so	A=/	AUGEF 10 - 357		UP=UNDISTU = 35 - 50%	RBED, PISTON V=VANE TEST

-	E		FORM NO. SM-1 ED. 1/71 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION								SHEET 4 OF 4			
J. Freitas					BUREAU OF HIGHWAYS BORING REPORT TOWN New Haven. Connecticut								Guild Drilling Co. BORING CONTRACTOR	
R. Borjeson				PROJECT NAME I-95 New Haven Harbor Program Management								Parsons Brinckerhoff Quade & Dougl		
LOCA	TION	SOILS ENGINEER		PROJ	ECT NO	).		9	2-505	;			CONTRACTING ENGINEER	
SURF	ACE ELE	V. 10.0		-			AUC	GER	CAS	ING	SAMPLER	CORE BAR	HOLE NO. PB-9	
DATE FINISHED 4/5/00				TYPE			HW		w	SS	N/A	LINE & STATION		
AT	GROUN	WATER OBSERVAT	HRS	HAM	IER WI		<u>le transmante</u> E		30	0#	140#	BIT	N. COORDINATE 167,179.4	
AT		FT	HRS	HAMA	MER FA	LL			2	4-	30"		E. COORDINATE 553,106.3	
DEPT	CASING BLOWS PER	DEPTHS	SAMPLE NO.	PEN.	REC.	TYPE	F	BLC PER 6 I O SAM	ows Inche In Pler	5	STRATA CHANGE DEPTH,		FIELD IDENTIFICATION OF SOIL, REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)	
н	FOOT	FROM - TO			1		0-6	6-12	12-18	18-24	ELEV.			
		120.0' - 122.0'	25	24	24	D	8	14	24	29	400.0	Red-brown	1 SILT, trace f sand, trace clay, clay layers up ancy.	
	_	· · · · · · · · · · · ·									-112.0	Bottom of boring at 122.0 ft		
					0		i		-					
125			-				contra-	har-say.		e non				
				1					-					
			1.1.1				hand							
120				-										
130				-			1	)						
	-	Network and the second second second					in a star							
				-		1								
135	-	P.		-	-	-		-						
											1			
				-			-		Same.					
	<u> </u>													
140			-											
						J								
	(			-	-		-							
		1. J. C. Den March 1. J. C. C.									1			
145		í									1			
							-	-			{			
		n contraste S									1			
							1				1			
150														
				-	-	1					1			
											1			
155				-							1			
100				-	-						1			
				-				· · · · · · · · · · · · · · · · · · ·			1			
								[					21	
- 14				-	-								*	
FF	ROM GRO	UND SURFACE TO	49	FEET	USED	4	INCH	CASIN	GTHE	N		OPEN HOL	E FOR 73 FEET	
- 2					- 141				-	-		ANTH FC		
ini	OTAGE IN	EARTH 122.0	) F	OUTAG	SEINR	OCK	0		TYPE	D/UP	NU. OF S	AMPLES	Z5/1 HOLE NO.	



0 2019 - GZA GeoEnvironmental, Inc. GZA-C:\Users\marc.chmura\appdata\local\temp\AcPublish_14872\GZA_BoringMapLayout2.0.dwg [FIG 1 11x17 OPTION 2] January 24, 2019 - 2:40pm marc.chmura



0 2019 — GZA GeeEnvironmental, Inc. GZA-C:\Users\marc.chmura\appdata\local\temp\AcPublish_14872\GZA_BoringMapLayout2.0.dwg [FIG 5 11x17] January 24, 2019 — 2:40pm marc.chmura

		Ņ									
		A									
		6									
		T									
		Λ									
100	200	300									
SCALE	IN FEET										
ISSUE/DESCRIPTION	4	BY DATE									
ED BY WRITTEN ADREEVENT, THE DRAMMO IS THE SOLE PROPERTY O Rhal not be thereforence, readed, correl, or altered in any named for											
TO FOR ANY THEIR FORCES WITHOUT THE PARTY WATER COMPANY OF DAY, ANY ATLANT TO THE DANAGE OF THE CLEDIT OF CHARGE, WITHOUT THE PARTY WITH ALL OF AT THE USER'S SOLE HER AND WITHOUT ANY HER OF LANDLINE TO COM-											
EN STORM WATER IMPROVMENTS											
NEW HAVEN, CONNECTICUT											
SUBSURFAC	E EXPLORAT	ION PLAN									
nvironmental loc	CDM	SMITH									
s and Scientists w.gza.com	NEW HAVEN,	CONNECTICUT									
EVIEWED BY: DCS RAWN BY: MEC	CHECKED BY: HM SCALE: 1" = 100"	DWG									
ROJECT NO. 173951.00	REVISION NO.										
Enginee 27 Naek Vernon, (860) 87	rs and Sc Road Connect 5-7655	ientists	066				PROPERTY OF GZA GEOENVIRONMENTAL, INC.	File No.	e: 1 OF 2 41802 AJ		
-------------------------------------------------------------------	---------------------------------------------------------------------------------------------------	--------------------------------------------------	-------------------------------------------	----------------------------------	---------------------------------------------------	--------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------	--------------------------	--	--
Boring ( Foreman GZA Re Date Sta Location G.S. Ele	co. presentat rt vation	GZA ( R. Hol A. Au 6/2 See Pla NA	GeoEnvi Iman gustine 29/98 an	Date Er	t 6/7	29/98	Casing         Sampler           Type         Steel         S.S.         Date         7           J.D./O.D.         4"         2" O.D.         6/29/98         6/29/98           Hammer         300 lb         140 lb.         6/29/98         6/29/98           Hammer F         30"         30"         6/29/98         6/29/98           Hammer F         30"         140 lb.         6/29/98         6/29/98	Groundwater Readin	Casing Time		
Depth	Casing Blows	Na.	Se PenJ Rec.	Depth (ft)	Blows/6"	Field Test Data	Sample Description and Classification	Stratum	emarka		
5 10 15	Push 22 31 24 15 Push Push Push Push Push Push Push 166 35	S-1 S-2 S-3 S-4	24/16 24/0 24/0 24/12	0-2 5-7 10-12 12-14	6-11 14-12 2-1 2-1 1-1 4-4 10-8		Medium dense, red/brown fine SAND, some fine Gravel, trace Silt. No Recovery No Recovery Medium dense, red/ brown fine to medium SAND, trace Silt (has odor)	FILL			
20 25 30	Push Push Push Push Push Push Push Push	S-6 S-7 S.T. S-8	24/14 24/14 24/24 24/23 24/24	20-22 25-27 27-29 29-31			Son, grey, Organic CLAY, trace Sea Shell Very soft, grey, Organic CLAY, trace Sea Shells Very soft, grey, Organic CLAY, trace Sea Shells Very soft, grey, Organic CLAY, trace Sea Shells.	S ORGANIC CLA	Y		
R E M A R K S											

GZA G Engineers 27 Naek I Vernon, G	EOEN and Scier Road Connecticu	ntists	MENTA	L, INC	•		PROPERTY OF GZA GEOENVIRONMENTAL, INC. Prile No.: Checked By:	2 OF 2 41802 AJ
(860) 875	-7655							
							Groundwater Readings	1
Boring Co	0-	GZA Ge	oEnvironn	sental	_		Casing Sampler	Stab
Foreman		R. Holma	an				Diop 4" 2" OD 679.98	ising 1 m
GZA Rep	resentativ	A Augu	o.o.g	Date End	6/20	2/0/8	ammer 300 lbs 140 lb	-
Location		See Plan	9/90	Louie Line		170	Jammer F 24" 30"	
G.S. Elev	ation	une i fait		Datum		-	Other Shelby Tube	
	1.01.00		San	ple Infor	mation			
Depth	Casing Blows	No.	Pen./ Rec.	Dopth (ft)	Blows/6"	Field Test Data	Sample Description and Classification Description	Remarks
35		-		-		-	ORGANIC CLAY	
	89	S-9	24/24	35-37	WOH/-	-	Very loose, grey, Organic CLAY, trace	
	73		-		24"		Sea Shells, 1/8" loose fine Sand.	
	74		-			1		
	92					-		
40	81			10.10		_	40'	-
	130	S-10	24/14	40-42	5-4	-	Vedium dense grey/brown fine to medium	
	82		-	-	6-11	_	SAND, trace Sill.	
	72		-	-			STRATIFIED DRU	т
45	79			-		-	011011110001	
		S-11	24/16	45-47	5-7		Medium dense red/brown fine SAND,	
					6-7		trace Silt. 47"	
							END OF	
		-		_			EXPLORATION	
50		_		-		_		
		-	-	-				
	-		-	-		-		
	-	-		-				
55				-		-		
1.2.2.1	5					1		
						1		
	1			-				
	10222				-			
60						-		_
R								
M								
A								
R								
К								
8								

## ATTACHMENT C: LABORATORY ANALYSES

LABORATORY TESTING DATA SHEET

Project N Project N Project E	ame o. ngineer	1-95 NEW NEW HAV L16173 D. SCHUL	HAVI VEN, C	EN HARI TT.	BOR P	ROJEC	T Assign Date	R. BORJESON     Reviewed By       May-00     Date Reviewed													
HOME ADD THE	44018493131	的运行时将自己的注意	P SHEEKS	he interest	90001900	ALLERGER	Identifi	cation T	ects	1913年日	Rolenter	Density	1.14.14		St	trength Tests		1.11	Consol.		
Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Water Content %	LL %	PL %	Sieve -200 55	Hyd +2µ %	ORG %	G,	Dry unit wt. pcf	Yd <u>MAX (pef)</u> W _{opt} (%)	Perme- ability cm/sec	Torvane or Type Test	σ _c psf	Failure Criteria	σ ₁ - σ ₃ or τ psf	Strain %	$\frac{C_{c}}{1+c_{0}}$	Laboratory Log and Soil Description	
PR-5	0.22	40-	133		71	35	92	22								-	i Santa ang			Grey Organic SILT, trace Sand	
10-5	00-7	75-	100				02	2												Red-Brown SILT, little (+) fine Sand	
	55-10	105-	134				02	3												Red-Brown SILT	
	55-22	107	133				70				æ										
		and a second																			
														a the state strength of the state						-	
									-												
														100							
																				2 7	

GZA GeoEnvironmental, Inc. QINEWTONLABYLABFORM7.XLS

labform1.xls

## LABORATORY TESTING DATA SHEET

Project N	ате	I-95 NEW NEW HAV	HAVE EN, C	EN HARE	BOR P	ROJEC	Т													
Project N Project E	o. ngincer	L16173 D. SCHUL		Assign Date	ed By	R. BOR. May-00	IESON	- 	1175 1000 - 1000 - 1000 1000 - 1000 - 1000 1000 - 1000 - 1000			6 1	Reviewe Date Re	d By viewed		· · · · · · · · · · · · · · · · · · ·				
COMPACT NO.	2107 HEALING				an a fai		Identifi	cation T	csts	18 1 1		Density	No.	is a started	St	rength To	sts		Consol.	1. 为 由 为 的 <b>时</b> 计 (太 由 代
Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Water Content %	LL %	PL %	Sieve -200	Hyd -2µ %	ORG %	G,	Dry unit wt. pcf	Yu <u>MAX (pcf)</u> W _{api} (%)	Perme- ability crtv/sec	Torvane or Type Test	σ _e psf	Failure Criteria	$\sigma_1 - \sigma_3$ or $\tau$ psf	Strain %	$\frac{C_0}{1+e_0}$	Laboratory Log and Soil Description
DP 0	55.6	24- 26	160		118	47	100	43												Grey Organic SILT of very high plasiticy
TD-9	55-12	54- 56	161		110		8													Brown f-c SAND, little Gravel, trace (+) Silt
	66.01	99-	162			-	00	2												Red-Brown Clayey SILT, trace (+) Sand
	55-21	120-	163				95	8												Red-Brown Clayey SILT, trace Sand
	33-23	122																		<ul> <li>Control Profile Control of Control Co Control Control Contro Control Control Control Control Control Control Control Cont</li></ul>
																	14 - L		All a least survey	
																				9

GZA GeoEnvironmental, Inc. Q:WEWTONLABILABFORM7.XLS labform1.xls

## LABORATORY TESTING DATA SHEET

Project N Project Er	o. ngineer	NEW HAV L16173 D. SCHUL	ZE	Τ.			Assigne Date	ed By	3y R. BORJESON May-00								d By viewed		1 d. Domo or	
Cinconation and	CONTRACTOR INC	IN SURGESTION TO P	CIPIL 94	S. OHIONI	at cases	Ren Handland	Identific	ation T	ests	G URA PE	12月1日日1月	Density	原始的	派法律师	St	rength Te	sts	同時間	Consol.	
Boring/ Test Pit No:	Sample No.	Depth ft.	Lab No.	Water Content %	LL	PL %	Sieve -200 %	Hyd -2µ %	ORG	G,	Dry unit wi. pcf	Ya <u>MAX (pcf)</u> W _{ept} (%)	Perme- ability cm/sec	Torvane or Type Test	$\sigma_c$ psť	Failure Criteria	$\sigma_1 - \sigma_3$ or $\tau$ psf	Strain %	$\frac{C_{c}}{1+e_{0}}$	Laboratory Log and Soil Description
PB-7	55-17	80- 82	154	E CIBRI	11(Karther)	Illar-946	77	5												Red-Brown Clayey SILT, some fine Sand
10-7	SS-20	95- 97	155				97	8			Si .									Red-Brown Clayey SILT
															1					
								-					-			-	-	-		
			-												1			-		4
						-														
		-	$\top$																	

GZA GeoEnvironmental, Inc. Q:NEWTONLAB/LABPORM7.XLS

labform1.xls

1-95 NEW HAVEN HARBOR PROJECT

Project Name

## LABORATORY TESTING DATA SHEET

Project N Project N Project E	ame lo. ngineer	I-95 NEW NEW HAV LI6173 D. SCHUL	HAVE EN, C	EN HARI T.	BOR P	ROJEC	Assign Date	ed By	R. BOR	JESON		Reviewed By								
		1 			- Dec - or other							Constantine Constantin			5) Caynawr-ra					
				1			Identifie	cation T	ests			Density	1 april 1	· 아이지 않는 것이	St	rength Te	sts	管理机	Consol.	
Boring/ Test Pit No.	Sample. No.	Depth ft.	Lab No.	Water Content %	LL %	PL %	Sieve -200 %	Hyd -2µ %	ORG %	G,	Dry unit wt. pef	Yd <u>MAX (pef)</u> W _{opi} (%)	Perme- ability cm/sec	Torvane or Type Test	σ _e psf	Failure Criteria	σ ₁ - σ ₃ or τ psf	Strain	$\frac{C_{c}}{1+e_{0}}$	Laboratory Log and Soil Description
		22-		~																
PB-9	UP-1	24	153		Avera	ge Tota	al Unit V	Veight (	22.0-23.9	r) = 88.	2 Pcf				1					
		22.2		98.9										Tv= 0.15						Dk.Grey Organic SILT of very
		22.4-	1														l'anne anna a' stàiteanna a' stàite			high plasticity, soft consisteny,
		22.6		95.4	117	52			l.	l. Perturna a d										trace fine Sand, trace Shell
		22.6-										1				3				
		22.7		97.8							46.6	<u></u>				1			0.27	
					- 21									Tv= 0.17						
		22.7		95.7		-								tsf	-					-
		22.7-		94.4							47.5			i nu i	1800	P/A MAX	845	20		
		20.2									- 47.5	:		$T_{y=0.17}$	1800	MAA	045	7.0		1
		23.3		95.7										tsf						
-	tited and all a	23.3-																		1
		23.8		Save								-					Sec. 1			
		5 g				1														
		and the street of																		
4		1							(											() 

GZA GeoEnvironmental, Inc. Q'NEWTONILABILABFORM7.XLS

labform1.xls



Tue, 03-AUG-2010 11:46:07



Tue, 03-AUG-2010 11:46:38

Phase calculations based on start and end of test.



Phase calculations based on start and end of test.

Tue, 03-AUG-2010 11:45:34



Tue, 03-AUG-2010 11:47:31

Phase calculations based on start and end of test.

