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REPORT

For Infrastructure Consulting & Engineering

Bridge Foundation Investigation (LRFD)
SR 1 (US 27) Over Long Cane Creek
P.I. No. 0013942
Troup County, Georgia
Project No. INFCE-20-GA-04719-01
February 15, 2021
Revised April 6, 2021

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February 15, 2021
Revised April 6, 2021

Tyler McIntosh, P.E.
Infrastructure Consulting & Engineering
4940 Peachtree Industrial Blvd.
Suite 310
Norcross, Georgia 30071

Via Email: tyler.mcintosh@ice-eng.com; VGill@dot.ga.gov

PROJECT: Report of Bridge Foundation Investigation
SR 1 (US 27) over Long Cane Creek
P.I. No. 0013942
Troup County, Georgia
UC Project No. **INFCE-20-GA-04719-01**

Dear Mr. McIntosh:

United Consulting is pleased to submit this revised Report of Bridge Foundation Investigation for the above referenced project site. This revision is based on the comments made by Georgia Department of Transportation (GDOT) Geotechnical Bureau under Interoffice Memo dated March 23, 2021. We appreciate the opportunity to assist you with this project and look forward to working with you on future projects. If you have any questions regarding this report, or if we can be of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

Lonnie Rucker

Lonnie Rucker, E.I.T.
Staff Engineer

GEORGIA REGISTERED No. 20064 PROFESSIONAL ENGINEER SANTANU SINHAROY

Santanu Sinharoy, P.E.
Chief Geotechnical Engineer
Registration No. 20064

LR/AW/SS/nj

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Bridge Foundation Investigation (LRFD)
Troup County
P.I. No. 0013942
April 6, 2021
Revision No. 1

LOCATION (See Map) SR 1 (US 27) over Long Cane Creek

GENERAL INFORMATION

GEOLOGIC FORMATION This project is geologically sited in the Mica Schist/ Gneiss/ Amphibolite Formations of the Georgia Piedmont Region.

SUBSURFACE FEATURES Borings Bent 1 and Bent 2 encountered fill to depths of 8 and 13 feet below grade underlain by 4 and 10 feet of alluvial soils, respectively. Beneath alluvial soils, both borings encountered residual soils underlain by Partially Weathered Rock (PWR) extending to the top of rock/auger refusal depths.

Subsurface materials generally consisted of sands with varying amounts of silts and clays, trace amounts of rock fragments, and trace to some amounts of mica, and sandy-silt soils with varying amounts of clay and trace amounts of rock fragments and mica.

Auger refusal indicating presence of hard rock occurred in borings Bent 1 and Bent 2 at elevations of 641.5 and 623 feet, respectively. Rock coring was performed in borings Bent 1 and Bent 2, with both recoveries and rock quality designation (RQD) values ranging from zero to 100 percent.

Groundwater was measured in borings Bent 1 and Bent 2 at the time of boring completion at elevations 653.5 and 664 feet, respectively. Stabilized groundwater was measured in boring Bent 2 at elevation 655 feet.

For additional information, see the boring layout and boring logs.

SITE CLASSIFICATION We recommend a site class of D per AASHTO LRFD 3.10.3.1.

1.0 --FOUNDATION RECOMMENDATIONS

Bents	Pile Bent (Type)
1 and 2	HP (50 ksi)

1.1 -- PILE PROPERTIES

Pile Type	Pile Size (in)	Nominal Compression Stress (ksi)	Nominal Tension Stress (ksi)	Maximum Factored Structural Resistance (kips)
HP (50 ksi)	14 x 89	45.0	45.0	653

1.2 -- DESIGN LOADS

Bents	Maximum Factored Strength Limit State Load (kips)	Maximum Factored Service Limit State Load (kips)	Factored Extreme Event I Limit State Load (kips)
1	243	171	142
2	241	170	141

2.0 -- FOUNDATION LOADS

2.1 -- PILE FOUNDATION LOADS

Bents	Pile Type	Size (in)	Downdrag[1] (kips)	Scour (kips)	Driving Resistance (kips)
1	HP (50 ksi)	14 x 89	9.58	-	399
2	HP (50 ksi)	14 x 89	46.08	-	491

[1]-Using DRIVEN Output

3.0 -- FOUNDATION ELEVATIONS

Bents	Minimum Tip	Estimated Tip
1	645	641
2	630	623

4.0 -- GENERAL NOTES

Elevations All elevations are based on Benchmark Elevations of 672.44 feet located at Station 106+06.11, 119.91 feet right of construction centerline as shown on plans entitled "Preliminary Layout - SR 1 (US 27) over Long Cane Creek", provided by Infrastructure Consulting & Engineering, Drawing No. 35-0001, dated April 30, 2020.

Waiting Period None required.

As-Built Foundation Information The as-built foundation information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.

4.1 -- PILE FOUNDATION NOTES

PDO Driving resistance after minimum tip elevations are achieved in conjunction with GDOT Standard Specification 520.3.05.D.2 and Special Provision 523 Dynamic Pile Testing. We recommend PDA tests at Bent 1-Left and Bent 2-Right in accordance with Special Provision 523.

Nominal Bearing Resistance of Single Pile Driving resistance is based on the following field verification method and resistance factor φ_{dyn} AASHTO LRFD 2014 (10.5.5.2.3-1):

Resistance Determination Method	Resistance Factor
Driving criteria established by dynamic testing of at least two piles per site condition, but no less than 2% of the production piles.	0.65

Down Drag The load factor γ_p used to calculate the downdrag force per AASTHO LRFD 2014 (3.4.1-2):

Method	Load Factor
Piles, λ Method	1.05

Piles Driven to Hard Rock The nominal resistance of piles driven to point bearing on hard rock where pile penetration into the rock formation is minimal is controlled by the structural limit state. The Nominal Driving Resistance should not exceed the Factored Structural Resistance. Dynamic pile measurements should be used to monitor for pile damage.

Drivability A drivability analysis has been completed on the above-mentioned piles to their respective estimated tips with an ICE I-30v2 hammer. Using GRLWeap Version 2010, pile-driving criteria were analyzed at Bent 1 and Bent 2. Based on the GRLWeap drivability analysis assuming ICE I-30v2 hammer, the driving stresses are within these limits.

Points Pile points are recommended for each pile to be driven at Bent 1 and Bent 2 to insure adequate penetration into very dense weathered rock.

LIMITATIONS

This report is for the exclusive use of the Infrastructure Consulting & Engineering, Georgia Department of Transportation, its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence are not implied or suggested by this report, and should not be inferred.

Our preliminary conclusions and recommendations are based upon design information furnished us, data obtained from current exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes, and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plan and applicable portions of the specifications to see if they are consistent with the intent of our recommendations.

QA / QC

Prepared By: Lonnie Rucker, E.I.T.

Reviewed By: Anry Wijaya

QC Reviewed By: Santanu Sinharoy, P.E.

Revised February 15, 2016

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

SR 1 (US 27) over Long Cane Creek
Troup County
P.I. No. 0013942

SECTION 523 - DYNAMIC PILE TESTING

523.1 General Description

The work consists of performing dynamic pile testing using the Pile Driving Analyzer (PDA) to monitor the driving of piles with accelerometer and strain gauges attached to the piles. Piles to be dynamically tested will be identified in the Special Provision or on the Plans. Prior to pile driving, the Engineer will determine production or test piles to be dynamically tested. Perform the dynamic pile testing in accordance with ASTM D4945-12.

Take dynamic measurements during driving of any required piles. Drive the pile as shown in the Special Provisions or on the Plans.

523.2 Materials

Furnish measuring instruments for dynamic pile testing. Attach instruments near the top of the piles with bolts placed in drilled holes. Furnish materials, labor and equipment necessary for installation of the instruments.

523.3 Construction Requirements

Measure wave speed prior to driving piles. Wave speed measurements will not be required for Steel H piles or metal shell piles. When wave speed measurements are performed, place the piles in a horizontal position not in contact with other piles.

Perform dynamic pile testing during driving. Modify the driving to reduce the stress and/or eliminate the damage, should the recommended stress level be exceeded or if damage occurs (determined visually or as indicated by the instrumentation).

Do not exceed the following maximum driving stresses, as determined by the dynamic pile testing:

1. For Steel piles:

   0.9 Fy, where Fy = Yield strength of steel

2. For Prestressed Concrete Piles:

   <u>Compression:</u>

   $$\sigma_{dr} = (0.85f'_c - f_{pe})$$

   <u>Tension in Normal Environments:</u>

   $$\sigma_{dr} = (0.095\sqrt{f'_c} + f_{pe})$$

   <u>Tension in Severe Corrosive Environments:</u>

   $$\sigma_{dr} = \varphi_{da} f_{pe}$$

   where;
   σ_{dr} = maximum allowed driving stress, ksi
   $f'c$= specified minimum 28-day compressive strength of concrete, ksi
   $f\ pe$= effective prestress in concrete, ksi, (after all losses) at the time of driving taken as 0.78 times the initial prestress force

Re-drive friction piles that do not obtain bearing after a freeze period of a minimum of 24 hours or for a period designated on the Plans, whichever is longer. Reset the gauges if required. Re-strike the pile with a warm hammer until a maximum penetration of 3 inches (76 mm) or 40 blows is reached, whichever occurs first. The Engineer may modify the Pile Driving Objective based on the results of the PDA work.

Provide two weeks' notice prior to the driving of designated piles and cooperate with the Engineer in connection with the performance of Dynamic Pile Testing.

Provide a complete report consisting of but not limited to PDA field monitoring data, results of CAPWAP computer analyses, and recommendations such as pile lengths, hammer fuel setting, and valid driving criteria. Valid driving criteria is defined as having the required hammer having a hammer set greater than 3 blows per inch and less than 10 blows per inch at the driving resistance for that pile. Submit the report electronically in PDF format and the electronic data files of the PDA analysis and CAPWAP to the Geotechnical Bureau and allow seven (7) calendar days for review and approval before proceeding with driving production piles.

523.4 Measurement

The Dynamic Pile Tests performed in accordance with these Specifications will be counted separately for payment. (Refer to plans summary sheet for the required amount of PDA testing.)

523.5 Payment

The Dynamic Pile Test completed and accepted will be paid for at the Contract Unit Price. This payment will be full compensation for all costs of complying with this specification, including incidentals, additional work, and any delays incurred in conjunction therewith.

Payment will be made under:

Item No. 523. Dynamic Pile Test . . . . Per Each

Office of Materials and Testing

SCALE: NTS	DATE: 01/25/2021	PROJECT NO: INFCE-20-GA-04719-01	TITLE: **PROJECT LOCATION MAP** SR 1 (US 27) OVER LONG CANE CREEK P.I. No. 0013942, TROUP COUNTY
PREPARED: LR	CHECKED BY: AW	REVISIONS:	
CLIENT: INFRASTRUCTURE CONSULTING & ENGINEERING			UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com

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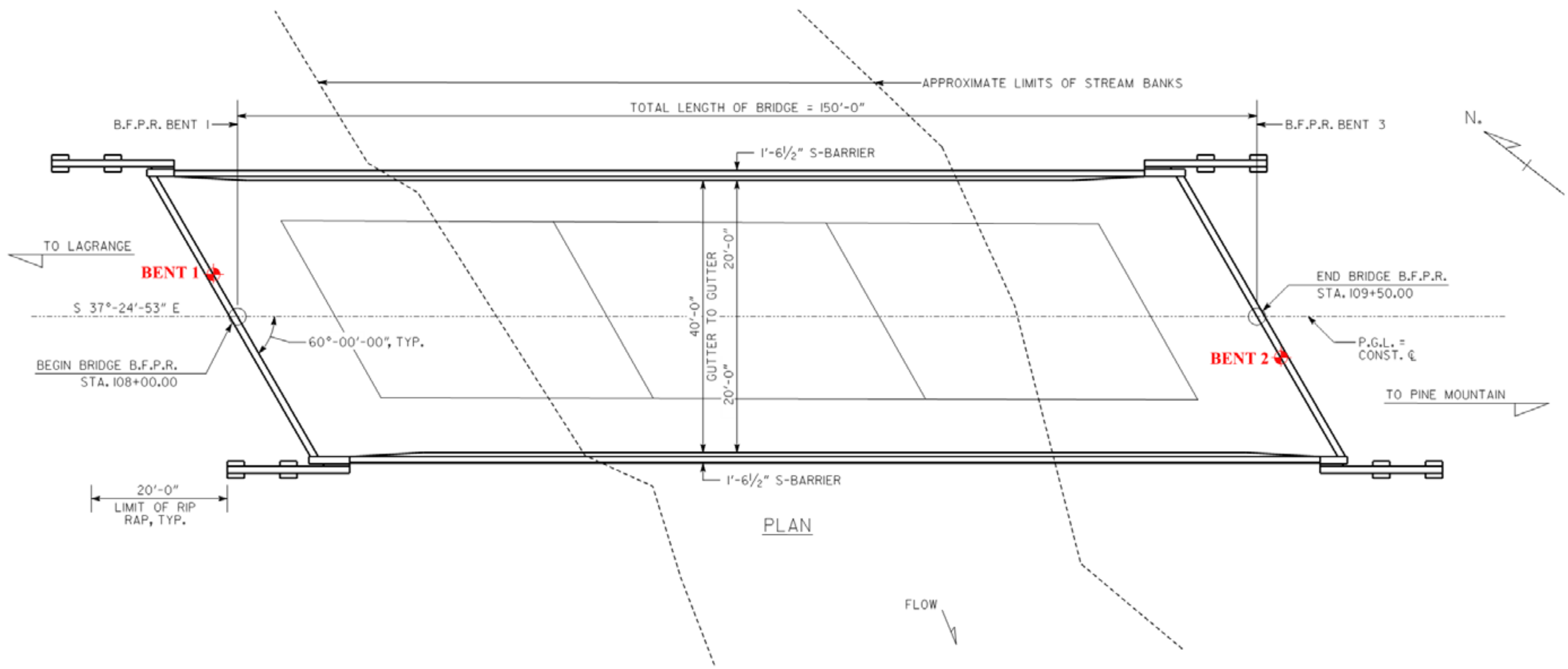
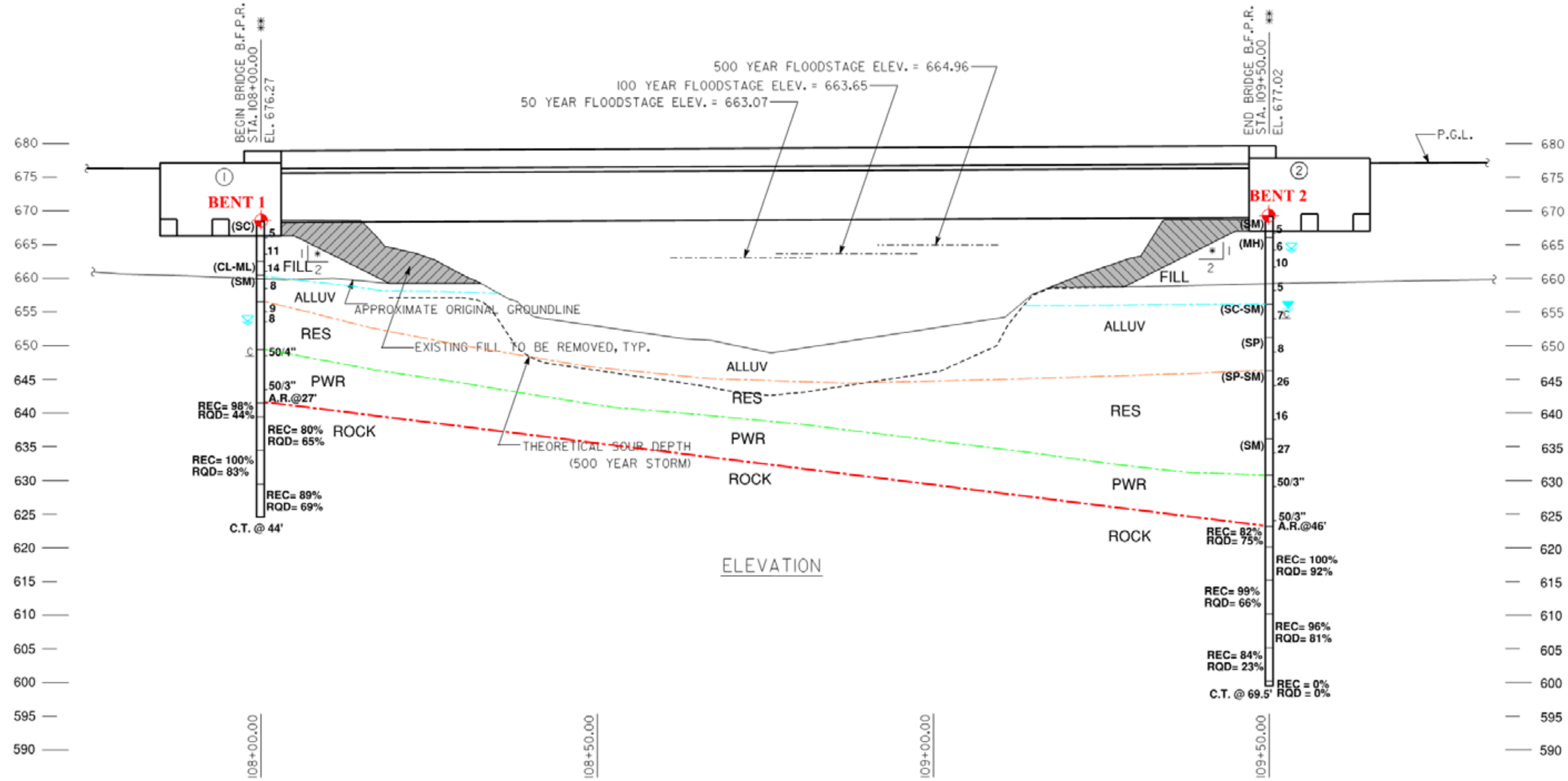
FIG. A



SCALE: NTS	DATE: 01/25/2021	PROJECT NO: INFCE-20-GA-04719-01	TITLE: **BORING LOCATION PLAN** SR 1 (US 27) OVER LONG CANE CREEK P.I. No. 0013942, TROUP COUNTY	**FIG. 1**
PREPARED: LR	CHECKED BY: AW	REVISIONS:		
CLIENT: INFRASTRUCTURE CONSULTING & ENGINEERING			UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING	



THEORETICAL SCOUR DEPTHS (FT)						
	100 YEAR STORM			500 YEAR STORM		
BENT LOCATIONS	GENERAL	LOCAL	TOTAL	GENERAL	LOCAL	TOTAL
LEFT OVERBANK	1.4	0.0	1.4	2.1	0.0	2.1
CHANNEL	5.1	0.0	5.1	6.5	0.0	6.5
RIGHT OVERBANK	0.0	0.0	0.0	0.0	0.0	0.0

LEGEND

	BORING LOCATION		TOP OF ALLUVIAL
	GROUNDWATER AT TIME OF BORING		TOP OF RESIDUAL
	STABILIZED GROUNDWATER		TOP OF PWR
REC	RECOVERY		TOP OF ROCK
RQD	ROCK QUALITY DESIGNATION	(SC)	CLAYEY SAND
A.R.	AUGER REFUSAL	(SM)	SILTY SAND
C.T.	CORING TERMINATED	(SP)	POORLY GRADED SAND
FILL	FILL SOIL	(CL)	LEAN CLAY
ALLUV	ALLUVIAL SOIL	(ML)	SILT
RES	RESIDUAL SOIL	(MH)	ELASTIC SILT
PWR	PARTIALLY WEATHERED ROCK		

SCALE: NTS	DATE: 01/25/2021	PROJECT NO: INFCE-20-GA-04719-01	TITLE: **SUBSURFACE PROFILE** SR 1 (US 27) OVER LONG CANE CREEK P.I. No. 0013942, TROUP COUNTY
PREPARED: LR	CHECKED BY: AW	REVISIONS:	
CLIENT: INFRASTRUCTURE CONSULTING & ENGINEERING			UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com

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FIG. 2

APPENDIX

General Notes/Description of Drilling Operations
Boring Logs (2)
Summary of USCS Tests (3 Pages)
Field Exploration Procedures
Site Photographs (3 Pages)
Laboratory Testing Procedures
Triaxial Shear Test Report (2)
Consolidation Test Reports (2)
Unconfined Compression Test of Rock Report (1 Page)
Rock Core Photographs (3 Pages)
Pile Bearing Analysis Results using DrivenPiles 1.3.8 – Bents 1 and 2 (35 Pages)
Pile Bearing Analysis Results using APile 2015.7.2 – Bents 1 and 2 (42 Pages)
GRLWeap Analysis Results – Bents 1 and 2 (6 Pages)
Seismic Site Class Calculations (1 Page)
Foundation Design Data (1 Page)
Hammer Calibration Report – CME 75 (23 Pages)

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND

 Split Spoon Sample obtained during Standard Penetration Testing

 Relatively Undisturbed Shelby Tube Sample

 Groundwater Level at Time of Boring Completion

 Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA NARRATIVE OF DRILLING OPERATION

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were collected at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D 1586. Soil samples were obtained with a standard 1.4” I.D. x 2.0” O.D. split barrel sampler. The sampler is first seated 6” to penetrate any loose cuttings and then driven an additional foot with the blows required of a 140-pound hammer freely falling a distance of 30 inches. The number of blows required to drive the sampler the final foot is designated the “standard penetration resistance.” The driving resistance, known as the “N” value, can be correlated with the relative density of granular soils and the consistency of cohesive deposits.

The following table describes soil consistency and relative densities based on standard penetration resistance values (N) determined by the Standard Penetration Test (SPT).

	“N”	Consistency
Clay and Silt	0-2	Very Soft
	3-4	Soft
	5-8	Firm
	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

	“N”	Relative Density
Sand	0-4	Very Loose
	5-10	Loose
	11-19	Firm
	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

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BORING LOG

CONTRACTED WITH: Infrastructure Consulting & Engineering   BORING NO.: BENT 1
PROJECT NAME: SR 1 (US 27) Over Long Cane Creek   DATE: 10/15/2020
JOB NO.: INFCE-20-GA-04719-01   DRILLER: Cliff   RIG: CME 75   LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3.5" Asphalt, 9.5" Concrete	0						Sta. 108+00, 7' Left
BoA=666.5	Sand-clayey, trace silt and rock fragments; loose; orange- brown (Fill) (SC)		1		2-2-3	18		BoA=Approximate Bottom of Abutment Footing Elevation
665	-some clay and silt, no rock fragments; firm	5	2		4-4-7	18	11.0	
	Clay-sandy, some silt and mica; stiff; brown-tan (CL-ML)		3		4-6-8	18	22.6	PPR=2.75 TSF
660	Sand-some silt, trace clay and mica; loose; brown-gray (Alluvial) (SM)	10	4		6-6-2	18	10.0	
	-silty, trace rock fragments; tan					22	15.6	Undisturbed sample taken at 10' to 12'
655	Sand-some silt and clay, trace mica; loose; tan-white (Residual) (SM)		5		4-3-6	15		
		15	6		3-3-5	18	19.5	Groundwater encountered at 15' at the time of drilling; borehole caved-in at 20'
650	Partially Weathered Rock sampled as Sand-some silt, trace clay and mica; very dense; tan-gray (SM)	20	7		41-50/4	10	9.1	PPR=Pocket Penetrometer Reading TSF=Tons per Square Foot
645		25	8		13-42-50/3	15		UCS=5,181.5 psi (27'7.5"-28'0.5") Auger Refusal at 27'
640	Moderately hard to hard; gray- white; solid to broken; competent gneissic amphibolite				REC=98% RQD=44%			Start 1st Core Run at 27' 1.85 min/ft End 1st Core Run at 29'
635	Soft to hard; gray-white-pink; solid to weathered; competent gneissic amphibolite	30			REC=80% RQD=65%			Start 2nd Core Run at 29' 1.52 min/ft UCS=7,826.3 psi (32'10"-33'3") End 2nd Core Run at 34'
630	Moderately hard to hard; gray- white; solid to fractured with stains; fairly continuous gneissic amphibolite	35			REC=100% RQD=83%			Start 3rd Core Run at 34' 1.57 min/ft UCS=10,807.5 psi (34'3"-34'8") End 3rd Core Run at 39'
	Moderately hard to hard; gray-tan; solid to broken; competent gneissic amphibolite	40			REC=89%			Start 4th Core Run at 39' 1.63 min/ft

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BORING LOG

CONTRACTED WITH: Infrastructure Consulting & Engineering BORING NO.: BENT 1
PROJECT NAME: SR 1 (US 27) Over Long Cane Creek DATE: 10/15/2020
JOB NO.: INFCE-20-GA-04719-01 DRILLER: Cliff RIG: CME 75 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
					RQD=69%			
625								
	CORING TERMINATED AT 44'	45						End 4th Core Run at 44'
								UCS= Unconfined Compression Strength Test on Rock
620								
		50						
615								
		55						
610								
		60						
605								
		65						
600								
		70						
595								
		75						
590								
		80						
585								Automatic Hammer Hammer Efficiency = 72.88%

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BORING LOG

CONTRACTED WITH: Infrastructure Consulting & Engineering
BORING NO.: BENT 2
PROJECT NAME: SR 1 (US 27) Over Long Cane Creek
DATE: 10/14/2020
JOB NO.: INFCE-20-GA-04719-01 DRILLER: Cliff RIG: CME 75 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
670	3.5" Asphalt, 10.5" Concrete	0						Sta. 109+50, 7' Right
BoA=667	Sand-silty, trace clay, mica and rock fragments; loose; orange-brown (Fill) (SM)		1		3-2-3	18		BoA=Approximate Bottom of Abutment Footing Elevation
665	Silt-sandy, clayey, trace mica and rock fragments; firm; orange-brown (MH)	5	2		3-3-3	15	26.1	PPR=1.5 TSF
	-stiff		3		3-4-6	18		PPR=1.5 TSF
660	-some clay					19	19.5	Undisturbed sample taken at 7.5' to 9.5'
	-firm	10	4		3-2-3	18		PPR=1.0 TSF
655	Sand-some clay and silt, trace mica; loose; brown (Alluvial) (SC-SM)	15	5		5-3-4	18	27.8	
								Groundwater encountered at 5' at the time of drilling and measured at 14' after 24 hours; borehole caved-in at 15'
650	-trace silt, clay and rock fragments; brown-gray (SP)	20	6		1-2-6	18	28.6	
						0		Attempted to take undisturbed sample at 20' to 22' No recovery
645	Sand-trace silt, clay, mica and rock fragments; medium dense; tan (Residual) (SP-SM)	25	7		4-12-14	12		
								PPR=Pocket Penetrometer Reading TSF=Tons per Square Foot
640	-firm; brown-gray	30	8		4-3-13	9	14.1	
635	-some silt, no rock fragments; medium dense; tan-brown (SM)	35	9		21-15-12	8	13.8	
630	Partially Weathered Rock sampled as Sand-some silt, trace clay, mica and rock fragments; very dense; brown-	40	10		50/3	3		

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BORING LOG

CONTRACTED WITH: Infrastructure Consulting & Engineering   BORING NO.: BENT 2
PROJECT NAME: SR 1 (US 27) Over Long Cane Creek   DATE: 10/14/2020
JOB NO.: INFCE-20-GA-04719-01   DRILLER: Cliff   RIG: CME 75   LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	gray (SM)							
625		45	11		50/3	2		
	Moderately hard to hard; gray-white; solid to broken; fairly continuous gneissic amphibolite				REC=82% RQD=75%			Auger Refusal at 46' Start 1st Core Run at 46' 2.65 min/ft UCS=8,841.6 psi (46'8"-47'1")
620	Moderately hard to hard; gray- white; solid to fractured with stains; continuous gneissic amphibolite	50			REC=100% RQD=92%			End 1st Core Run at 49' Start 2nd Core Run at 49' 1.85 min/ft UCS=8,954.6 psi (53'1" - 53'6")
615	Moderately hard to hard; gray- pink; solid to broken; competent gneissic amphibolite	55			REC=99% RQD=66%			End 2nd Core Run at 54' Start 3rd Core Run at 54' 2.20 min/ft UCS=12,437.7 psi (55'0"-55'5")
610	Moderately hard to hard; gray- tan; solid to broken; fairly continuous gneissic amphibolite	60			REC=96% RQD=81%			End 3rd Core Run at 59' Start 4th Core Run at 59' 1.39 min/ft
605	Moderately soft to hard; gray- brown; solid to fractured with stains; incompetent gneissic amphibolite	65			REC=84% RQD=23%			End 4th Core Run at 64' Start 5th Core Run at 64' Fractured at 67'-68' 1.62 min/ft
600	Rock-No recovery	70			REC=0% RQD=0%			End 5th Core Run at 69' Start 6th Core Run at 69' 1.70 min/ft End 6th Core Run at 69.5'
	CORING TERMINATED AT 69.5'							Unable to core past 69.5' due to loss of circulation and core barrel and casing getting stuck in hole
595		75						UCS= Unconfined Compression Strength Test on Rock
590		80						
585								Automatic Hammer Hammer Efficiency = 72.88%

Project No.: INFCE-20-GA-04719-01 P.I. No.: 0013942
Project Name: SR 1 (US 27) Over Long Cane Creek County: Troup

Sample No.	1	2	3	4
Lab. No.	B1-1	B1-2	B1-3	B1-UD-1
Station	108+00 7' Left	108+00 7' Left	108+00 7' Left	108+00 7' Left
Location	Bent 1	Bent 1	Bent 1	Bent 1
Depth (ft)	3.5 – 5.0	6.0 – 7.5	8.5 – 10.0	10.0 – 12.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	97.9	98.9	99.5	98.0
#40 Sieve	60.6	81.3	74.9	64.9
#60 Sieve	40.9	68.1	40.4	52.0
#200 Sieve	33.6	55.8	20.5	38.8
Liquid Lmt. (%)	27	22	NP	NP
Plast. Index (%)	11	5	NP	NP
Moisture (%)	11.0	22.6	10.0	15.6
Organics (%)	-	-	-	-
CLASSIFICATION				
Unified Soil Classification	SC	CL-ML	SM	SM
TESTING DATES				
Date Sampled	10/15/2020	10/15/2020	10/15/2020	10/15/2020
Date Received	10/30/2020	10/30/2020	10/30/2020	10/30/2020
Date Completed	11/05/2020	11/05/2020	11/05/2020	11/05/2020

Remarks: ______________________________

Respectfully Submitted: Mahmand Salelle ______________________

NP: Non-Plastic

Project No.: INFCE-20-GA-04719-01
Project Name: SR 1 (US 27) Over Long Cane Creek

P.I. No.: 0013942
County: Troup

Sample No.	5	6	7	8
Lab. No.	B1-4	B1-5	B2-1	B2-UD-1
Station	108+00 7’ Left	108+00 7’ Left	109+50 7’ Right	109+50 7’ Right
Location	Bent 1	Bent 1	Bent 2	Bent 2
Depth (ft)	13.5 – 15.0	18.5 – 20.0	3.5 – 5.0	7.5 – 9.5
PHYSICAL TESTS				
2-1/2” Sieve	100	100	100	100
1-1/2” Sieve	100	100	100	100
#10 Sieve	99.6	99.8	96.4	95.8
#40 Sieve	56.4	49.4	72.5	68.7
#60 Sieve	38.1	28.1	65.4	58.5
#200 Sieve	29.9	18.5	59.6	50.0
Liquid Lmt. (%)	37	NP	53	53
Plast. Index (%)	8	NP	19	23
Moisture (%)	19.5	9.1	26.1	19.5
Organics (%)	-	-	-	-
CLASSIFICATION				
Unified Soil Classification	SM	SM	MH	MH
TESTING DATES				
Date Sampled	10/15/2020	10/15/2020	10/14/2020	10/14/2020
Date Received	10/30/2020	10/30/2020	10/30/2020	10/30/2020
Date Completed	11/05/2020	11/05/2020	11/05/2020	11/05/2020

Remarks: ______________________________

Respectfully Submitted: Mahmoud Saleh

NP: Non-Plastic

Sample No.	9	10	11	12
Lab. No.	B2-2	B2-3	B2-4	B2-5
Station	109+50 7' Right	109+50 7' Right	109+50 7' Right	109+50 7' Right
Location	Bent 2	Bent 2	Bent 2	Bent 2
Depth (ft)	13.5 – 15.0	18.5 – 20.0	28.5 – 30.0	33.5 – 35.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	99.7	87.8	72.9	99.8
#40 Sieve	65.6	21.7	25.8	53.8
#60 Sieve	44.3	11.1	17.5	36.2
#200 Sieve	43.8	4.5	12.0	23.0
Liquid Lmt. (%)	26	NP	NP	NP
Plast. Index (%)	7	NP	NP	NP
Moisture (%)	27.8	28.6	14.1	13.8
Organics (%)	-	-	-	-
CLASSIFICATION				
Unified Soil Classification	SC-SM	SP	SP-SM	SM
TESTING DATES				
Date Sampled	10/14/2020	10/14/2020	10/14/2020	10/14/2020
Date Received	10/30/2020	10/30/2020	10/30/2020	10/30/2020
Date Completed	11/05/2020	11/05/2020	11/05/2020	11/05/2020

Remarks: ______________________________

Respectfully Submitted: Mahmoud Saleh

NP: Non-Plastic

FIELD EXPLORATION PROCEDURES

SPT Borings

Two (2) SPT borings (designated Bent 1 and Bent 2) were drilled along the proposed bridge bents. The depths of borings Bent 1 and Bent 2 were 27 and 46 feet below the existing grades, respectively. The approximate locations of the borings are shown on the attached Boring Location Plan (Figure 1) provided in Appendix of this report.

Borings were located in the field by the Project Engineer by measuring distances and estimating right angles from existing site feature shown on site plan. The drilling and sampling were performed in general accordance with ASTM Standard D-1586. Soil samples obtained were observed by a Geotechnical Engineer and classified according to the visual manual procedures (ASTM D-2488-00). A narrative of field operations is also included in The Appendix.

Rock Coring

Rock coring was performed in borings Bent 1 and Bent 2 to depths of 44 and 69.5 feet below the existing ground, respectively.

Core drilling procedures are utilized to determine the characteristics and continuity of materials below the soil drilling refusal level. The core drilling procedure is performed in general accordance with ASTM designation D 2113-70. Initially, casing is set through the overburden soils or hollow stem augers are utilized to keep the hole from collapsing. Refusal materials are then cored with a diamond-studded bit fastened to the end of a hollow core barrel. This device is rotated at high speeds and is capable of cutting the hardest rock. The cuttings are brought to the surface by circulating water. Rock core samples of the materials penetrated are protected and retained in the inner core barrel. Upon completion of the drill run, the core barrel is brought to the surface and the samples are removed and placed in partitioned boxes. The samples are then returned to our laboratory where the rock is identified and "recovery" and rock quality designation (RQD) are determined.

The ratio of the length of core obtained to the distance drilled is known as the "core recovery", expressed as a percent. The "rock quality designation" (RQD) is the ratio of recovered rock sample in sections four or more inches long to the distance drilled. This designation is generally applied only to samples of NX size or larger and to sample described as moderately hard or harder. The NX size designates a bit which obtains core samples 2-$^{1}/_{8}$ inches in diameter. The percent recovery and RQD are related to rock soundness and continuity.

An RQD ratio of 90 percent or more denotes excellent rock; 75 to 90 percent denotes good rock; 50 to 75 percent denotes fair rock; and 25 to 50 percent denotes poor rock. Hardness terms are based on the following descriptions:

Soft:	May be broken with fingers
Moderately Soft:	May be scratched with a nail, corners and edges may be broken with fingers
Moderately Hard:	Light blow of hammer required to break sample
Hard:	Hard blow of hammer required to break sample
Very Hard:	Rock core rings when struck with hammer

Looking in decreasing station from proposed Bent 1, Sta. 108+00±, centerline

Looking in increasing station from proposed Bent 1, Sta. 108+00±, centerline

Looking to the left toward proposed Bent 1 from Sta. 108+00±, 22’ right of centerline

Looking in increasing station along existing bridge from Sta. 108+25±, centerline

Looking in decreasing station from proposed Bent 2, Sta. 109+50±, centerline

Looking in increasing station from proposed Bent 2, Sta. 109+50±, centerline

LABORATORY TESTING PROCEDURES

Moisture Content

The moisture content was determined for selected soil samples obtained in the split-barrel sampler. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degrees Centigrade for at least 15 to 16 hours. After removal from the oven, the soil was again weighed. The weight of the moisture lost during drying thus was determined. From this data, the moisture content of the sample was then calculated as the weight of moisture divided by dry weight of soil, expressed as a percentage. This test was conducted according to ASTM D 2216.

Moisture content is a useful index of a soil's compressibility. If the soil is to be used as fill, the moisture content may be compared to the range of water contents for which proper compaction may be achieved. These moisture contents may be found at the appropriate depths on the respective Boring Logs and are denoted by "w".

Unified Soil Classification System (USCS)

Soils to be classified as per Unified Soil Classification System (USCS) are generally required to perform grain size analysis (particle size distribution), liquid limit and plasticity index tests when precise classification is required. After performing the required tests, the classification is generally performed in accordance with ASTM D 2487. These classification tests are also required by GDOT in the areas of construction of new pavement over existing paved shoulders, areas of muck, swamp, lake/pond bottom, etc.

Grain Size (Sieve) Analysis with or without Hydrometer

Grain Size Analysis tests were performed to determine the particle size distribution of selected samples tested. The grain size distribution of soils coarser than a number 200 sieve was determined by passing the samples through a standard set of nested sieves. Materials finer than the number 200 sieves were suspended in water and the grain size distribution computed from the time rate of settlement of the different size particles. Air-dried soil passed through #200 sieve. 50 grams of that must soak in s/c agent for a minimum of 8 hours. Soil is then put in graduated cylinder with a hydrometer. Readings are taken at specified times. A graph is drawn from data. These tests were similar to those described by ASTM D 421 and D 422. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Liquid and Plastic Limits (Atterberg Limits)

Liquid Limit and Plastic Limit tests aid in the classification of the soils and provide an indication of the soil behavior with moisture change. The Plasticity Index is calculated by subtracting the Plastic Limit (PL) from the Liquid Limit (LL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid and is the upper limit of the plastic range, as determined in accordance with ASTM D 4318. The Plastic Limit is the moisture content at which the soil begins to lose its plasticity, as determined in accordance with ASTM D 4318. The Liquidity Index is the ratio of the difference between the in-place moisture and the plastic limit to the Plasticity Limit. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Triaxial Shear

Three specimens (with minimum of 6-inch long) are prepared from the UD sample. For insufficient recovery, either multistage triaxial shear on one specimen or triaxial shear on smaller length is performed. We have the capability of performing triaxial shear on a 4-inch long sample using some difficult preparation time. After preparation of the specimen, the specimen is encased in a rubber membrane and is placed in the triaxial cell. The specimen is initially saturated using the increasing confining pressures. Once the saturation is obtained, the desired all around confining pressures are applied and the axial load is increased until the specimen fails in shear or in excess of 15% strain is achieved. Pore pressures are measured for CU tests to help determine total and effective stresses during testing. Readings are taken and then plotted in the form of Mohr's circles using the computer program. Method is similar as described in ASTM D4767.

Consolidation

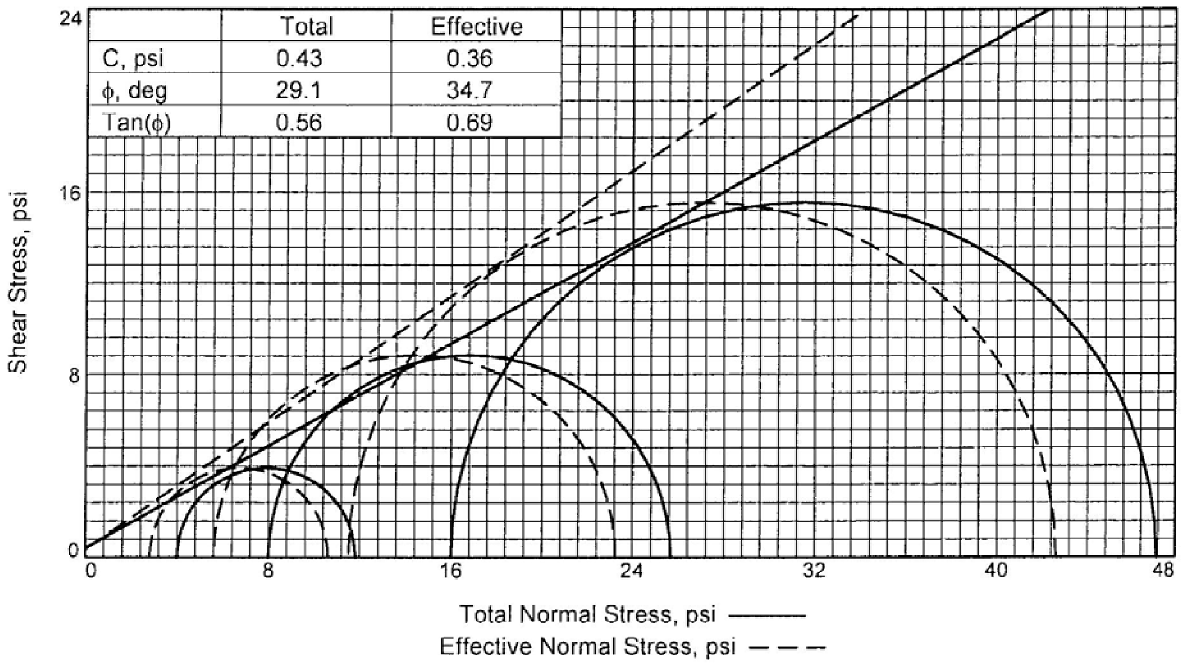
A section of a selected undisturbed sample was extruded from its sampling tube for consolidation testing. The section was trimmed into a disc 2.5 inches in diameter and 1.0 inch thick. The disc was confined in a stainless steel ring and sandwiched between porous stone plates. After being submerged in water, the sample was then subjected to incrementally increasing vertical loads and the resulting deformations measured with a micrometer dial gauge. This test procedure is described by ASTM D 2435.

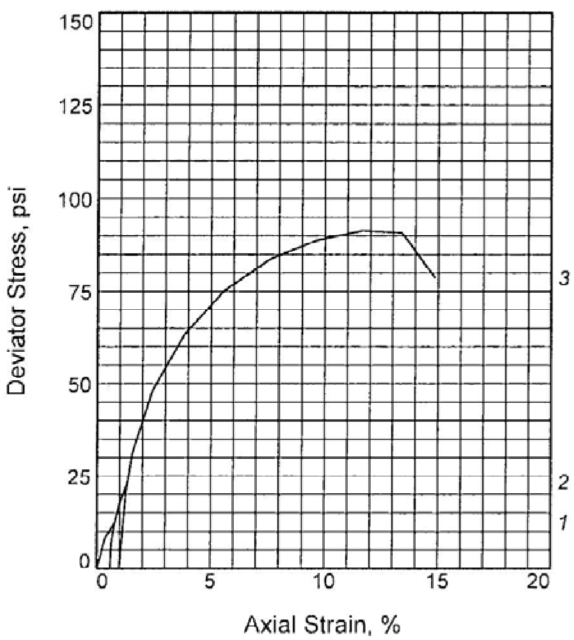
Unconfined Compressive Strength - Rock

The Unconfined Compressive Strength (UCS) of rock cores is evaluated in general accordance with the American Society of Testing and Materials (ASTM) procedure D2938. This method addresses protocols for preparation of the sample, performance of the UCS test, and acquiring and reporting data.

The test specimens tested are cylindrical in shape, with approximate length to diameter ratio of 2, and had a diameter of 1¾ to 2½ inches. The ends of the specimens are cut parallel to each other and at right angles. The end surfaces are flat and capped with a capping compound to assure a smooth surface.

Once the testing specimens are capped, they were placed on the base plate of the loading frame and raised by turning the loading frame switch to up until the samples are securely held between the top and bottom plates. The load is then applied continuously and without shock. The strain rate is approximately 0.05 in/min. The maximum load sustained by the specimens is recorded. The compressive strength of each specimen is calculated from the maximum compressive load on the specimen and the initial computed cross-sectional area. Test results are indicated on the respective boring logs included in Appendix.





Sample No.		1	2	3
Initial	Water Content, %	11.9	11.9	11.9
	Dry Density, pcf	114.9	114.9	114.9
	Saturation, %	68.9	68.9	68.9
	Void Ratio	0.4671	0.4671	0.4671
	Diameter, in.	2.87	2.87	2.87
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	16.1	16.0	15.6
	Dry Density, pcf	117.6	117.7	118.7
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4335	0.4320	0.4203
	Diameter, in.	2.85	2.85	2.84
	Height, in.	5.56	5.55	5.54
Strain rate, in./min.		0.008	0.008	0.008
Back Pressure, psi		110.0	110.0	110.0
Cell Pressure, psi		114.0	118.0	126.0
Fail. Stress, psi		7.8	17.7	31.1
Total Pore Pr., psi		111.2	112.4	114.5
Ult. Stress, psi		12.6	23.6	78.8
Total Pore Pr., psi		110.4	111.5	41.3
$\bar{\sigma}_1$ Failure, psi		10.6	23.3	42.6
$\bar{\sigma}_3$ Failure, psi		2.8	5.6	11.5

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Sand-silty, trace clay and gravel, tan

LL= NV **PI=** NP

Specific Gravity= 2.7

Remarks:

Figure ________

Client: Infrastructure Consulting & Engineering

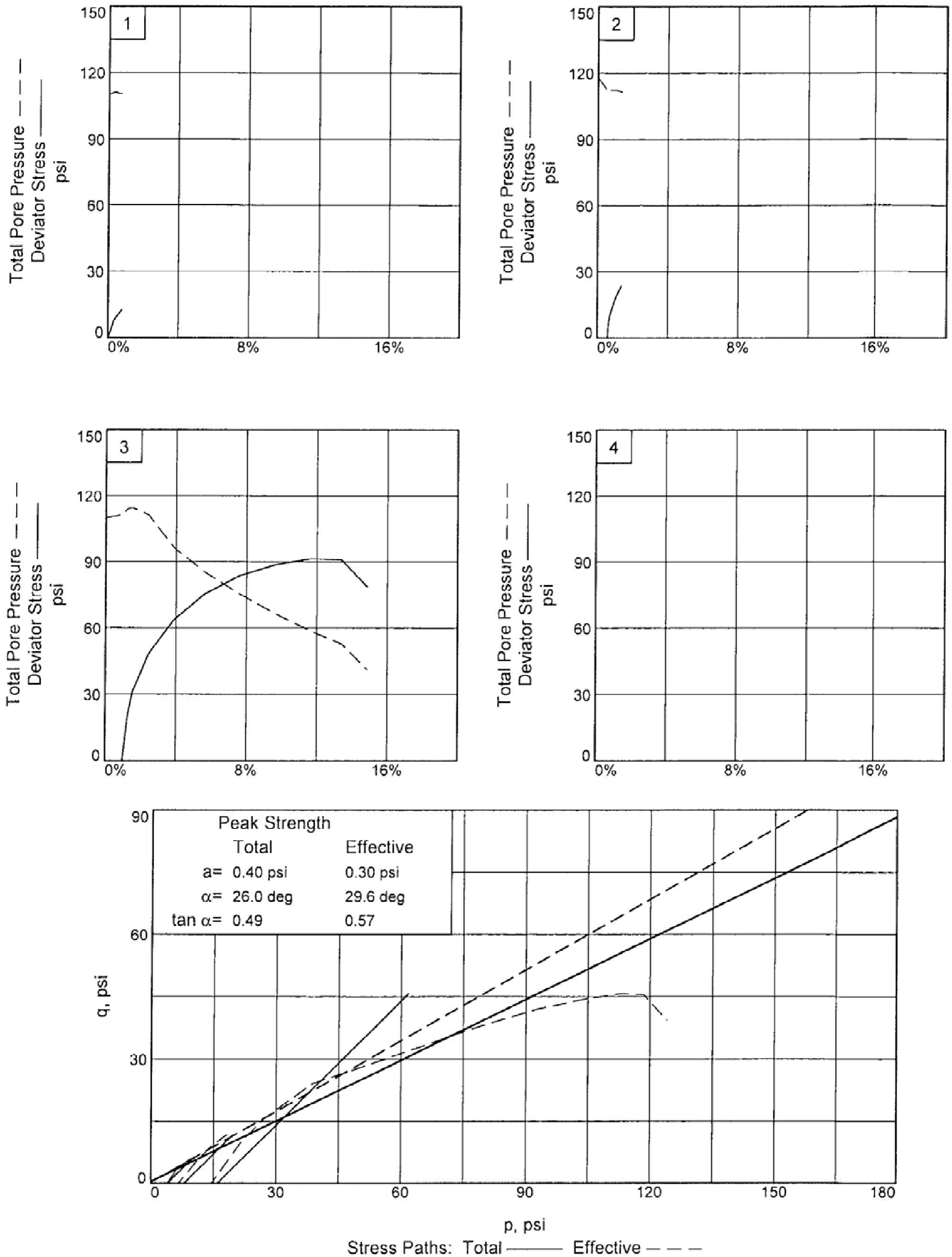
Project: SR 1 (US 27) over Long Cane Creek
P.I. No. 0013942, Troup County

Location: 108+00,7'L

Sample Number: B1-UD-1 **Depth:** 10-12 ft

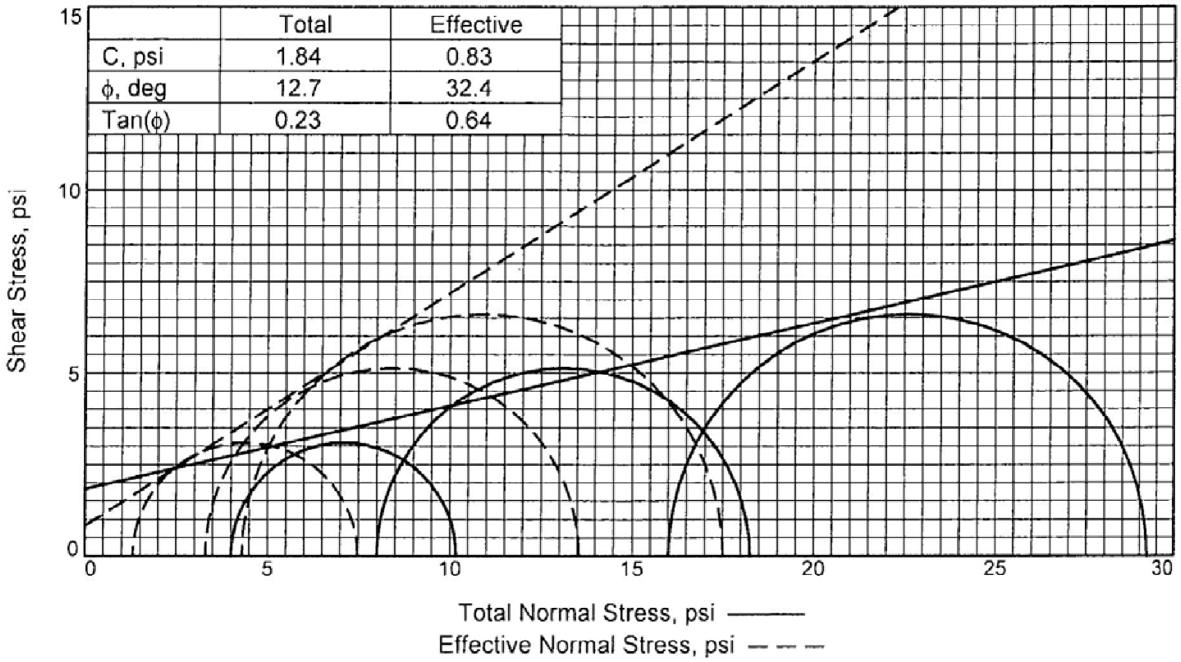
Proj. No.: INFCE-20-GA-04719-01 **Date Sampled:** 10/31/2020

TRIAXIAL SHEAR TEST REPORT
United Consulting
Norcross, Georgia

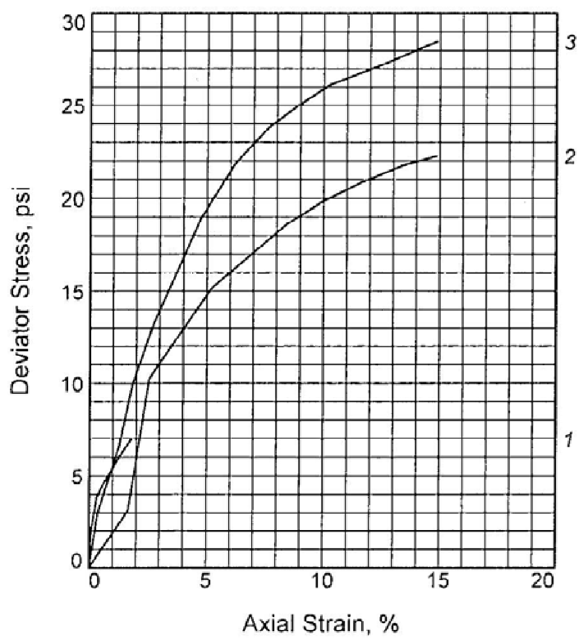


Client: Infrastructure Consulting & Engineering
Project: SR 1 (US 27) over Long Cane Creek - P.I. No. 0013942, Troup County
Location: 108+00,7'L **Depth:** 10-12 ft **Sample Number:** B1-UD-1
Project No.: INFCE-20-GA-04719-01 **Figure** ________

United Consulting



	Total	Effective
C, psi	1.84	0.83
ϕ, deg	12.7	32.4
Tan(ϕ)	0.23	0.64



	Sample No.	1	2	3
Initial	Water Content, %	25.1	25.1	28.6
	Dry Density, pcf	97.3	97.3	91.2
	Saturation, %	92.6	92.6	91.0
	Void Ratio	0.7326	0.7326	0.8487
	Diameter, in.	2.87	2.87	2.87
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	23.6	23.0	28.8
	Dry Density, pcf	103.0	103.9	94.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6363	0.6219	0.7780
	Diameter, in.	2.82	2.81	2.83
	Height, in.	5.49	5.48	5.53
	Strain rate, in./min.	0.008	0.008	0.008
	Back Pressure, psi	80.0	80.0	70.0
	Cell Pressure, psi	84.0	88.0	86.0
	Fail. Stress, psi	6.2	10.2	13.2
	Total Pore Pr., psi	82.7	84.7	81.7
	Ult. Stress, psi	7.0	22.3	28.5
	Total Pore Pr., psi	82.5	80.7	76.1
	$\bar{\sigma}_1$ Failure, psi	7.5	13.5	17.5
	$\bar{\sigma}_3$ Failure, psi	1.3	3.3	4.3

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Silt-sandy, some clay, trace gravel, red brown

LL= 53 **PL=** 30 **PI=** 23

Specific Gravity= 2.7

Remarks:

Figure ________

Client: Infrastructure Consulting & Engineering

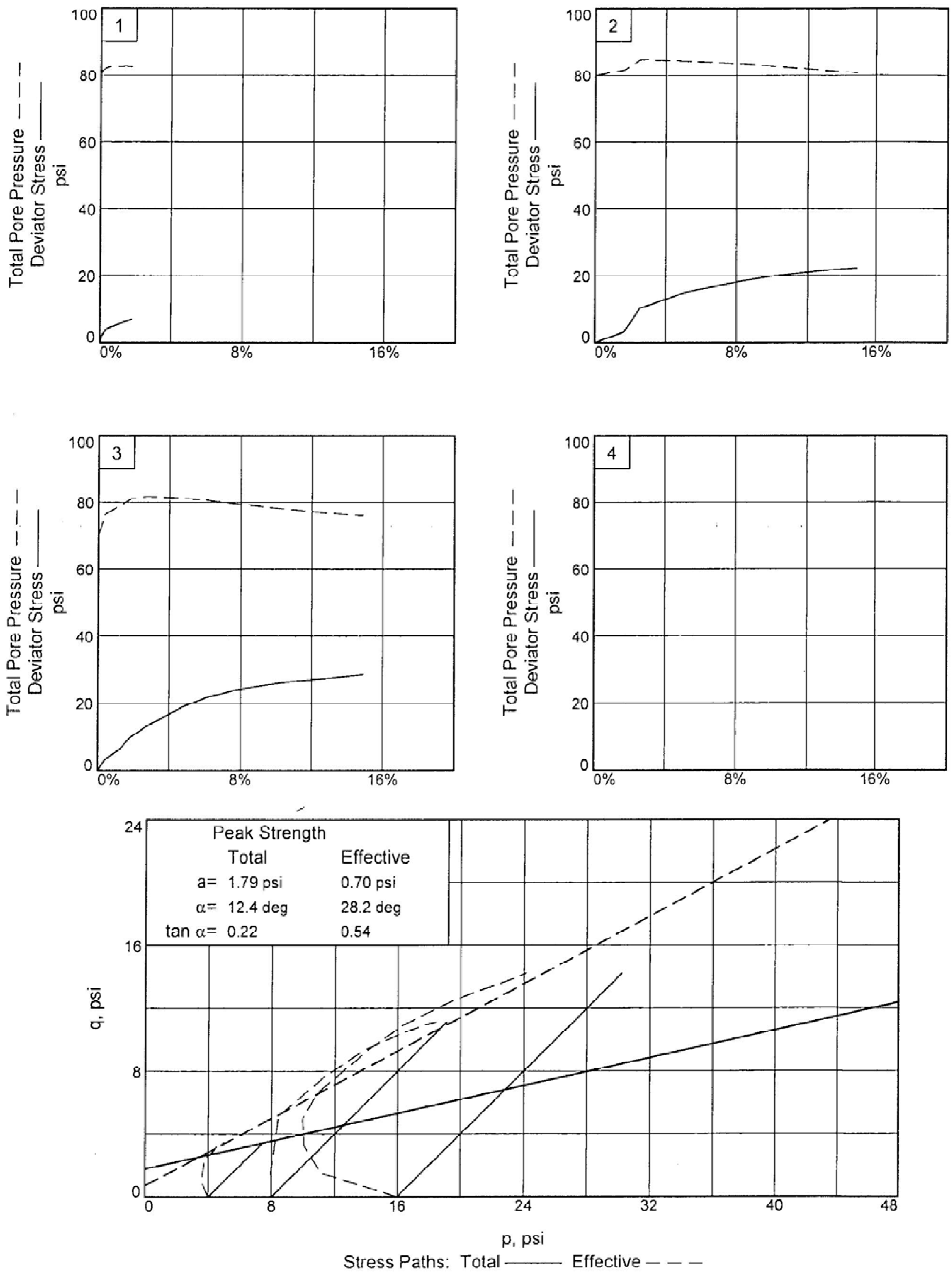
Project: SR 1 (US 27) over Long Cane Creek
P.I. No. 0013942, Troup County

Location: Bent 2

Sample Number: B2-UD-1 **Depth:** 7.5-9.5 ft

Proj. No.: INFCE-20-GA-04719-01 **Date Sampled:** 11/4/2020

TRIAXIAL SHEAR TEST REPORT
United Consulting
Norcross, Georgia



Client: Infrastructure Consulting & Engineering

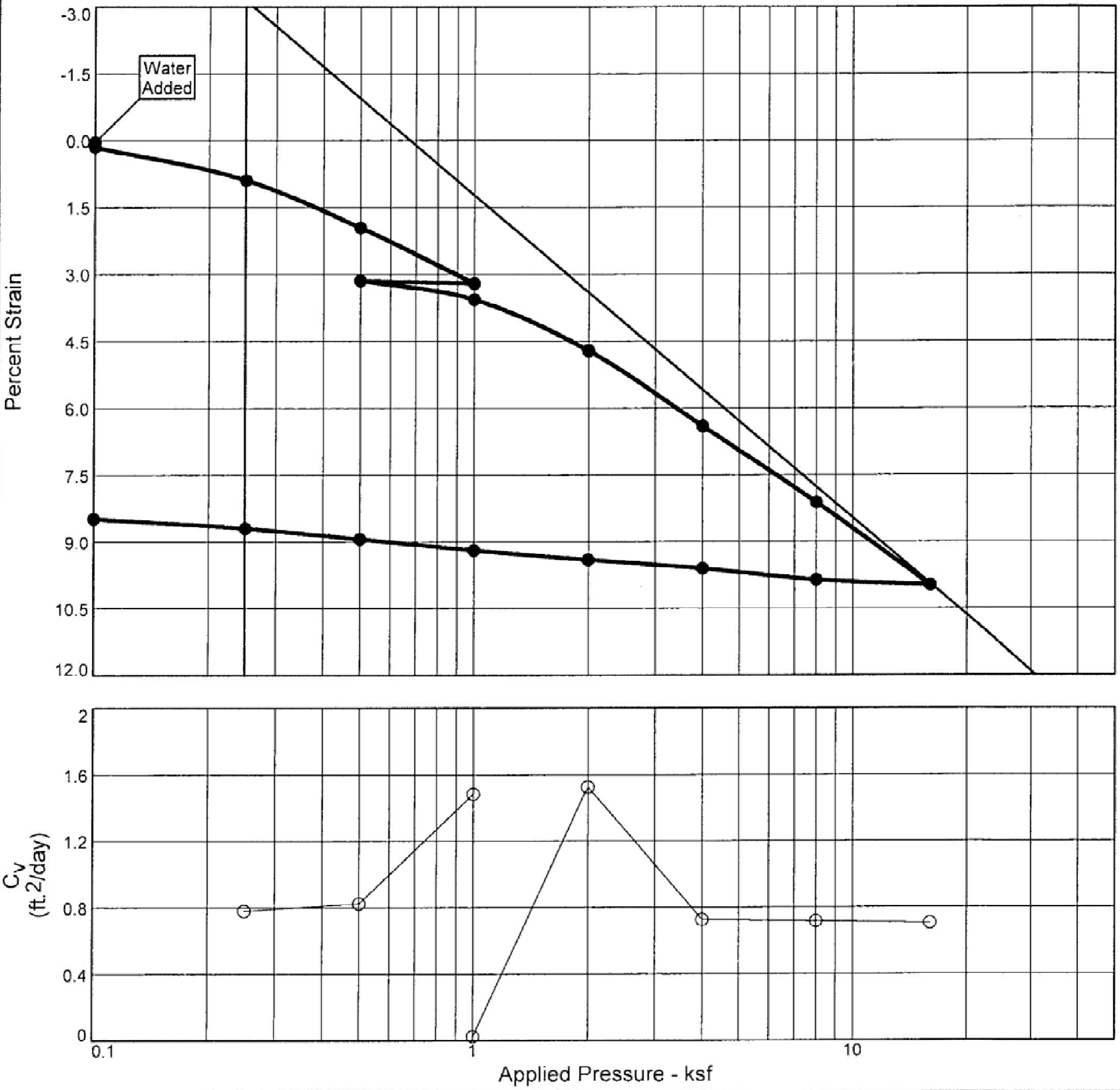
Project: SR 1 (US 27) over Long Cane Creek - P.I. No. 0013942, Troup County

Location: Bent 2 **Depth:** 7.5-9.5 ft **Sample Number:** B2-UD-1

Project No.: INFCE-20-GA-04719-01 **Figure** ________

United Consulting

CONSOLIDATION REPORT-METHOD B



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
51.1 %	11.5 %	105.0	NV	NP	2.7	1.32	1.2	0.12	0.01	0.605

MATERIAL DESCRIPTION	USCS	AASHTO
Sand-silty, trace clay and gravel, tan	SM	A-4(0)

Project No. INFCE-20-GA-04719-01 **Client:** Infrastructure Consulting & Engineering
Project: SR 1 (US 27) over Long Cane Creek
P.I. No. 0013942, Troup County

Location: 108+00,7'L **Depth:** 10-12 ft **Sample Number:** B1-UD-1

United Consulting

Norcross, Georgia

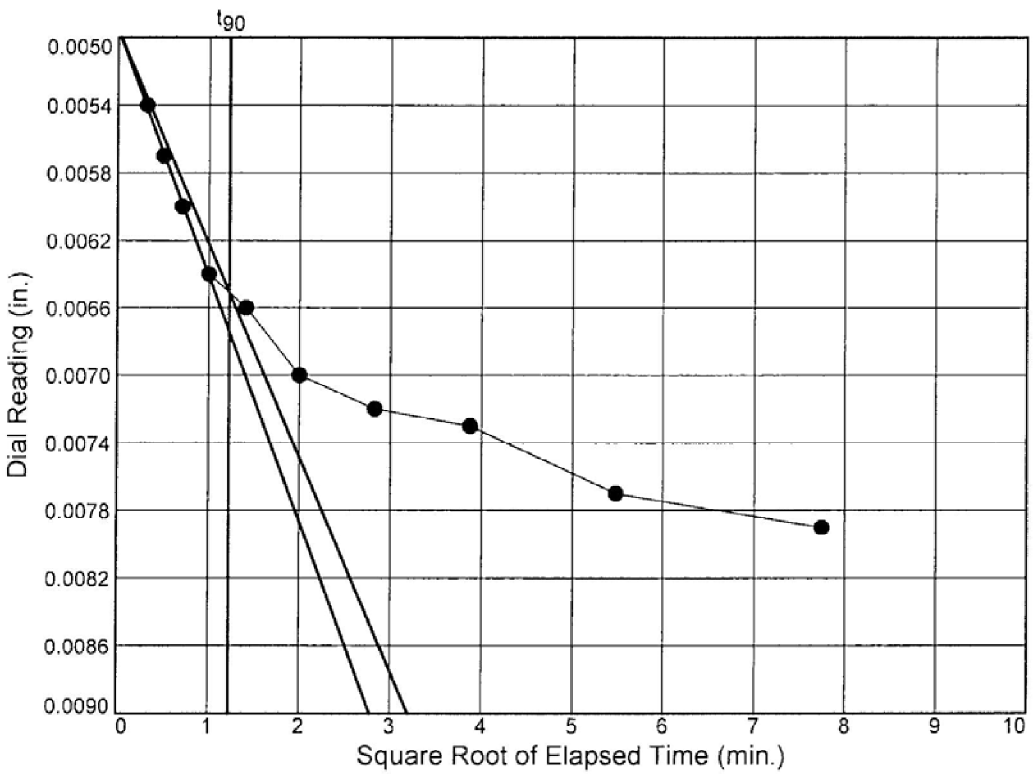
Remarks:

Figure

Dial Reading vs. Time

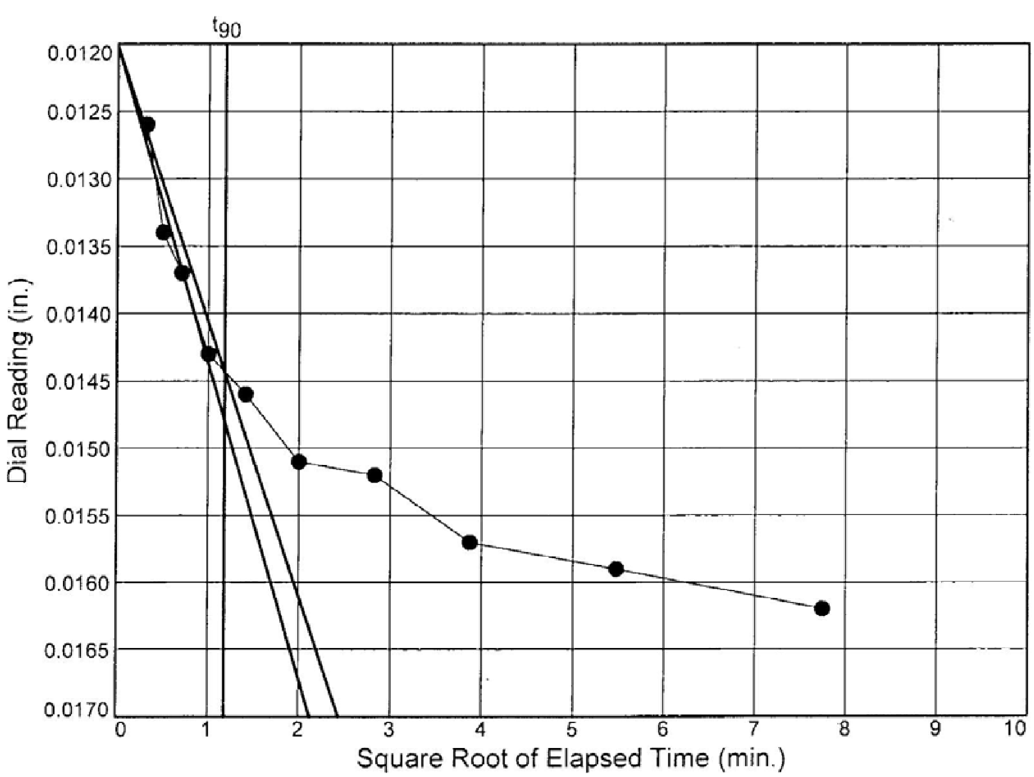
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: 108+00,7'L Depth: 10-12 ft Sample Number: B1-UD-1



Load No.= 3
Load= 0.25 ksf
D_0 = 0.0050
D_{90} = 0.0065
D_{100} = 0.0067
T_{90} = 1.51 min.

C_v @ T_{90}
0.780 ft.^{2}/day



Load No.= 4
Load= 0.50 ksf
D_0 = 0.0120
D_{90} = 0.0144
D_{100} = 0.0147
T_{90} = 1.39 min.

C_v @ T_{90}
0.825 ft.^{2}/day

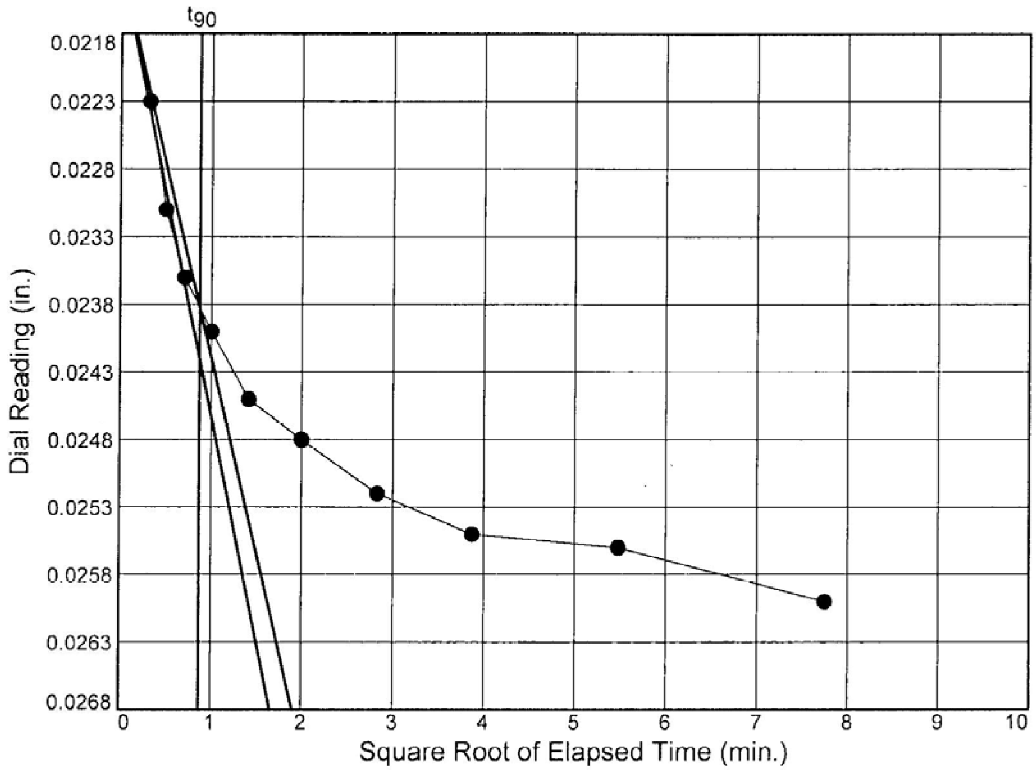
Figure

United Consulting

Dial Reading vs. Time

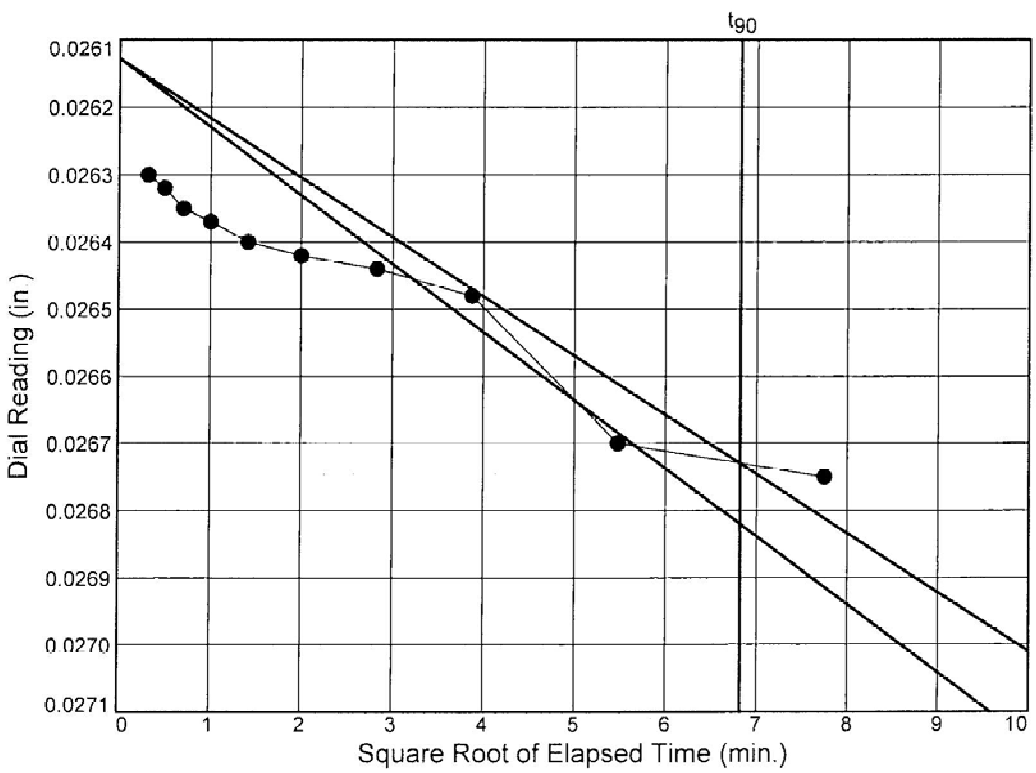
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: 108+00,7'L   Depth: 10-12 ft   Sample Number: B1-UD-1



Load No.= 5
Load= 1.00 ksf
D_0 = 0.0213
D_{90} = 0.0238
D_{100} = 0.0241
T_{90} = 0.76 min.

C_v @ T_{90}
1.483 ft.^{2}/day



Load No.= 7
Load= 1.00 ksf
D_0 = 0.0261
D_{90} = 0.0267
D_{100} = 0.0268
T_{90} = 46.47 min.

C_v @ T_{90}
0.024 ft.^{2}/day

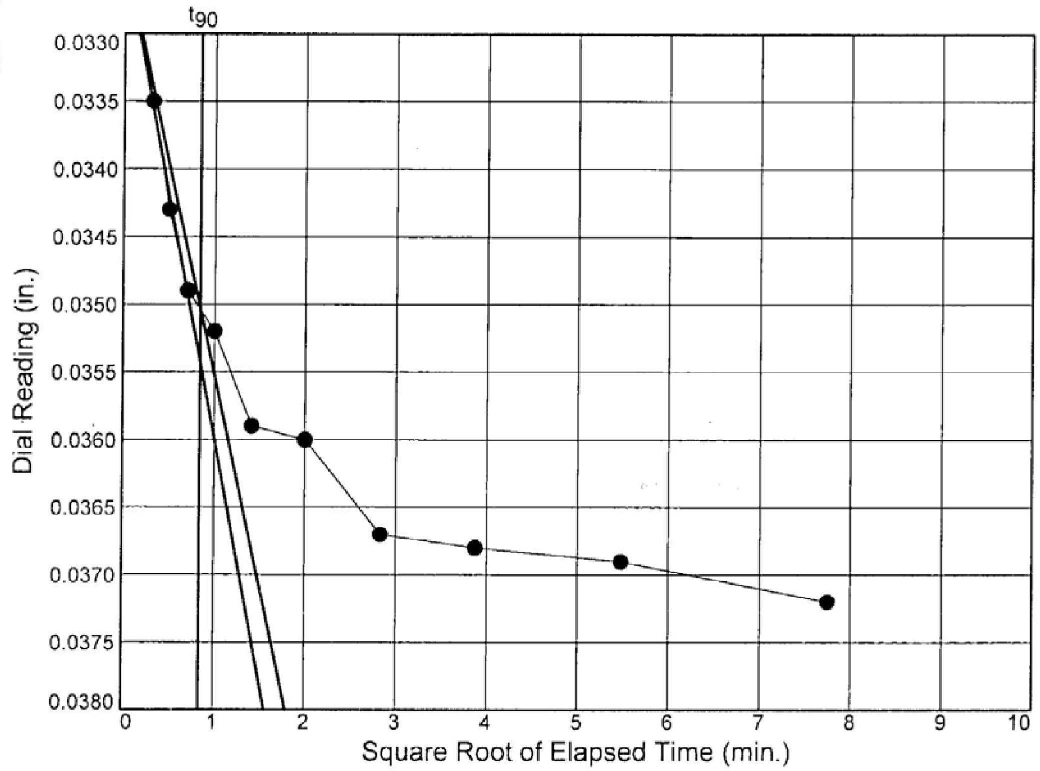
Figure

United Consulting

Dial Reading vs. Time

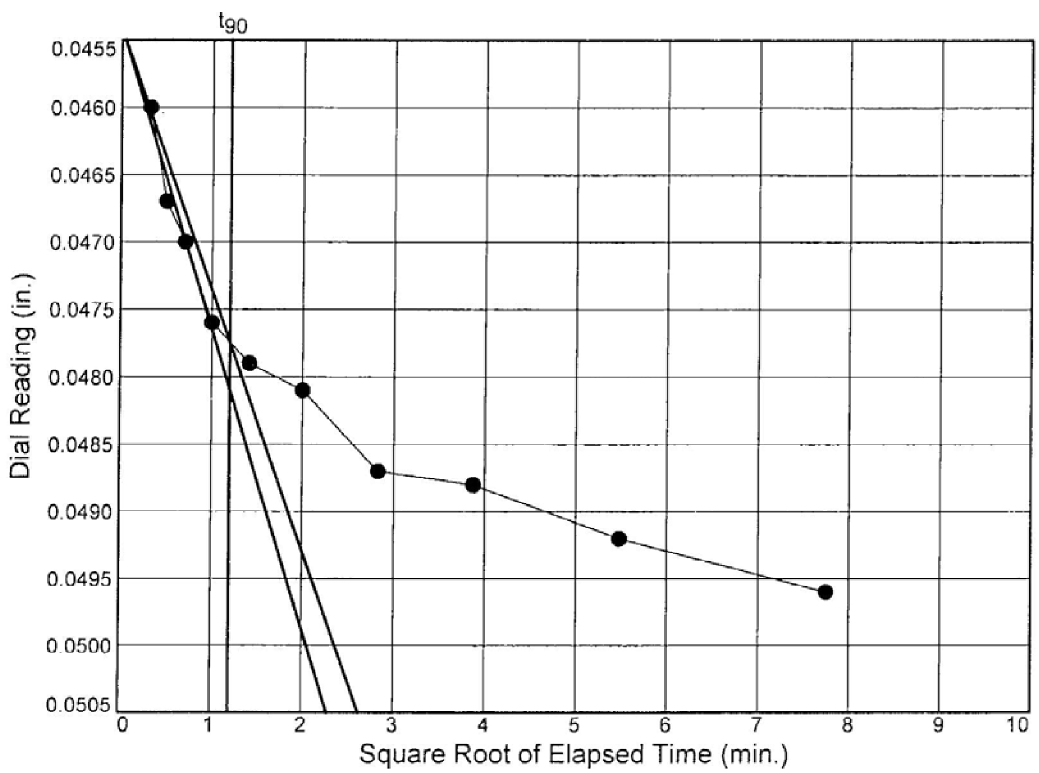
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: 108+00,7'L Depth: 10-12 ft Sample Number: B1-UD-1



Load No.= 8
Load= 2.00 ksf
D_0 = 0.0324
D_{90} = 0.0350
D_{100} = 0.0353
T_{90} = 0.71 min.

C_v @ T_{90}
1.526 ft.^{2}/day



Load No.= 9
Load= 4.00 ksf
D_0 = 0.0454
D_{90} = 0.0477
D_{100} = 0.0480
T_{90} = 1.44 min.

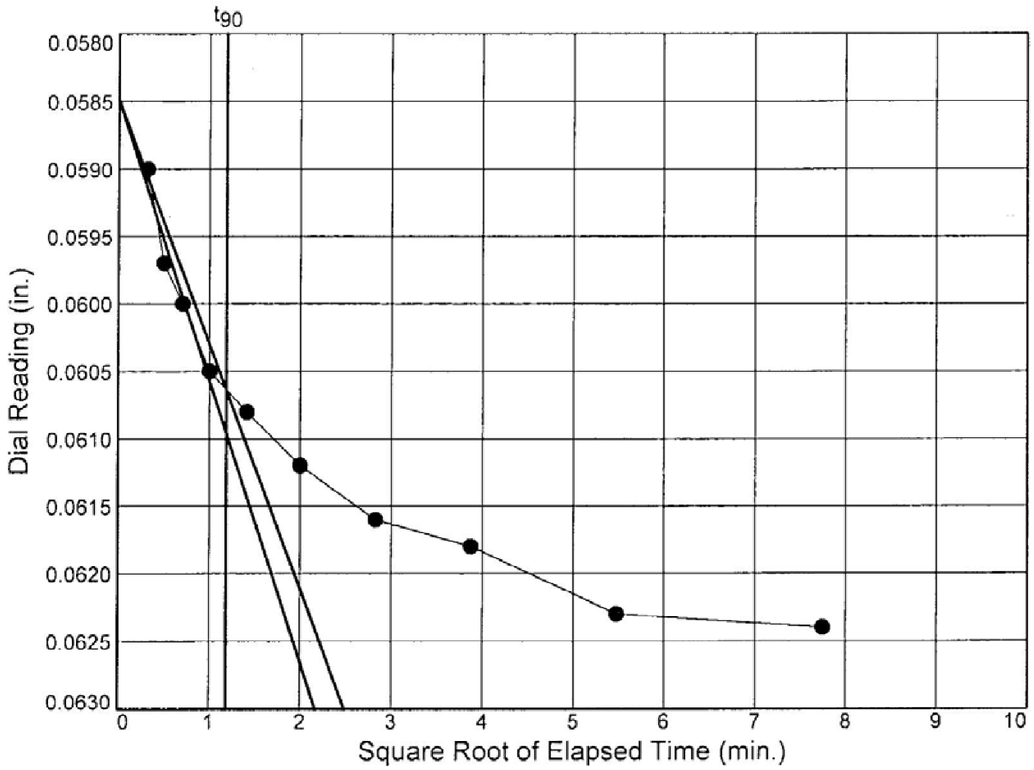
C_v @ T_{90}
0.728 ft.^{2}/day

Figure

Dial Reading vs. Time

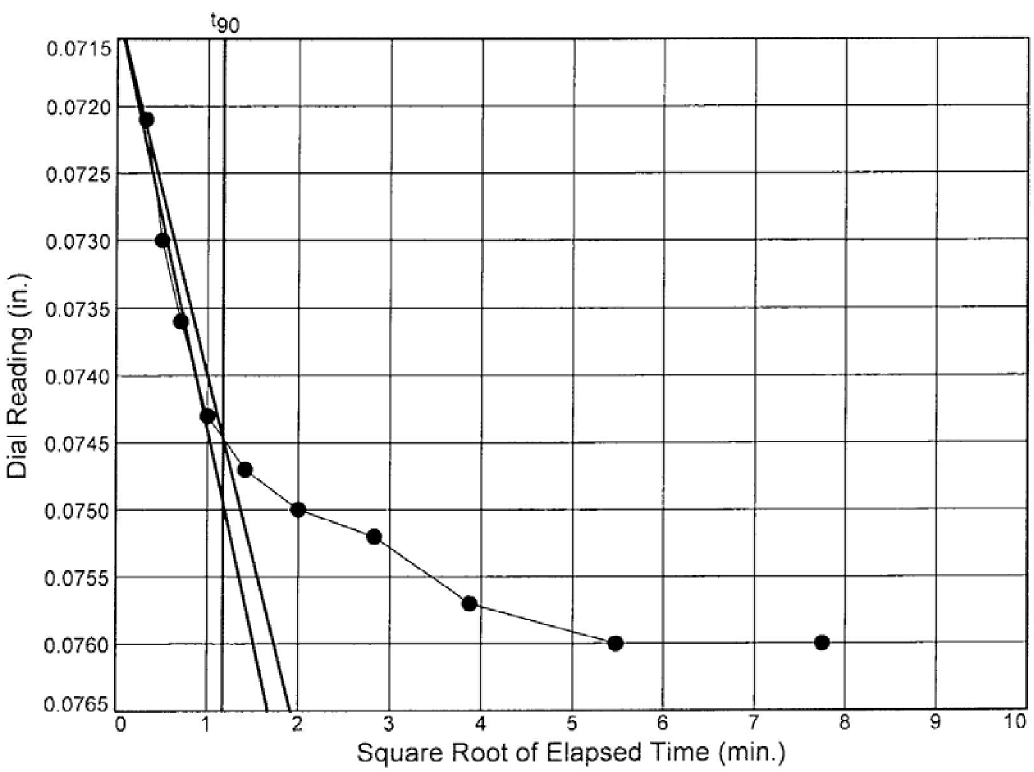
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: 108+00,7'L Depth: 10-12 ft Sample Number: B1-UD-1



Load No.= 10
Load= 8.00 ksf
D_0 = 0.0585
D_{90} = 0.0606
D_{100} = 0.0609
T_{90} = 1.41 min.

C_v @ T_{90}
0.718 ft.^{2}/day

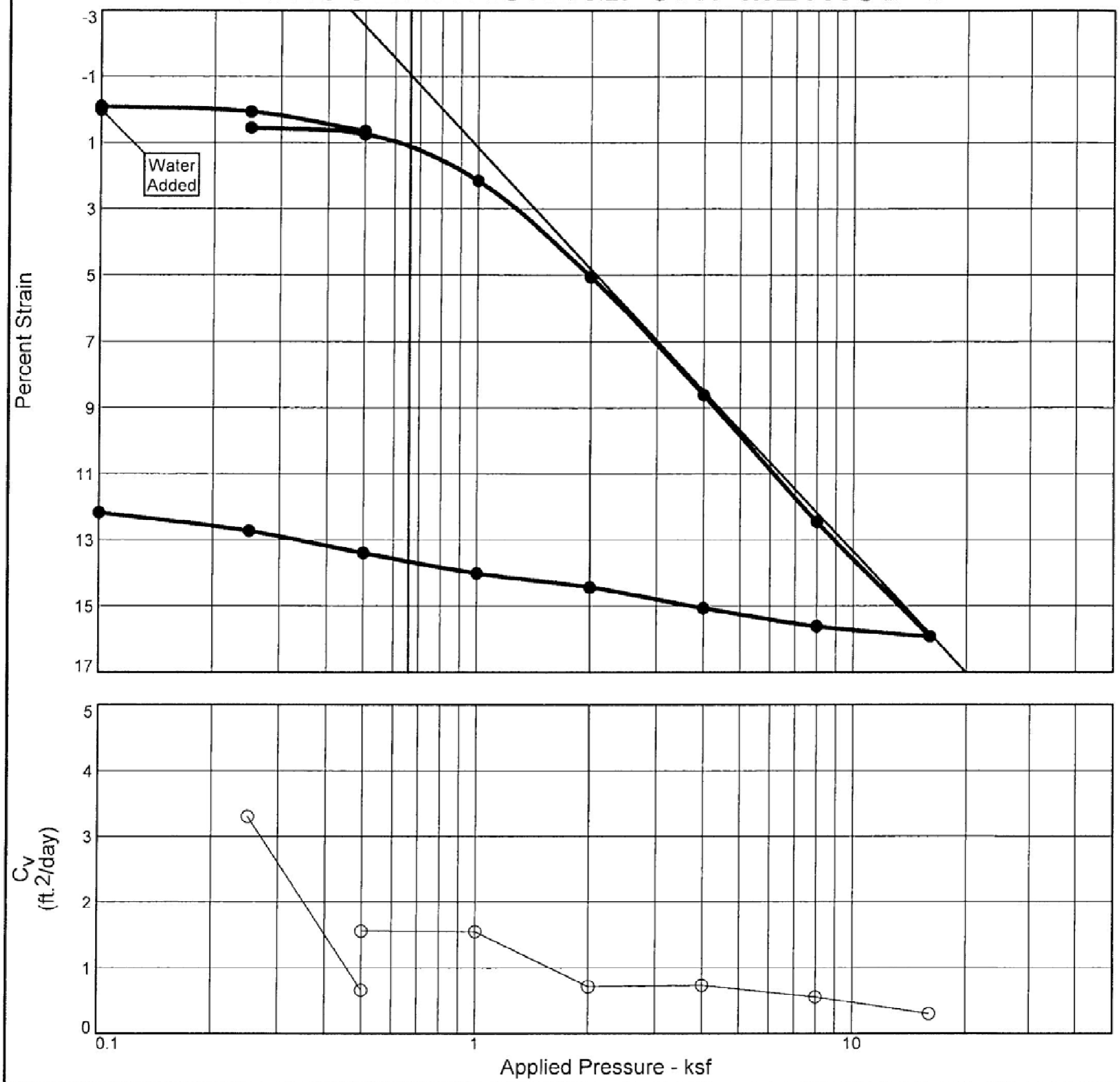


Load No.= 11
Load= 16.00 ksf
D_0 = 0.0713
D_{90} = 0.0745
D_{100} = 0.0748
T_{90} = 1.37 min.

C_v @ T_{90}
0.707 ft.^{2}/day

Figure

CONSOLIDATION REPORT-METHOD B



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
68.8 %	20.6 %	93.1	53	23	2.7	1.02	1.1	0.22	0.03	0.810

MATERIAL DESCRIPTION	USCS	AASHTO
Silt-sandy, some clay, trace gravel, red brown	MH	A-7-5(9)

Project No. INFCE-20-GA-04719-01 **Client:** Infrastructure Consulting & Engineering

Project: SR 1 (US 27) over Long Cane Creek
P.I. No. 0013942, Troup County

Location: Bent 2 **Depth:** 7.5-9.5 ft **Sample Number:** B2-UD-1

United Consulting

Norcross, Georgia

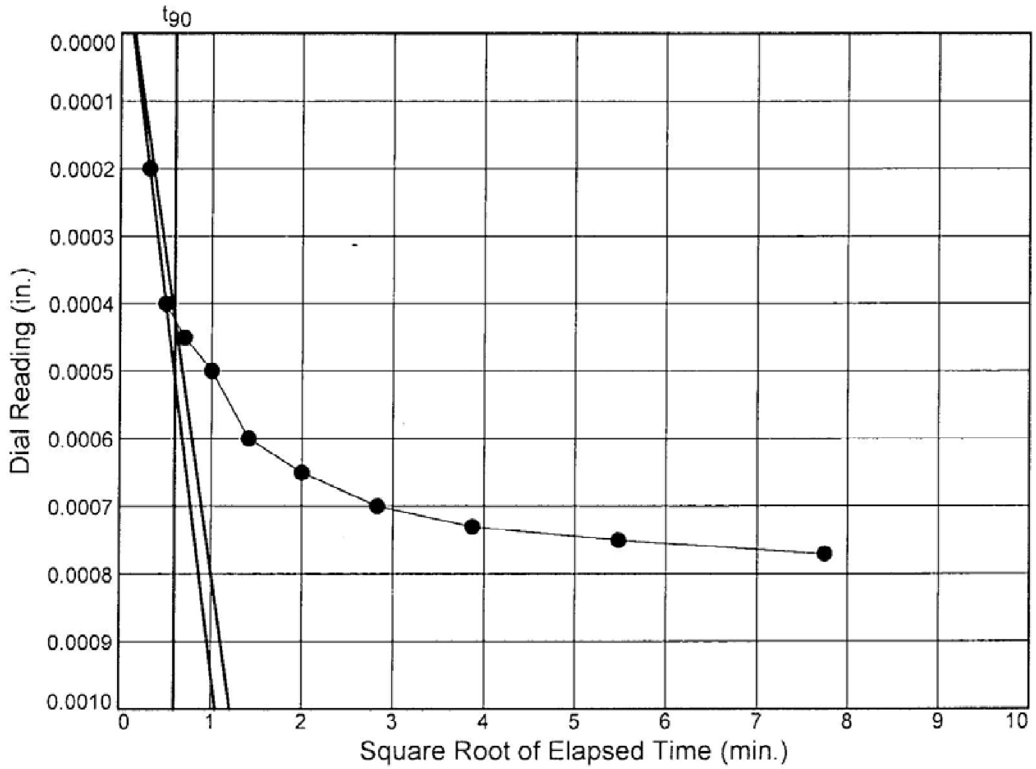
Remarks:

Figure

Dial Reading vs. Time

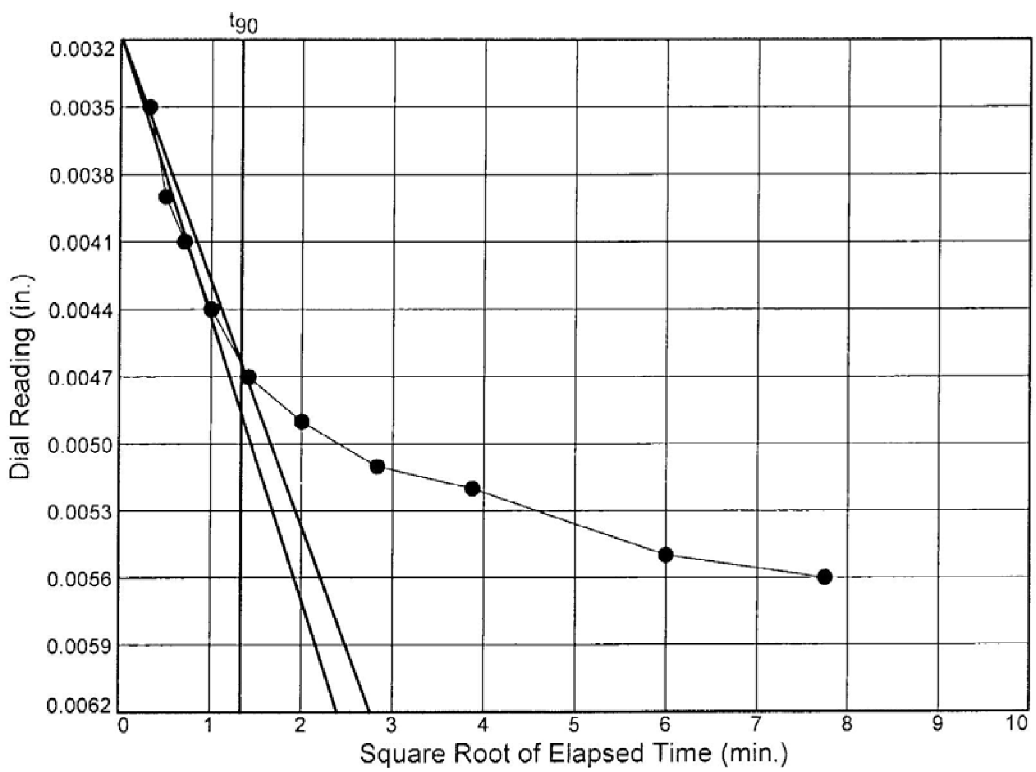
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: Bent 2 Depth: 7.5-9.5 ft Sample Number: B2-UD-1



Load No.= 3
Load= 0.25 ksf
D_0 = -0.0001
D_{90} = 0.0004
D_{100} = 0.0005
T_{90} = 0.36 min.

C_v @ T_{90}
3.300 ft.^{2}/day



Load No.= 4
Load= 0.50 ksf
D_0 = 0.0032
D_{90} = 0.0046
D_{100} = 0.0048
T_{90} = 1.78 min.

C_v @ T_{90}
0.662 ft.^{2}/day

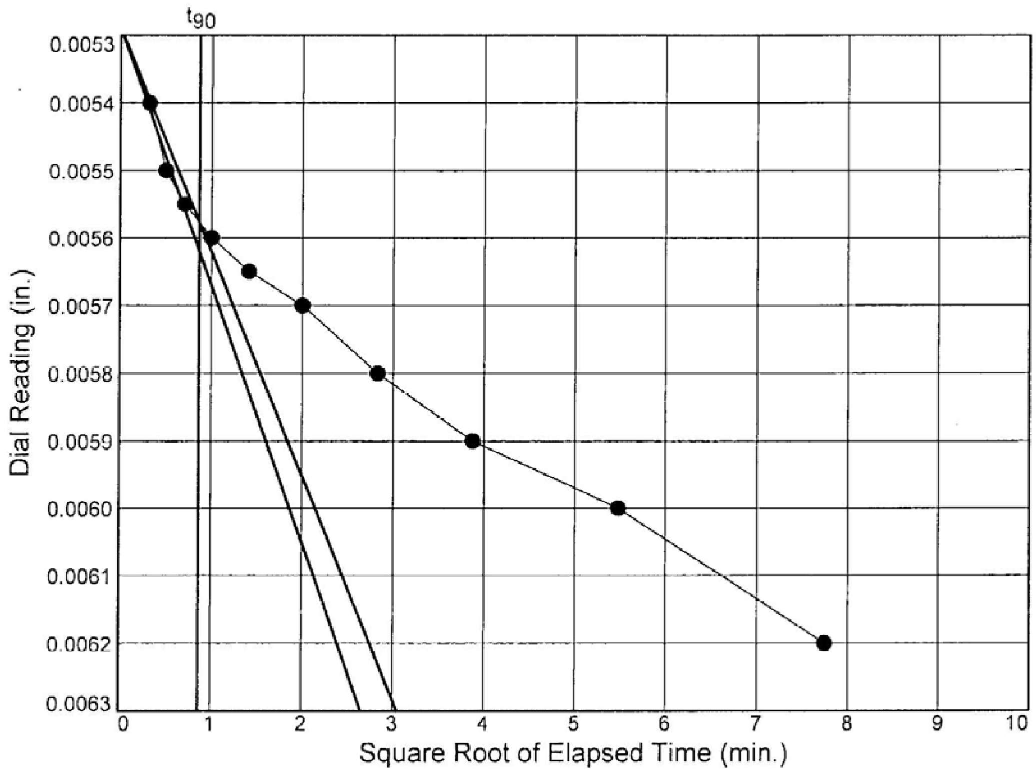
Figure

United Consulting

Dial Reading vs. Time

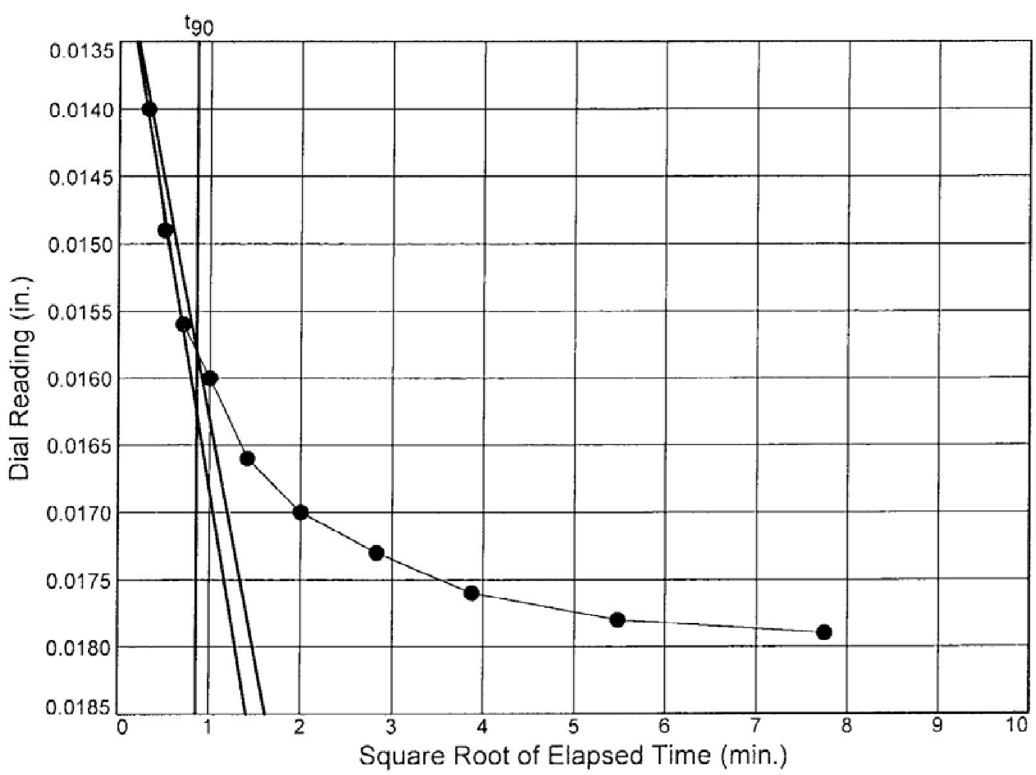
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: Bent 2 Depth: 7.5-9.5 ft Sample Number: B2-UD-1



Load No.= 6
Load= 0.50 ksf
D_0 = 0.0053
D_{90} = 0.0056
D_{100} = 0.0056
T_{90} = 0.75 min.

C_v @ T_{90}
1.561 ft.^{2}/day



Load No.= 7
Load= 1.00 ksf
D_0 = 0.0128
D_{90} = 0.0158
D_{100} = 0.0161
T_{90} = 0.74 min.

C_v @ T_{90}
1.556 ft.^{2}/day

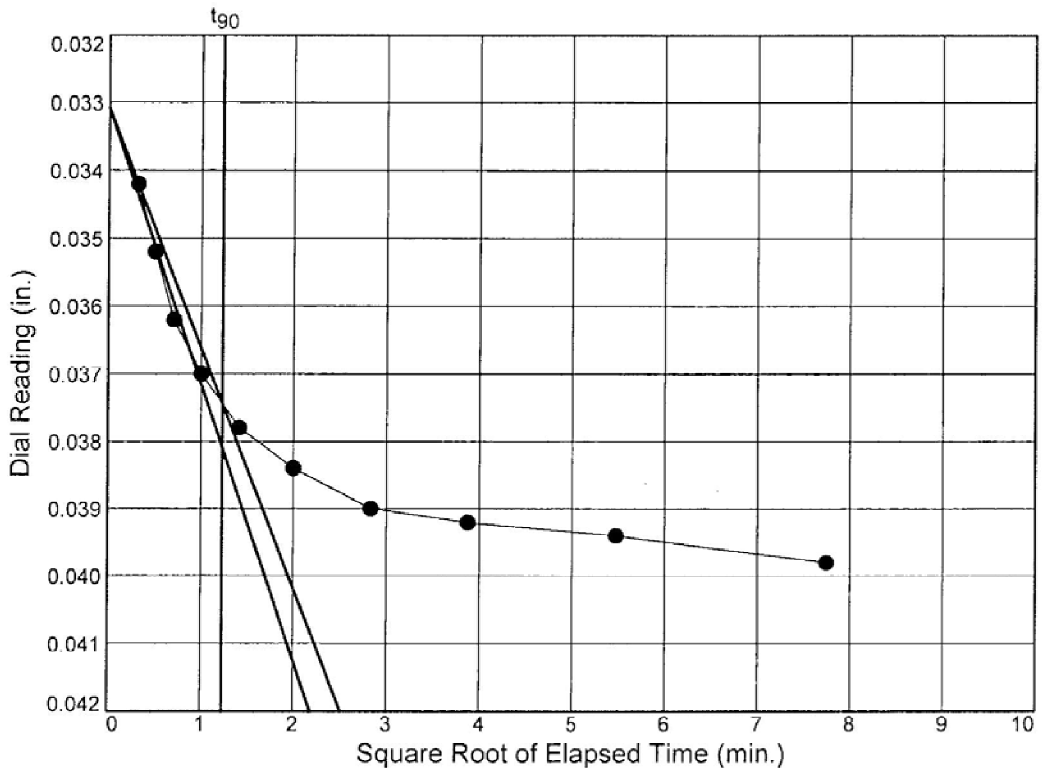
Figure

United Consulting

Dial Reading vs. Time

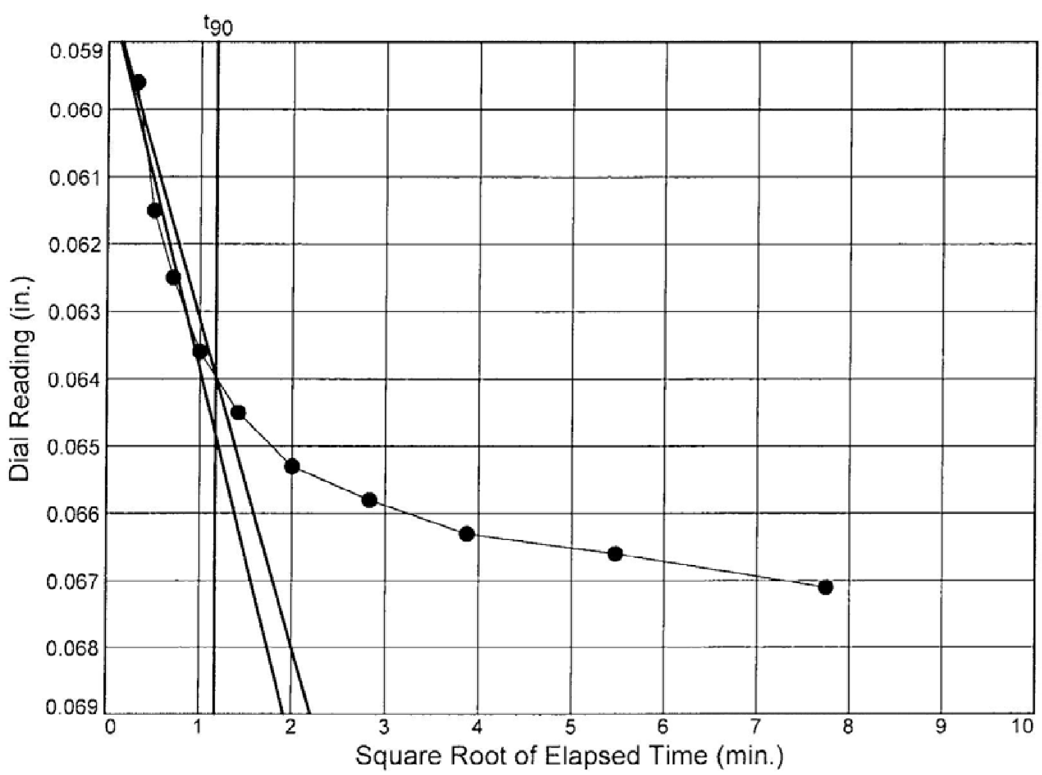
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: Bent 2 Depth: 7.5-9.5 ft Sample Number: B2-UD-1



Load No.= 8
Load= 2.00 ksf
D_0 = 0.0331
D_{90} = 0.0374
D_{100} = 0.0379
T_{90} = 1.51 min.

C_v @ T_{90}
0.715 $ft.^2$/day



Load No.= 9
Load= 4.00 ksf
D_0 = 0.0583
D_{90} = 0.0640
D_{100} = 0.0646
T_{90} = 1.37 min.

C_v @ T_{90}
0.735 $ft.^2$/day

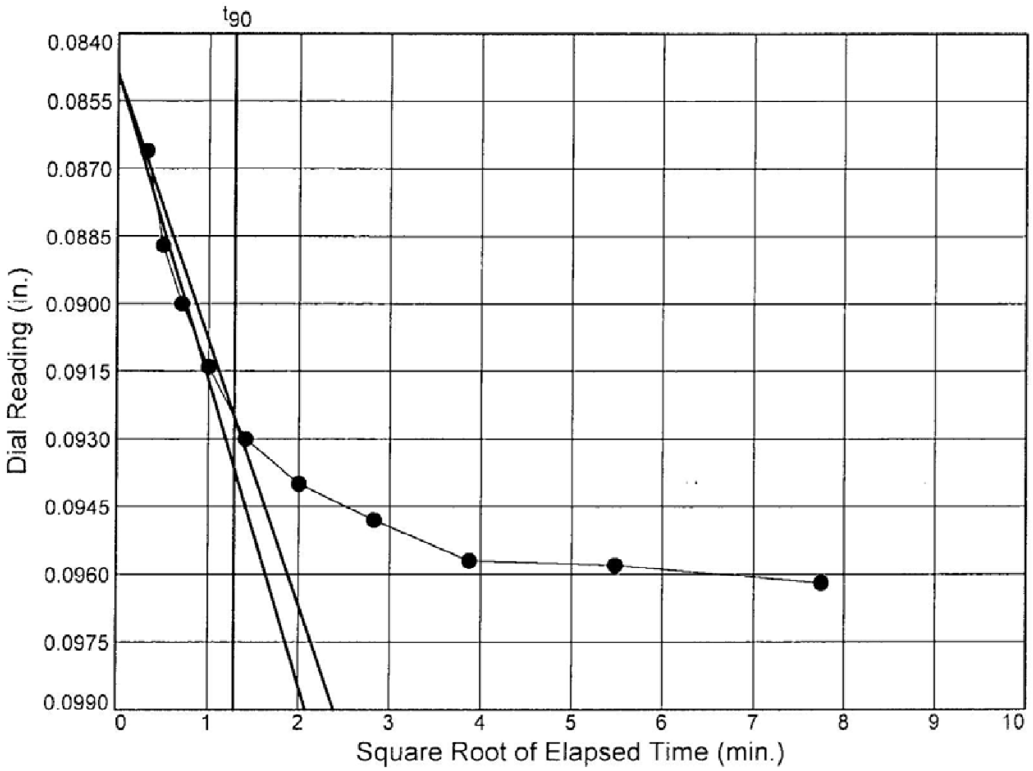
Figure

United Consulting

Dial Reading vs. Time

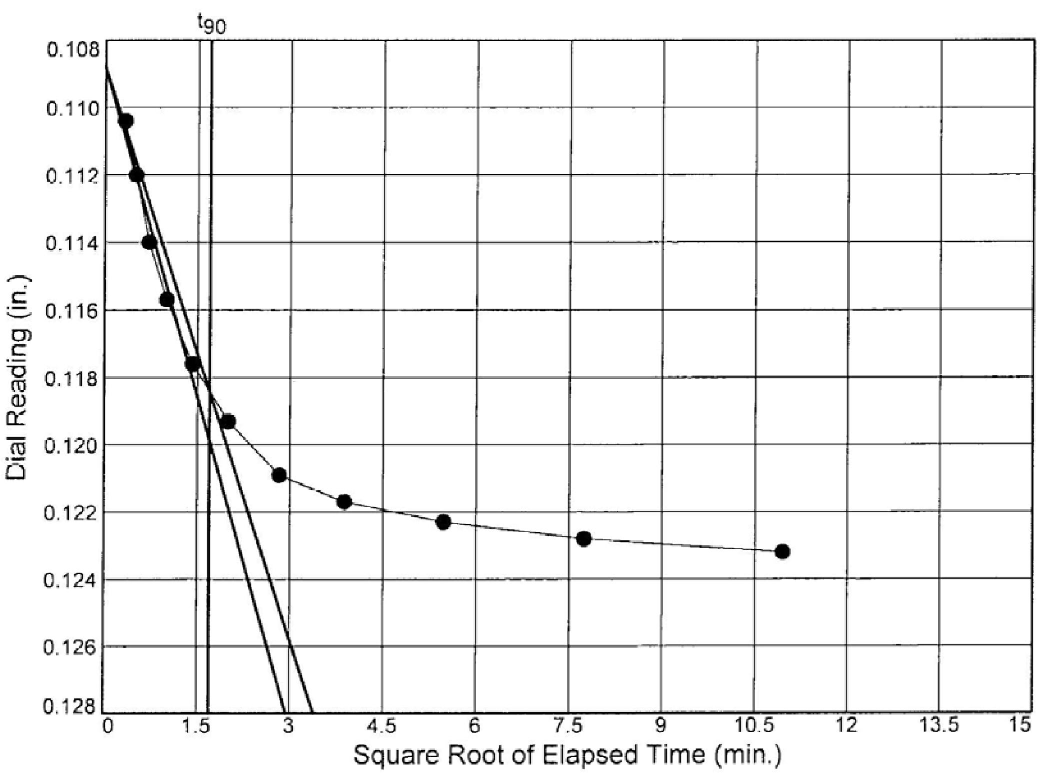
Project No: INFCE-20-GA-04719-01
Project: SR 1 (US 27) over Long Cane Creek, P.I. No. 0013942, Troup County

Location: Bent 2 Depth: 7.5-9.5 ft Sample Number: B2-UD-1



Load No.= 10
Load= 8.00 ksf
D_0 = 0.0849
D_{90} = 0.0925
D_{100} = 0.0934
T_{90} = 1.67 min.

C_v @ T_{90}
0.554 ft.^{2}/day



Load No.= 11
Load= 16.00 ksf
D_0 = 0.1088
D_{90} = 0.1184
D_{100} = 0.1195
T_{90} = 2.87 min.

C_v @ T_{90}
0.299 ft.^{2}/day

Figure

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UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

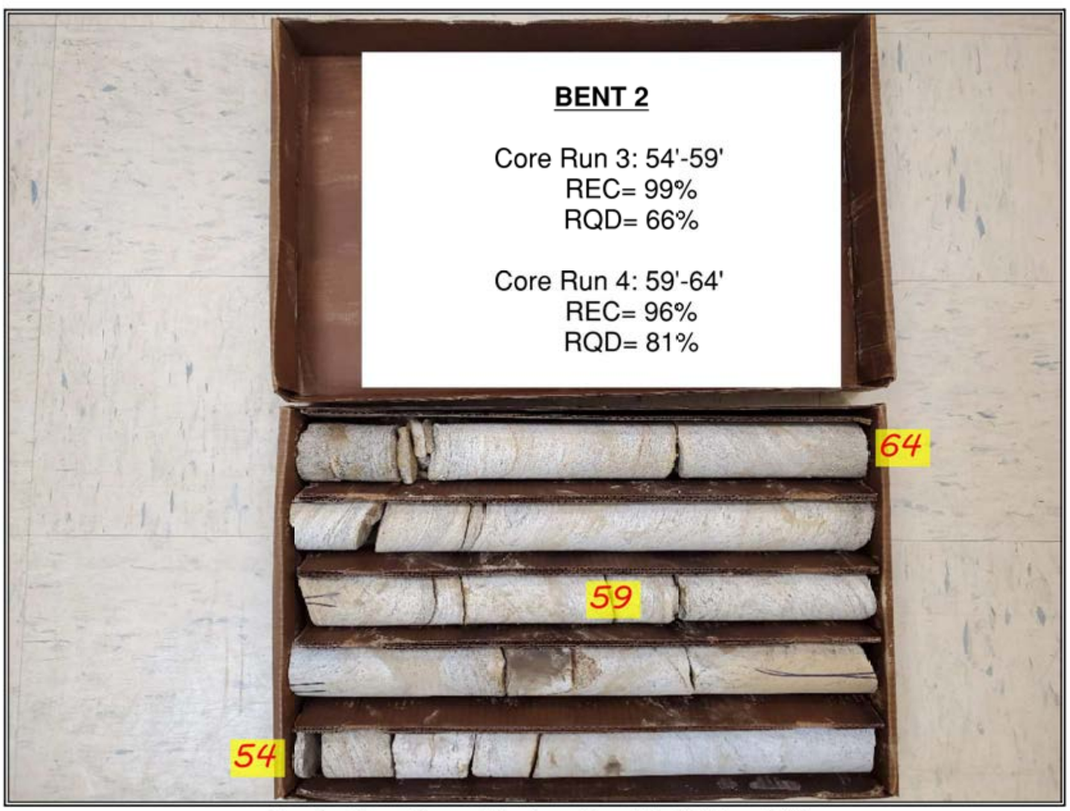
Title: **SR 1 (US 27) Over Long Cane Creek**
Troup County, P.I. No. 0013942
Project No.: **INFCE-20-GA-04719-01**

Sample No.	Location	Station No.	Depth (ft)	Diameter (in)	Height (in)	Maximum Load (lb)	Cross Sectional Area (in^2)	Correction Factor	Unconfined Compressive Strength (psi)	Test Date	Tested By
B1-R1	Bent 1	108+00 7'L	27'7.5" - 28'0.5"	2.484	5.032	25,110	4.85	1.00	5,181.5	10/30/2020	Evan P.
B1-R2	Bent 1	108+00 7'L	32'10" - 33'3"	2.489	5.017	38,080	4.87	1.00	7,826.3	10/30/2020	Evan P.
B1-R3	Bent 1	108+00 7'L	34'3" - 34'8"	2.491	5.031	52,670	4.87	1.00	10,807.5	10/30/2020	Evan P.
B2-R1	Bent 2	109+50 7'R	46'8" - 47'1"	2.489	4.955	43,020	4.87	1.00	8,841.6	10/30/2020	Evan P.
B2-R2	Bent 2	109+50 7'R	53'1" - 53'6"	2.485	5.090	43,430	4.85	1.00	8,954.6	10/30/2020	Evan P.
B2-R3	Bent 2	109+50 7'R	55'0" - 55'5"	2.487	4.981	60,420	4.86	1.00	12,437.7	10/30/2020	Evan P.

Rock Core from Boring Bent 1 (27' – 34')

Rock Core from Boring Bent 1 (34' – 44')

Rock Core from Boring Bent 2 (46' – 54')



Rock Core from Boring Bent 2 (54' – 64')

Rock Core from Boring Bent 2 (64’ – 69’)

DrivenPiles - Report

General Project Information

Filename: ...R 1 (US 27) Over Long Cane Creek\Working Files\Driven\Input\SR 1 (US 27)_BENT 1 HP 14X89.dvn
Project Name: SR 1 (US 27) Over Long Cane Creek-Bent 1 HP 14X89
Project Client: Infrastructure Consulting and Engineering
Prepared By: Lonnie Rucker
Project Manager: Santanu Sinharoy

Pile Information

Pile Type: H Pile
Top of Pile: 0.00 ft
Diameter of Pile: 14.70 in

Nominal Considerations

Water Table Depth At Time Of:

Drilling:	13.00 ft
Driving/Restrike:	13.00 ft
Nominal:	1.50 ft

Nominal Considations:

Local Scour:	0.00 ft
Long Term Scour:	0.00 ft
Soft Soil:	6.00 ft

Nominal Profile

Layer	Soil Type	Thickness	Setup Factor	Unit Weight	Strength	Nominal Curve
1	Cohesionless	1.00 ft	1.000	110.00 pcf	28.1/28.1	Nordlund
2	Cohesionless	3.00 ft	1.000	120.00 pcf	30.3/30.3	Nordlund
3	Cohesive	2.00 ft	1.000	120.00 pcf	2750.00 psf	T-79 Steel
4	Cohesionless	4.00 ft	1.000	110.00 pcf	29.2/29.2	Nordlund
5	Cohesionless	7.00 ft	1.000	110.00 pcf	29.4/29.4	Nordlund
6	Cohesionless	8.00 ft	1.000	135.00 pcf	42.0/42.0	Nordlund

Restrike - Skin Friction

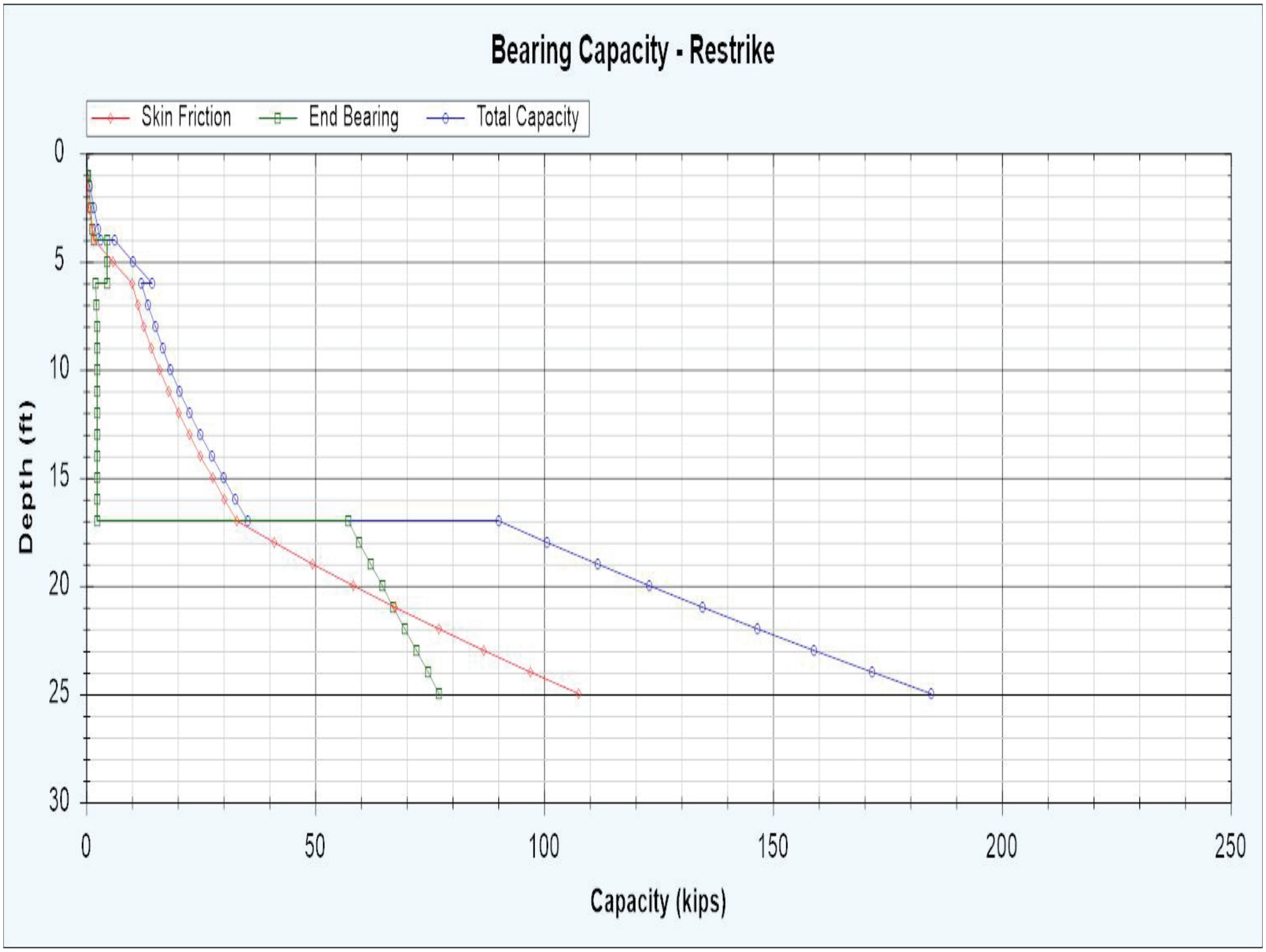
Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	22.82	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	22.82	N/A	0.08 kips
1.01 ft	Cohesionless	110.60 psf	24.60	N/A	0.08 kips
1.49 ft	Cohesionless	139.40 psf	24.60	N/A	0.20 kips
1.51 ft	Cohesionless	170.60 psf	24.60	N/A	0.21 kips
2.50 ft	Cohesionless	230.00 psf	24.60	N/A	0.61 kips
3.50 ft	Cohesionless	290.00 psf	24.60	N/A	1.23 kips
3.99 ft	Cohesionless	319.40 psf	24.60	N/A	1.61 kips
4.01 ft	Cohesive	320.00 psf	24.60	878.75 psf	1.66 kips
5.00 ft	Cohesive	320.00 psf	24.60	878.75 psf	5.80 kips
5.99 ft	Cohesive	320.00 psf	24.60	878.75 psf	9.93 kips
6.01 ft	Cohesionless	710.55 psf	23.74	N/A	9.98 kips
7.00 ft	Cohesionless	765.00 psf	23.74	N/A	11.21 kips
8.00 ft	Cohesionless	820.00 psf	23.74	N/A	12.64 kips
9.00 ft	Cohesionless	875.00 psf	23.74	N/A	14.24 kips
9.99 ft	Cohesionless	929.45 psf	23.74	N/A	16.00 kips
10.01 ft	Cohesionless	1150.55 psf	23.90	N/A	16.03 kips
11.00 ft	Cohesionless	1205.00 psf	23.90	N/A	18.00 kips
12.00 ft	Cohesionless	1260.00 psf	23.90	N/A	20.17 kips
12.99 ft	Cohesionless	1314.45 psf	23.90	N/A	22.49 kips
13.01 ft	Cohesionless	1480.24 psf	23.90	N/A	22.54 kips
14.00 ft	Cohesionless	1503.80 psf	23.90	N/A	24.99 kips
15.00 ft	Cohesionless	1527.60 psf	23.90	N/A	27.55 kips
16.00 ft	Cohesionless	1551.40 psf	23.90	N/A	30.18 kips
16.99 ft	Cohesionless	1574.96 psf	23.90	N/A	32.87 kips
17.01 ft	Cohesionless	1670.76 psf	34.10	N/A	32.97 kips
18.00 ft	Cohesionless	1706.70 psf	34.10	N/A	41.02 kips
19.00 ft	Cohesionless	1743.00 psf	34.10	N/A	49.48 kips
20.00 ft	Cohesionless	1779.30 psf	34.10	N/A	58.30 kips
21.00 ft	Cohesionless	1815.60 psf	34.10	N/A	67.46 kips
22.00 ft	Cohesionless	1851.90 psf	34.10	N/A	76.96 kips
23.00 ft	Cohesionless	1888.20 psf	34.10	N/A	86.81 kips
24.00 ft	Cohesionless	1924.50 psf	34.10	N/A	97.01 kips
24.99 ft	Cohesionless	1960.44 psf	34.10	N/A	107.44 kips

Restrike - End Bearing

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	1.10 psf	23.16	2.41 kips	0.00 kips
0.99 ft	Cohesionless	108.90 psf	23.16	2.41 kips	0.25 kips
1.01 ft	Cohesionless	111.20 psf	31.56	2.81 kips	0.37 kips
1.49 ft	Cohesionless	168.80 psf	31.56	2.81 kips	0.57 kips
1.51 ft	Cohesionless	171.20 psf	31.56	2.81 kips	0.57 kips
2.50 ft	Cohesionless	290.00 psf	31.56	2.81 kips	0.97 kips
3.50 ft	Cohesionless	410.00 psf	31.56	2.81 kips	1.38 kips
3.99 ft	Cohesionless	468.80 psf	31.56	2.81 kips	1.57 kips
4.01 ft	Cohesive	471.20 psf	0.00	N/A	4.49 kips
5.00 ft	Cohesive	590.00 psf	0.00	N/A	4.49 kips
5.99 ft	Cohesive	708.80 psf	0.00	N/A	4.49 kips
6.01 ft	Cohesionless	711.10 psf	27.26	2.41 kips	1.98 kips
7.00 ft	Cohesionless	820.00 psf	27.26	2.41 kips	2.28 kips
8.00 ft	Cohesionless	930.00 psf	27.26	2.41 kips	2.41 kips
9.00 ft	Cohesionless	1040.00 psf	27.26	2.41 kips	2.41 kips
9.99 ft	Cohesionless	1148.90 psf	27.26	2.41 kips	2.41 kips
10.01 ft	Cohesionless	1151.10 psf	27.95	2.41 kips	2.41 kips
11.00 ft	Cohesionless	1260.00 psf	27.95	2.41 kips	2.41 kips
12.00 ft	Cohesionless	1370.00 psf	27.95	2.41 kips	2.41 kips
12.99 ft	Cohesionless	1478.90 psf	27.95	2.41 kips	2.41 kips
13.01 ft	Cohesionless	1480.48 psf	27.95	2.41 kips	2.41 kips
14.00 ft	Cohesionless	1527.60 psf	27.95	2.41 kips	2.41 kips
15.00 ft	Cohesionless	1575.20 psf	27.95	2.41 kips	2.41 kips
16.00 ft	Cohesionless	1622.80 psf	27.95	2.41 kips	2.41 kips
16.99 ft	Cohesionless	1669.92 psf	27.95	2.41 kips	2.41 kips
17.01 ft	Cohesionless	1671.13 psf	244.00	107.40 kips	57.20 kips
18.00 ft	Cohesionless	1743.00 psf	244.00	107.40 kips	59.66 kips
19.00 ft	Cohesionless	1815.60 psf	244.00	107.40 kips	62.15 kips
20.00 ft	Cohesionless	1888.20 psf	244.00	107.40 kips	64.63 kips
21.00 ft	Cohesionless	1960.80 psf	244.00	107.40 kips	67.12 kips
22.00 ft	Cohesionless	2033.40 psf	244.00	107.40 kips	69.60 kips
23.00 ft	Cohesionless	2106.00 psf	244.00	107.40 kips	72.09 kips
24.00 ft	Cohesionless	2178.60 psf	244.00	107.40 kips	74.57 kips
24.99 ft	Cohesionless	2250.47 psf	244.00	107.40 kips	77.03 kips

Restrike - Summary of Capacities

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	0.08 kips	0.25 kips	0.33 kips
1.01 ft	0.08 kips	0.37 kips	0.46 kips
1.49 ft	0.20 kips	0.57 kips	0.77 kips
1.51 ft	0.21 kips	0.57 kips	0.78 kips
2.50 ft	0.61 kips	0.97 kips	1.59 kips
3.50 ft	1.23 kips	1.38 kips	2.61 kips
3.99 ft	1.61 kips	1.57 kips	3.19 kips
4.01 ft	1.66 kips	4.49 kips	6.15 kips
5.00 ft	5.80 kips	4.49 kips	10.28 kips
5.99 ft	9.93 kips	4.49 kips	14.41 kips
6.01 ft	9.98 kips	1.98 kips	11.96 kips
7.00 ft	11.21 kips	2.28 kips	13.50 kips
8.00 ft	12.64 kips	2.41 kips	15.05 kips
9.00 ft	14.24 kips	2.41 kips	16.65 kips
9.99 ft	16.00 kips	2.41 kips	18.41 kips
10.01 ft	16.03 kips	2.41 kips	18.45 kips
11.00 ft	18.00 kips	2.41 kips	20.42 kips
12.00 ft	20.17 kips	2.41 kips	22.58 kips
12.99 ft	22.49 kips	2.41 kips	24.90 kips
13.01 ft	22.54 kips	2.41 kips	24.95 kips
14.00 ft	24.99 kips	2.41 kips	27.41 kips
15.00 ft	27.55 kips	2.41 kips	29.96 kips
16.00 ft	30.18 kips	2.41 kips	32.60 kips
16.99 ft	32.87 kips	2.41 kips	35.28 kips
17.01 ft	32.97 kips	57.20 kips	90.18 kips
18.00 ft	41.02 kips	59.66 kips	100.68 kips
19.00 ft	49.48 kips	62.15 kips	111.63 kips
20.00 ft	58.30 kips	64.63 kips	122.93 kips
21.00 ft	67.46 kips	67.12 kips	134.58 kips
22.00 ft	76.96 kips	69.60 kips	146.57 kips
23.00 ft	86.81 kips	72.09 kips	158.90 kips
24.00 ft	97.01 kips	74.57 kips	171.58 kips
24.99 ft	107.44 kips	77.03 kips	184.48 kips



Bearing Capacity - Restrike
Skin Friction
End Bearing
Total Capacity
Depth (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Capacity (kips)

Driving - Skin Friction

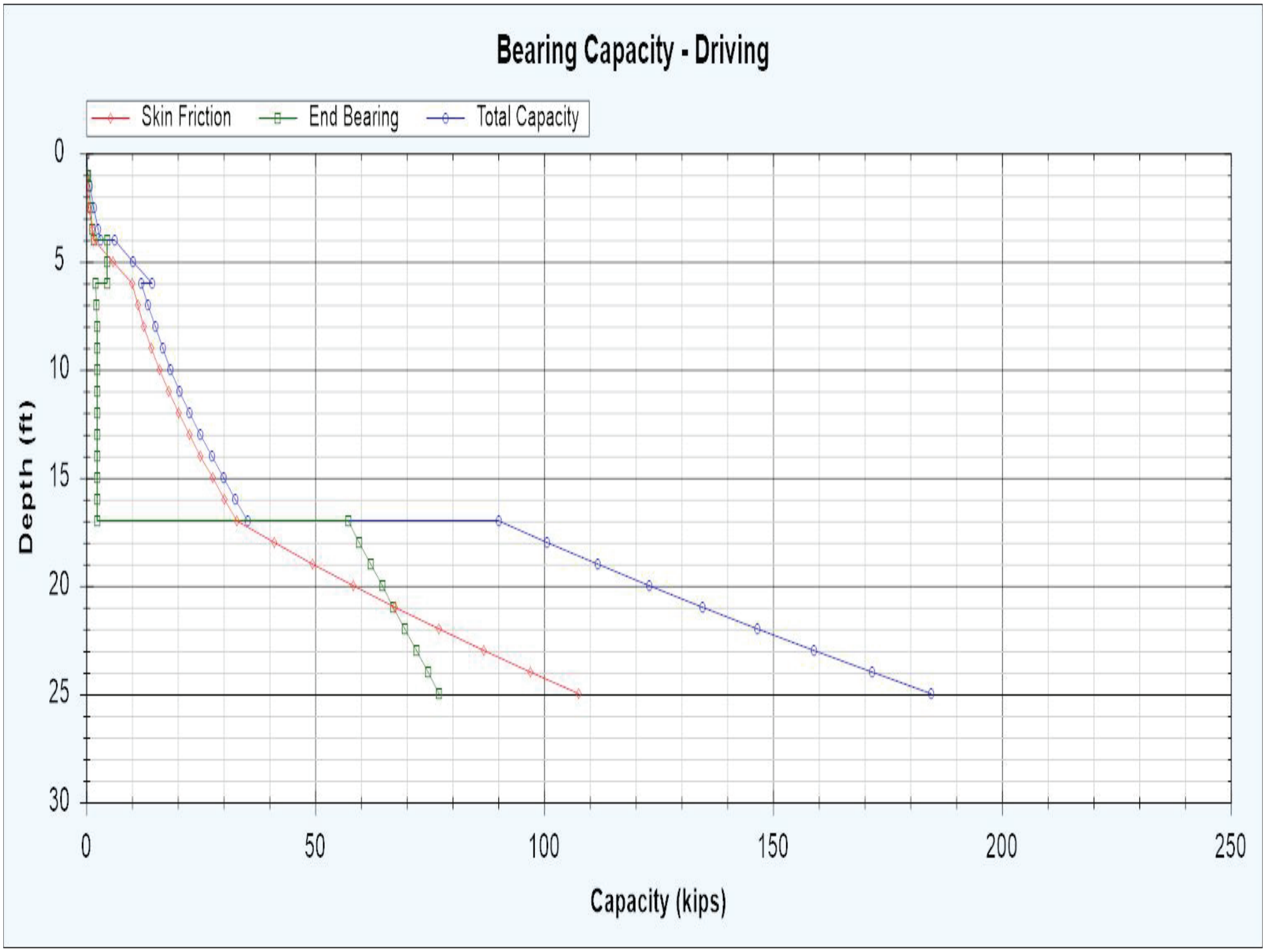
Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	22.82	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	22.82	N/A	0.08 kips
1.01 ft	Cohesionless	110.60 psf	24.60	N/A	0.08 kips
1.49 ft	Cohesionless	139.40 psf	24.60	N/A	0.20 kips
1.51 ft	Cohesionless	170.60 psf	24.60	N/A	0.21 kips
2.50 ft	Cohesionless	230.00 psf	24.60	N/A	0.61 kips
3.50 ft	Cohesionless	290.00 psf	24.60	N/A	1.23 kips
3.99 ft	Cohesionless	319.40 psf	24.60	N/A	1.61 kips
4.01 ft	Cohesive	320.00 psf	24.60	878.75 psf	1.66 kips
5.00 ft	Cohesive	320.00 psf	24.60	878.75 psf	5.80 kips
5.99 ft	Cohesive	320.00 psf	24.60	878.75 psf	9.93 kips
6.01 ft	Cohesionless	710.55 psf	23.74	N/A	9.98 kips
7.00 ft	Cohesionless	765.00 psf	23.74	N/A	11.21 kips
8.00 ft	Cohesionless	820.00 psf	23.74	N/A	12.64 kips
9.00 ft	Cohesionless	875.00 psf	23.74	N/A	14.24 kips
9.99 ft	Cohesionless	929.45 psf	23.74	N/A	16.00 kips
10.01 ft	Cohesionless	1150.55 psf	23.90	N/A	16.03 kips
11.00 ft	Cohesionless	1205.00 psf	23.90	N/A	18.00 kips
12.00 ft	Cohesionless	1260.00 psf	23.90	N/A	20.17 kips
12.99 ft	Cohesionless	1314.45 psf	23.90	N/A	22.49 kips
13.01 ft	Cohesionless	1480.24 psf	23.90	N/A	22.54 kips
14.00 ft	Cohesionless	1503.80 psf	23.90	N/A	24.99 kips
15.00 ft	Cohesionless	1527.60 psf	23.90	N/A	27.55 kips
16.00 ft	Cohesionless	1551.40 psf	23.90	N/A	30.18 kips
16.99 ft	Cohesionless	1574.96 psf	23.90	N/A	32.87 kips
17.01 ft	Cohesionless	1670.76 psf	34.10	N/A	32.97 kips
18.00 ft	Cohesionless	1706.70 psf	34.10	N/A	41.02 kips
19.00 ft	Cohesionless	1743.00 psf	34.10	N/A	49.48 kips
20.00 ft	Cohesionless	1779.30 psf	34.10	N/A	58.30 kips
21.00 ft	Cohesionless	1815.60 psf	34.10	N/A	67.46 kips
22.00 ft	Cohesionless	1851.90 psf	34.10	N/A	76.96 kips
23.00 ft	Cohesionless	1888.20 psf	34.10	N/A	86.81 kips
24.00 ft	Cohesionless	1924.50 psf	34.10	N/A	97.01 kips
24.99 ft	Cohesionless	1960.44 psf	34.10	N/A	107.44 kips

Driving - End Bearing

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	1.10 psf	23.16	2.41 kips	0.00 kips
0.99 ft	Cohesionless	108.90 psf	23.16	2.41 kips	0.25 kips
1.01 ft	Cohesionless	111.20 psf	31.56	2.81 kips	0.37 kips
1.49 ft	Cohesionless	168.80 psf	31.56	2.81 kips	0.57 kips
1.51 ft	Cohesionless	171.20 psf	31.56	2.81 kips	0.57 kips
2.50 ft	Cohesionless	290.00 psf	31.56	2.81 kips	0.97 kips
3.50 ft	Cohesionless	410.00 psf	31.56	2.81 kips	1.38 kips
3.99 ft	Cohesionless	468.80 psf	31.56	2.81 kips	1.57 kips
4.01 ft	Cohesive	471.20 psf	0.00	N/A	4.49 kips
5.00 ft	Cohesive	590.00 psf	0.00	N/A	4.49 kips
5.99 ft	Cohesive	708.80 psf	0.00	N/A	4.49 kips
6.01 ft	Cohesionless	711.10 psf	27.26	2.41 kips	1.98 kips
7.00 ft	Cohesionless	820.00 psf	27.26	2.41 kips	2.28 kips
8.00 ft	Cohesionless	930.00 psf	27.26	2.41 kips	2.41 kips
9.00 ft	Cohesionless	1040.00 psf	27.26	2.41 kips	2.41 kips
9.99 ft	Cohesionless	1148.90 psf	27.26	2.41 kips	2.41 kips
10.01 ft	Cohesionless	1151.10 psf	27.95	2.41 kips	2.41 kips
11.00 ft	Cohesionless	1260.00 psf	27.95	2.41 kips	2.41 kips
12.00 ft	Cohesionless	1370.00 psf	27.95	2.41 kips	2.41 kips
12.99 ft	Cohesionless	1478.90 psf	27.95	2.41 kips	2.41 kips
13.01 ft	Cohesionless	1480.48 psf	27.95	2.41 kips	2.41 kips
14.00 ft	Cohesionless	1527.60 psf	27.95	2.41 kips	2.41 kips
15.00 ft	Cohesionless	1575.20 psf	27.95	2.41 kips	2.41 kips
16.00 ft	Cohesionless	1622.80 psf	27.95	2.41 kips	2.41 kips
16.99 ft	Cohesionless	1669.92 psf	27.95	2.41 kips	2.41 kips
17.01 ft	Cohesionless	1671.13 psf	244.00	107.40 kips	57.20 kips
18.00 ft	Cohesionless	1743.00 psf	244.00	107.40 kips	59.66 kips
19.00 ft	Cohesionless	1815.60 psf	244.00	107.40 kips	62.15 kips
20.00 ft	Cohesionless	1888.20 psf	244.00	107.40 kips	64.63 kips
21.00 ft	Cohesionless	1960.80 psf	244.00	107.40 kips	67.12 kips
22.00 ft	Cohesionless	2033.40 psf	244.00	107.40 kips	69.60 kips
23.00 ft	Cohesionless	2106.00 psf	244.00	107.40 kips	72.09 kips
24.00 ft	Cohesionless	2178.60 psf	244.00	107.40 kips	74.57 kips
24.99 ft	Cohesionless	2250.47 psf	244.00	107.40 kips	77.03 kips

Driving - Summary of Capacities

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	0.08 kips	0.25 kips	0.33 kips
1.01 ft	0.08 kips	0.37 kips	0.46 kips
1.49 ft	0.20 kips	0.57 kips	0.77 kips
1.51 ft	0.21 kips	0.57 kips	0.78 kips
2.50 ft	0.61 kips	0.97 kips	1.59 kips
3.50 ft	1.23 kips	1.38 kips	2.61 kips
3.99 ft	1.61 kips	1.57 kips	3.19 kips
4.01 ft	1.66 kips	4.49 kips	6.15 kips
5.00 ft	5.80 kips	4.49 kips	10.28 kips
5.99 ft	9.93 kips	4.49 kips	14.41 kips
6.01 ft	9.98 kips	1.98 kips	11.96 kips
7.00 ft	11.21 kips	2.28 kips	13.50 kips
8.00 ft	12.64 kips	2.41 kips	15.05 kips
9.00 ft	14.24 kips	2.41 kips	16.65 kips
9.99 ft	16.00 kips	2.41 kips	18.41 kips
10.01 ft	16.03 kips	2.41 kips	18.45 kips
11.00 ft	18.00 kips	2.41 kips	20.42 kips
12.00 ft	20.17 kips	2.41 kips	22.58 kips
12.99 ft	22.49 kips	2.41 kips	24.90 kips
13.01 ft	22.54 kips	2.41 kips	24.95 kips
14.00 ft	24.99 kips	2.41 kips	27.41 kips
15.00 ft	27.55 kips	2.41 kips	29.96 kips
16.00 ft	30.18 kips	2.41 kips	32.60 kips
16.99 ft	32.87 kips	2.41 kips	35.28 kips
17.01 ft	32.97 kips	57.20 kips	90.18 kips
18.00 ft	41.02 kips	59.66 kips	100.68 kips
19.00 ft	49.48 kips	62.15 kips	111.63 kips
20.00 ft	58.30 kips	64.63 kips	122.93 kips
21.00 ft	67.46 kips	67.12 kips	134.58 kips
22.00 ft	76.96 kips	69.60 kips	146.57 kips
23.00 ft	86.81 kips	72.09 kips	158.90 kips
24.00 ft	97.01 kips	74.57 kips	171.58 kips
24.99 ft	107.44 kips	77.03 kips	184.48 kips



Bearing Capacity - Driving
Skin Friction
End Bearing
Total Capacity
Depth (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Capacity (kips)

Nominal - Skin Friction

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	22.82	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	22.82	N/A	-0.08 kips
1.01 ft	Cohesionless	110.60 psf	24.60	N/A	-0.08 kips
1.49 ft	Cohesionless	139.40 psf	24.60	N/A	-0.20 kips
1.51 ft	Cohesionless	170.29 psf	24.60	N/A	-0.21 kips
2.50 ft	Cohesionless	198.80 psf	24.60	N/A	-0.56 kips
3.50 ft	Cohesionless	227.60 psf	24.60	N/A	-1.01 kips
3.99 ft	Cohesionless	241.71 psf	24.60	N/A	-1.27 kips
4.01 ft	Cohesive	242.00 psf	24.60	878.75 psf	-1.32 kips
5.00 ft	Cohesive	242.00 psf	24.60	878.75 psf	-5.45 kips
5.99 ft	Cohesive	242.00 psf	24.60	878.75 psf	-9.58 kips
6.01 ft	Cohesionless	429.44 psf	23.74	N/A	-9.58 kips
7.00 ft	Cohesionless	453.00 psf	23.74	N/A	-8.85 kips
8.00 ft	Cohesionless	476.80 psf	23.74	N/A	-8.03 kips
9.00 ft	Cohesionless	500.60 psf	23.74	N/A	-7.14 kips
9.99 ft	Cohesionless	524.16 psf	23.74	N/A	-6.18 kips
10.01 ft	Cohesionless	619.84 psf	23.90	N/A	-6.16 kips
11.00 ft	Cohesionless	643.40 psf	23.90	N/A	-5.11 kips
12.00 ft	Cohesionless	667.20 psf	23.90	N/A	-3.98 kips
12.99 ft	Cohesionless	690.76 psf	23.90	N/A	-2.77 kips
13.01 ft	Cohesionless	762.64 psf	23.90	N/A	-2.75 kips
14.00 ft	Cohesionless	786.20 psf	23.90	N/A	-1.46 kips
15.00 ft	Cohesionless	810.00 psf	23.90	N/A	-0.09 kips
16.00 ft	Cohesionless	833.80 psf	23.90	N/A	1.36 kips
16.99 ft	Cohesionless	857.36 psf	23.90	N/A	2.88 kips
17.01 ft	Cohesionless	953.16 psf	34.10	N/A	2.94 kips
18.00 ft	Cohesionless	989.10 psf	34.10	N/A	7.60 kips
19.00 ft	Cohesionless	1025.40 psf	34.10	N/A	12.65 kips
20.00 ft	Cohesionless	1061.70 psf	34.10	N/A	18.05 kips
21.00 ft	Cohesionless	1098.00 psf	34.10	N/A	23.79 kips
22.00 ft	Cohesionless	1134.30 psf	34.10	N/A	29.88 kips
23.00 ft	Cohesionless	1170.60 psf	34.10	N/A	36.32 kips
24.00 ft	Cohesionless	1206.90 psf	34.10	N/A	43.10 kips
24.99 ft	Cohesionless	1242.84 psf	34.10	N/A	50.15 kips

Nominal - End Bearing

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
0.99 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
1.01 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
1.49 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
1.51 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
2.50 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
3.50 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
3.99 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
4.01 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
5.00 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
5.99 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
6.01 ft	Cohesionless	429.68 psf	27.26	2.41 kips	1.20 kips
7.00 ft	Cohesionless	476.80 psf	27.26	2.41 kips	1.33 kips
8.00 ft	Cohesionless	524.40 psf	27.26	2.41 kips	1.46 kips
9.00 ft	Cohesionless	572.00 psf	27.26	2.41 kips	1.59 kips
9.99 ft	Cohesionless	619.12 psf	27.26	2.41 kips	1.72 kips
10.01 ft	Cohesionless	620.08 psf	27.95	2.41 kips	1.78 kips
11.00 ft	Cohesionless	667.20 psf	27.95	2.41 kips	1.92 kips
12.00 ft	Cohesionless	714.80 psf	27.95	2.41 kips	2.05 kips
12.99 ft	Cohesionless	761.92 psf	27.95	2.41 kips	2.19 kips
13.01 ft	Cohesionless	762.88 psf	27.95	2.41 kips	2.19 kips
14.00 ft	Cohesionless	810.00 psf	27.95	2.41 kips	2.33 kips
15.00 ft	Cohesionless	857.60 psf	27.95	2.41 kips	2.41 kips
16.00 ft	Cohesionless	905.20 psf	27.95	2.41 kips	2.41 kips
16.99 ft	Cohesionless	952.32 psf	27.95	2.41 kips	2.41 kips
17.01 ft	Cohesionless	953.53 psf	244.00	107.40 kips	32.64 kips
18.00 ft	Cohesionless	1025.40 psf	244.00	107.40 kips	35.10 kips
19.00 ft	Cohesionless	1098.00 psf	244.00	107.40 kips	37.58 kips
20.00 ft	Cohesionless	1170.60 psf	244.00	107.40 kips	40.07 kips
21.00 ft	Cohesionless	1243.20 psf	244.00	107.40 kips	42.55 kips
22.00 ft	Cohesionless	1315.80 psf	244.00	107.40 kips	45.04 kips
23.00 ft	Cohesionless	1388.40 psf	244.00	107.40 kips	47.53 kips
24.00 ft	Cohesionless	1461.00 psf	244.00	107.40 kips	50.01 kips
24.99 ft	Cohesionless	1532.87 psf	244.00	107.40 kips	52.47 kips

Elev. 666.5' at Depth "0"

Nominal - Summary of Capacities

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	-0.08 kips	0.00 kips	-0.08 kips
1.01 ft	-0.08 kips	0.00 kips	-0.08 kips
1.49 ft	-0.20 kips	0.00 kips	-0.20 kips
1.51 ft	-0.21 kips	0.00 kips	-0.21 kips
2.50 ft	-0.56 kips	0.00 kips	-0.56 kips
3.50 ft	-1.01 kips	0.00 kips	-1.01 kips
3.99 ft	-1.27 kips	0.00 kips	-1.27 kips
4.01 ft	-1.32 kips	0.00 kips	-1.32 kips
5.00 ft	-5.45 kips	0.00 kips	-5.45 kips
5.99 ft	-9.58 kips	0.00 kips	-9.58 kips
6.01 ft	-9.58 kips	1.20 kips	-8.38 kips
7.00 ft	-8.85 kips	1.33 kips	-7.52 kips
8.00 ft	-8.03 kips	1.46 kips	-6.57 kips
9.00 ft	-7.14 kips	1.59 kips	-5.55 kips
9.99 ft	-6.18 kips	1.72 kips	-4.46 kips
10.01 ft	-6.16 kips	1.78 kips	-4.38 kips
11.00 ft	-5.11 kips	1.92 kips	-3.20 kips
12.00 ft	-3.98 kips	2.05 kips	-1.92 kips
12.99 ft	-2.77 kips	2.19 kips	-0.58 kips
13.01 ft	-2.75 kips	2.19 kips	-0.55 kips
14.00 ft	-1.46 kips	2.33 kips	0.86 kips
15.00 ft	-0.09 kips	2.41 kips	2.32 kips
16.00 ft	1.36 kips	2.41 kips	3.77 kips
16.99 ft	2.88 kips	2.41 kips	5.29 kips
17.01 ft	2.94 kips	32.64 kips	35.58 kips
18.00 ft	7.60 kips	35.10 kips	42.70 kips
19.00 ft	12.65 kips	37.58 kips	50.24 kips
20.00 ft	18.05 kips	40.07 kips	58.12 kips
21.00 ft	23.79 kips	42.55 kips	66.35 kips
22.00 ft	29.88 kips	45.04 kips	74.92 kips
23.00 ft	36.32 kips	47.53 kips	83.84 kips
24.00 ft	43.10 kips	50.01 kips	93.11 kips
24.99 ft	50.15 kips	52.47 kips	102.62 kips

DD= 9.58 kips

Driving Resistance = (1.05 x DD + Factored Load)/ 0.65 + DD
= (1.05 x 9.58 + 243)/ 0.65 + 9.58 = 398.90 kips, say 399 kips

Bearing Capacity - Nominal
Skin Friction
End Bearing
Total Capacity
Depth (ft)
0
5
10
15
20
25
30
-40
-20
0
20
40
60
80
100
120
140
160
180
200
220
240
Capacity (kips)

DrivenPiles - Report

General Project Information

Filename: ...R 1 (US 27) Over Long Cane Creek\Working Files\Driven\Input\SR 1 (US 27)_BENT 2_HP14X89.dvn
Project Name: SR 1 (US 27) Over Long Crane Creek-Bent 2 HP 14X89
Project Client: Infrastructure Consulting & Engineering
Prepared By: Sharath Chikka
Project Manager: Santanu Sinharoy

Pile Information

Pile Type: H Pile
Top of Pile: 0.00 ft
Diameter of Pile: 14.70 in

Nominal Considerations

Water Table Depth At Time Of:

Drilling:	3.00 ft
Driving/Restrike:	12.00 ft
Nominal:	2.00 ft

Nominal Considations:

Local Scour:	0.00 ft
Long Term Scour:	0.00 ft
Soft Soil:	11.00 ft

Nominal Profile

Layer	Soil Type	Thickness	Setup Factor	Unit Weight	Strength	Nominal Curve
1	Cohesionless	1.00 ft	1.000	110.00 pcf	29.9/29.9	Nordlund
2	Cohesive	2.50 ft	1.000	110.00 pcf	1500.00 psf	T-79 Steel
3	Cohesive	4.00 ft	1.000	120.00 pcf	1500.00 psf	T-79 Steel
4	Cohesive	3.50 ft	1.000	110.00 pcf	1000.00 psf	T-79 Steel
5	Cohesionless	5.00 ft	1.000	110.00 pcf	29.6/29.6	Nordlund
6	Cohesionless	5.00 ft	1.000	110.00 pcf	29.8/29.8	Nordlund
7	Cohesionless	5.00 ft	1.000	130.00 pcf	35.7/35.7	Nordlund
8	Cohesionless	5.00 ft	1.000	120.00 pcf	32.1/32.1	Nordlund
9	Cohesionless	5.50 ft	1.000	130.00 pcf	35.1/35.1	Nordlund
10	Cohesionless	4.50 ft	1.000	135.00 pcf	42.0/42.0	Nordlund
11	Cohesionless	3.00 ft	1.000	135.00 pcf	42.0/42.0	Nordlund

Restrike - Skin Friction

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	24.27	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	24.27	N/A	0.09 kips
1.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	0.14 kips
1.99 ft	Cohesive	55.00 psf	24.27	1060.00 psf	5.08 kips
2.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	5.18 kips
3.00 ft	Cohesive	55.00 psf	24.27	1060.00 psf	10.16 kips
3.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	12.63 kips
3.51 ft	Cohesive	55.00 psf	24.27	1060.00 psf	12.73 kips
4.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	17.72 kips
5.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	22.75 kips
6.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	27.79 kips
7.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	32.77 kips
7.51 ft	Cohesive	55.00 psf	24.27	800.00 psf	32.86 kips
8.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	36.62 kips
9.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	40.42 kips
10.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	44.22 kips
10.99 ft	Cohesive	55.00 psf	24.27	800.00 psf	46.08 kips
11.01 ft	Cohesionless	1250.55 psf	24.04	N/A	46.14 kips
11.99 ft	Cohesionless	1304.45 psf	24.04	N/A	48.28 kips
12.01 ft	Cohesionless	1360.24 psf	24.04	N/A	48.32 kips
13.00 ft	Cohesionless	1383.80 psf	24.04	N/A	50.61 kips
14.00 ft	Cohesionless	1407.60 psf	24.04	N/A	53.00 kips
15.00 ft	Cohesionless	1431.40 psf	24.04	N/A	55.46 kips
15.99 ft	Cohesionless	1454.96 psf	24.04	N/A	57.98 kips
16.01 ft	Cohesionless	1550.64 psf	24.19	N/A	58.04 kips
17.00 ft	Cohesionless	1574.20 psf	24.19	N/A	60.67 kips
18.00 ft	Cohesionless	1598.00 psf	24.19	N/A	63.41 kips
19.00 ft	Cohesionless	1621.80 psf	24.19	N/A	66.23 kips
20.00 ft	Cohesionless	1645.60 psf	24.19	N/A	69.13 kips
20.99 ft	Cohesionless	1669.16 psf	24.19	N/A	72.08 kips
21.01 ft	Cohesionless	1788.74 psf	28.97	N/A	72.17 kips
22.00 ft	Cohesionless	1822.20 psf	28.97	N/A	77.51 kips
23.00 ft	Cohesionless	1856.00 psf	28.97	N/A	83.11 kips
24.00 ft	Cohesionless	1889.80 psf	28.97	N/A	88.91 kips
25.00 ft	Cohesionless	1923.60 psf	28.97	N/A	94.91 kips
25.99 ft	Cohesionless	1957.06 psf	28.97	N/A	101.05 kips
26.01 ft	Cohesionless	2126.69 psf	26.02	N/A	101.15 kips
27.00 ft	Cohesionless	2155.20 psf	26.02	N/A	105.65 kips
28.00 ft	Cohesionless	2184.00 psf	26.02	N/A	110.31 kips
29.00 ft	Cohesionless	2212.80 psf	26.02	N/A	115.09 kips

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
30.00 ft	Cohesionless	2241.60 psf	26.02	N/A	120.00 kips
30.99 ft	Cohesionless	2270.11 psf	26.02	N/A	124.97 kips
31.01 ft	Cohesionless	2414.74 psf	28.52	N/A	125.09 kips
32.00 ft	Cohesionless	2448.20 psf	28.52	N/A	131.78 kips
33.00 ft	Cohesionless	2482.00 psf	28.52	N/A	138.71 kips
34.00 ft	Cohesionless	2515.80 psf	28.52	N/A	145.84 kips
35.00 ft	Cohesionless	2549.60 psf	28.52	N/A	153.15 kips
36.00 ft	Cohesionless	2583.40 psf	28.52	N/A	160.65 kips
36.49 ft	Cohesionless	2599.96 psf	28.52	N/A	164.39 kips
36.51 ft	Cohesionless	2786.56 psf	34.10	N/A	164.60 kips
37.50 ft	Cohesionless	2822.50 psf	34.10	N/A	177.90 kips
38.50 ft	Cohesionless	2858.80 psf	34.10	N/A	191.68 kips
39.50 ft	Cohesionless	2895.10 psf	34.10	N/A	205.80 kips
40.50 ft	Cohesionless	2931.40 psf	34.10	N/A	220.27 kips
40.99 ft	Cohesionless	2949.19 psf	34.10	N/A	227.49 kips
41.01 ft	Cohesionless	3113.26 psf	34.10	N/A	227.78 kips
42.00 ft	Cohesionless	3149.20 psf	34.10	N/A	242.62 kips
43.00 ft	Cohesionless	3185.50 psf	34.10	N/A	257.96 kips
43.99 ft	Cohesionless	3221.44 psf	34.10	N/A	273.48 kips

Restrike - End Bearing

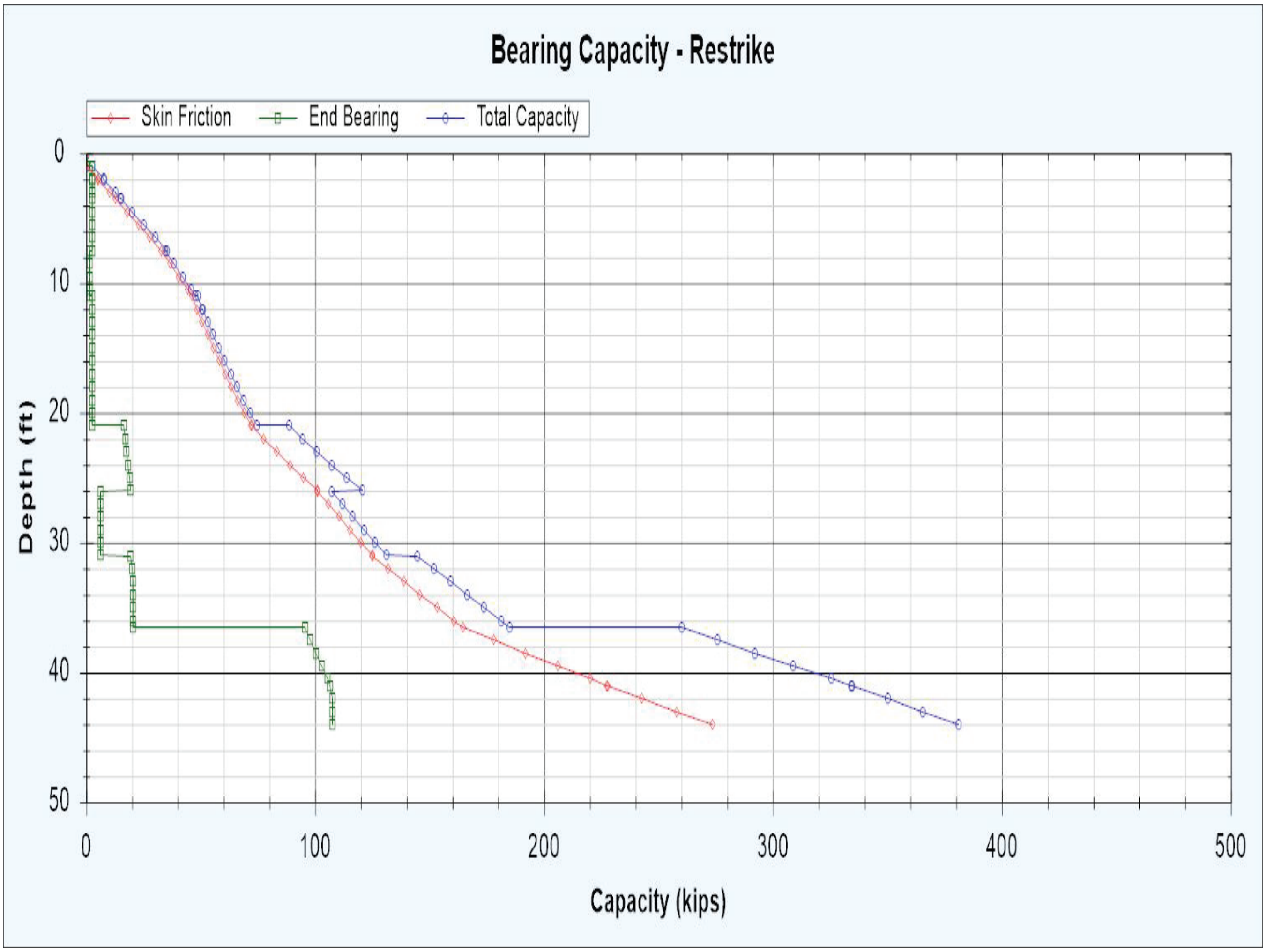
Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	1.10 psf	29.60	2.41 kips	0.00 kips
0.99 ft	Cohesionless	108.90 psf	29.60	2.41 kips	0.34 kips
1.01 ft	Cohesive	111.10 psf	0.00	N/A	2.45 kips
1.99 ft	Cohesive	218.90 psf	0.00	N/A	2.45 kips
2.01 ft	Cohesive	221.10 psf	0.00	N/A	2.45 kips
3.00 ft	Cohesive	330.00 psf	0.00	N/A	2.45 kips
3.49 ft	Cohesive	383.90 psf	0.00	N/A	2.45 kips
3.51 ft	Cohesive	386.20 psf	0.00	N/A	2.45 kips
4.50 ft	Cohesive	505.00 psf	0.00	N/A	2.45 kips
5.50 ft	Cohesive	625.00 psf	0.00	N/A	2.45 kips
6.50 ft	Cohesive	745.00 psf	0.00	N/A	2.45 kips
7.49 ft	Cohesive	863.80 psf	0.00	N/A	2.45 kips
7.51 ft	Cohesive	866.10 psf	0.00	N/A	1.63 kips
8.50 ft	Cohesive	975.00 psf	0.00	N/A	1.63 kips
9.50 ft	Cohesive	1085.00 psf	0.00	N/A	1.63 kips
10.50 ft	Cohesive	1195.00 psf	0.00	N/A	1.63 kips
10.99 ft	Cohesive	1248.90 psf	0.00	N/A	1.63 kips
11.01 ft	Cohesionless	1251.10 psf	28.60	2.41 kips	2.41 kips
11.99 ft	Cohesionless	1358.90 psf	28.60	2.41 kips	2.41 kips
12.01 ft	Cohesionless	1360.48 psf	28.60	2.41 kips	2.41 kips
13.00 ft	Cohesionless	1407.60 psf	28.60	2.41 kips	2.41 kips
14.00 ft	Cohesionless	1455.20 psf	28.60	2.41 kips	2.41 kips
15.00 ft	Cohesionless	1502.80 psf	28.60	2.41 kips	2.41 kips
15.99 ft	Cohesionless	1549.92 psf	28.60	2.41 kips	2.41 kips
16.01 ft	Cohesionless	1550.88 psf	29.24	2.41 kips	2.41 kips
17.00 ft	Cohesionless	1598.00 psf	29.24	2.41 kips	2.41 kips
18.00 ft	Cohesionless	1645.60 psf	29.24	2.41 kips	2.41 kips
19.00 ft	Cohesionless	1693.20 psf	29.24	2.41 kips	2.41 kips
20.00 ft	Cohesionless	1740.80 psf	29.24	2.41 kips	2.41 kips
20.99 ft	Cohesionless	1787.92 psf	29.24	2.41 kips	2.41 kips
21.01 ft	Cohesionless	1789.08 psf	73.25	24.93 kips	16.37 kips
22.00 ft	Cohesionless	1856.00 psf	73.25	24.93 kips	16.98 kips
23.00 ft	Cohesionless	1923.60 psf	73.25	24.93 kips	17.60 kips
24.00 ft	Cohesionless	1991.20 psf	73.25	24.93 kips	18.22 kips
25.00 ft	Cohesionless	2058.80 psf	73.25	24.93 kips	18.83 kips
25.99 ft	Cohesionless	2125.72 psf	73.25	24.93 kips	19.43 kips
26.01 ft	Cohesionless	2126.98 psf	40.66	6.11 kips	6.11 kips
27.00 ft	Cohesionless	2184.00 psf	40.66	6.11 kips	6.11 kips
28.00 ft	Cohesionless	2241.60 psf	40.66	6.11 kips	6.11 kips
29.00 ft	Cohesionless	2299.20 psf	40.66	6.11 kips	6.11 kips

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
30.00 ft	Cohesionless	2356.80 psf	40.66	6.11 kips	6.11 kips
30.99 ft	Cohesionless	2413.82 psf	40.66	6.11 kips	6.11 kips
31.01 ft	Cohesionless	2415.08 psf	65.63	20.46 kips	19.44 kips
32.00 ft	Cohesionless	2482.00 psf	65.63	20.46 kips	19.96 kips
33.00 ft	Cohesionless	2549.60 psf	65.63	20.46 kips	20.46 kips
34.00 ft	Cohesionless	2617.20 psf	65.63	20.46 kips	20.46 kips
35.00 ft	Cohesionless	2684.80 psf	65.63	20.46 kips	20.46 kips
36.00 ft	Cohesionless	2752.40 psf	65.63	20.46 kips	20.46 kips
36.49 ft	Cohesionless	2785.52 psf	65.63	20.46 kips	20.46 kips
36.51 ft	Cohesionless	2786.93 psf	244.00	107.40 kips	95.40 kips
37.50 ft	Cohesionless	2858.80 psf	244.00	107.40 kips	97.86 kips
38.50 ft	Cohesionless	2931.40 psf	244.00	107.40 kips	100.34 kips
39.50 ft	Cohesionless	3004.00 psf	244.00	107.40 kips	102.83 kips
40.50 ft	Cohesionless	3076.60 psf	244.00	107.40 kips	105.31 kips
40.99 ft	Cohesionless	3112.17 psf	244.00	107.40 kips	106.53 kips
41.01 ft	Cohesionless	3113.63 psf	244.00	107.40 kips	106.58 kips
42.00 ft	Cohesionless	3185.50 psf	244.00	107.40 kips	107.40 kips
43.00 ft	Cohesionless	3258.10 psf	244.00	107.40 kips	107.40 kips
43.99 ft	Cohesionless	3329.97 psf	244.00	107.40 kips	107.40 kips

Restrike - Summary of Capacities

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	0.09 kips	0.34 kips	0.43 kips
1.01 ft	0.14 kips	2.45 kips	2.59 kips
1.99 ft	5.08 kips	2.45 kips	7.53 kips
2.01 ft	5.18 kips	2.45 kips	7.63 kips
3.00 ft	10.16 kips	2.45 kips	12.61 kips
3.49 ft	12.63 kips	2.45 kips	15.08 kips
3.51 ft	12.73 kips	2.45 kips	15.18 kips
4.50 ft	17.72 kips	2.45 kips	20.16 kips
5.50 ft	22.75 kips	2.45 kips	25.20 kips
6.50 ft	27.79 kips	2.45 kips	30.23 kips
7.49 ft	32.77 kips	2.45 kips	35.22 kips
7.51 ft	32.86 kips	1.63 kips	34.49 kips
8.50 ft	36.62 kips	1.63 kips	38.25 kips
9.50 ft	40.42 kips	1.63 kips	42.05 kips
10.50 ft	44.22 kips	1.63 kips	45.85 kips
10.99 ft	46.08 kips	1.63 kips	47.71 kips
11.01 ft	46.14 kips	2.41 kips	48.56 kips
11.99 ft	48.28 kips	2.41 kips	50.69 kips
12.01 ft	48.32 kips	2.41 kips	50.74 kips
13.00 ft	50.61 kips	2.41 kips	53.02 kips
14.00 ft	53.00 kips	2.41 kips	55.41 kips
15.00 ft	55.46 kips	2.41 kips	57.88 kips
15.99 ft	57.98 kips	2.41 kips	60.40 kips
16.01 ft	58.04 kips	2.41 kips	60.45 kips
17.00 ft	60.67 kips	2.41 kips	63.08 kips
18.00 ft	63.41 kips	2.41 kips	65.82 kips
19.00 ft	66.23 kips	2.41 kips	68.65 kips
20.00 ft	69.13 kips	2.41 kips	71.55 kips
20.99 ft	72.08 kips	2.41 kips	74.50 kips
21.01 ft	72.17 kips	16.37 kips	88.53 kips
22.00 ft	77.51 kips	16.98 kips	94.49 kips
23.00 ft	83.11 kips	17.60 kips	100.71 kips
24.00 ft	88.91 kips	18.22 kips	107.13 kips
25.00 ft	94.91 kips	18.83 kips	113.74 kips
25.99 ft	101.05 kips	19.43 kips	120.47 kips
26.01 ft	101.15 kips	6.11 kips	107.26 kips
27.00 ft	105.65 kips	6.11 kips	111.76 kips
28.00 ft	110.31 kips	6.11 kips	116.42 kips
29.00 ft	115.09 kips	6.11 kips	121.20 kips
30.00 ft	120.00 kips	6.11 kips	126.11 kips

Depth	Skin Friction	End Bearing	Total Capacity
30.99 ft	124.97 kips	6.11 kips	131.08 kips
31.01 ft	125.09 kips	19.44 kips	144.53 kips
32.00 ft	131.78 kips	19.96 kips	151.73 kips
33.00 ft	138.71 kips	20.46 kips	159.17 kips
34.00 ft	145.84 kips	20.46 kips	166.30 kips
35.00 ft	153.15 kips	20.46 kips	173.61 kips
36.00 ft	160.65 kips	20.46 kips	181.11 kips
36.49 ft	164.39 kips	20.46 kips	184.85 kips
36.51 ft	164.60 kips	95.40 kips	259.99 kips
37.50 ft	177.90 kips	97.86 kips	275.76 kips
38.50 ft	191.68 kips	100.34 kips	292.02 kips
39.50 ft	205.80 kips	102.83 kips	308.63 kips
40.50 ft	220.27 kips	105.31 kips	325.58 kips
40.99 ft	227.49 kips	106.53 kips	334.02 kips
41.01 ft	227.78 kips	106.58 kips	334.36 kips
42.00 ft	242.62 kips	107.40 kips	350.02 kips
43.00 ft	257.96 kips	107.40 kips	365.36 kips
43.99 ft	273.48 kips	107.40 kips	380.88 kips



Bearing Capacity - Restrike
Skin Friction
End Bearing
Total Capacity
Depth (ft)
0
10
20
30
40
50
0
100
200
300
400
500
Capacity (kips)

Driving - Skin Friction

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	24.27	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	24.27	N/A	0.09 kips
1.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	0.14 kips
1.99 ft	Cohesive	55.00 psf	24.27	1060.00 psf	5.08 kips
2.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	5.18 kips
3.00 ft	Cohesive	55.00 psf	24.27	1060.00 psf	10.16 kips
3.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	12.63 kips
3.51 ft	Cohesive	55.00 psf	24.27	1060.00 psf	12.73 kips
4.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	17.72 kips
5.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	22.75 kips
6.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	27.79 kips
7.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	32.77 kips
7.51 ft	Cohesive	55.00 psf	24.27	800.00 psf	32.86 kips
8.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	36.62 kips
9.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	40.42 kips
10.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	44.22 kips
10.99 ft	Cohesive	55.00 psf	24.27	800.00 psf	46.08 kips
11.01 ft	Cohesionless	1250.55 psf	24.04	N/A	46.14 kips
11.99 ft	Cohesionless	1304.45 psf	24.04	N/A	48.28 kips
12.01 ft	Cohesionless	1360.24 psf	24.04	N/A	48.32 kips
13.00 ft	Cohesionless	1383.80 psf	24.04	N/A	50.61 kips
14.00 ft	Cohesionless	1407.60 psf	24.04	N/A	53.00 kips
15.00 ft	Cohesionless	1431.40 psf	24.04	N/A	55.46 kips
15.99 ft	Cohesionless	1454.96 psf	24.04	N/A	57.98 kips
16.01 ft	Cohesionless	1550.64 psf	24.19	N/A	58.04 kips
17.00 ft	Cohesionless	1574.20 psf	24.19	N/A	60.67 kips
18.00 ft	Cohesionless	1598.00 psf	24.19	N/A	63.41 kips
19.00 ft	Cohesionless	1621.80 psf	24.19	N/A	66.23 kips
20.00 ft	Cohesionless	1645.60 psf	24.19	N/A	69.13 kips
20.99 ft	Cohesionless	1669.16 psf	24.19	N/A	72.08 kips
21.01 ft	Cohesionless	1788.74 psf	28.97	N/A	72.17 kips
22.00 ft	Cohesionless	1822.20 psf	28.97	N/A	77.51 kips
23.00 ft	Cohesionless	1856.00 psf	28.97	N/A	83.11 kips
24.00 ft	Cohesionless	1889.80 psf	28.97	N/A	88.91 kips
25.00 ft	Cohesionless	1923.60 psf	28.97	N/A	94.91 kips
25.99 ft	Cohesionless	1957.06 psf	28.97	N/A	101.05 kips
26.01 ft	Cohesionless	2126.69 psf	26.02	N/A	101.15 kips
27.00 ft	Cohesionless	2155.20 psf	26.02	N/A	105.65 kips
28.00 ft	Cohesionless	2184.00 psf	26.02	N/A	110.31 kips
29.00 ft	Cohesionless	2212.80 psf	26.02	N/A	115.09 kips

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
30.00 ft	Cohesionless	2241.60 psf	26.02	N/A	120.00 kips
30.99 ft	Cohesionless	2270.11 psf	26.02	N/A	124.97 kips
31.01 ft	Cohesionless	2414.74 psf	28.52	N/A	125.09 kips
32.00 ft	Cohesionless	2448.20 psf	28.52	N/A	131.78 kips
33.00 ft	Cohesionless	2482.00 psf	28.52	N/A	138.71 kips
34.00 ft	Cohesionless	2515.80 psf	28.52	N/A	145.84 kips
35.00 ft	Cohesionless	2549.60 psf	28.52	N/A	153.15 kips
36.00 ft	Cohesionless	2583.40 psf	28.52	N/A	160.65 kips
36.49 ft	Cohesionless	2599.96 psf	28.52	N/A	164.39 kips
36.51 ft	Cohesionless	2786.56 psf	34.10	N/A	164.60 kips
37.50 ft	Cohesionless	2822.50 psf	34.10	N/A	177.90 kips
38.50 ft	Cohesionless	2858.80 psf	34.10	N/A	191.68 kips
39.50 ft	Cohesionless	2895.10 psf	34.10	N/A	205.80 kips
40.50 ft	Cohesionless	2931.40 psf	34.10	N/A	220.27 kips
40.99 ft	Cohesionless	2949.19 psf	34.10	N/A	227.49 kips
41.01 ft	Cohesionless	3113.26 psf	34.10	N/A	227.78 kips
42.00 ft	Cohesionless	3149.20 psf	34.10	N/A	242.62 kips
43.00 ft	Cohesionless	3185.50 psf	34.10	N/A	257.96 kips
43.99 ft	Cohesionless	3221.44 psf	34.10	N/A	273.48 kips

Driving - End Bearing

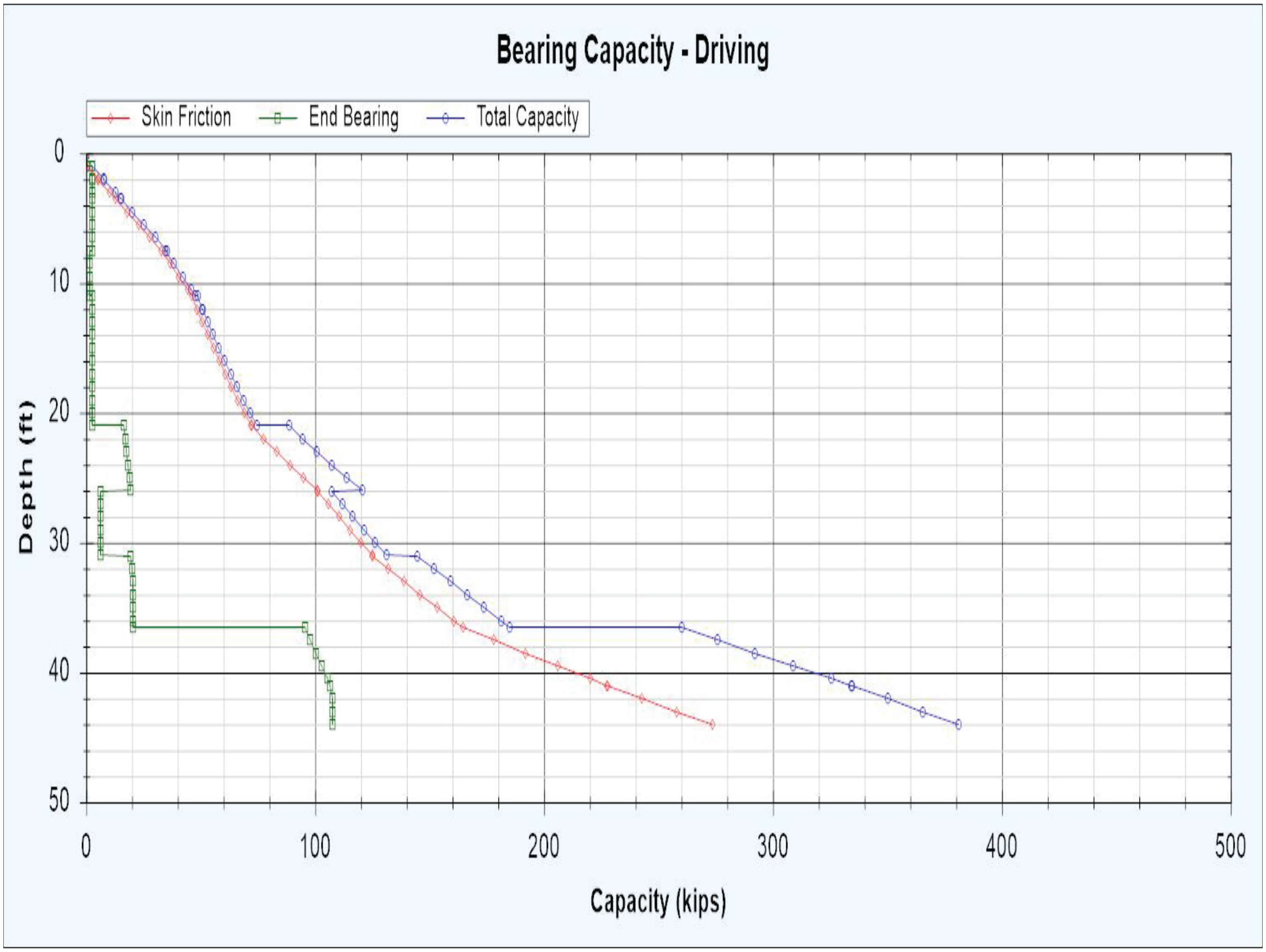
Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	1.10 psf	29.60	2.41 kips	0.00 kips
0.99 ft	Cohesionless	108.90 psf	29.60	2.41 kips	0.34 kips
1.01 ft	Cohesive	111.10 psf	0.00	N/A	2.45 kips
1.99 ft	Cohesive	218.90 psf	0.00	N/A	2.45 kips
2.01 ft	Cohesive	221.10 psf	0.00	N/A	2.45 kips
3.00 ft	Cohesive	330.00 psf	0.00	N/A	2.45 kips
3.49 ft	Cohesive	383.90 psf	0.00	N/A	2.45 kips
3.51 ft	Cohesive	386.20 psf	0.00	N/A	2.45 kips
4.50 ft	Cohesive	505.00 psf	0.00	N/A	2.45 kips
5.50 ft	Cohesive	625.00 psf	0.00	N/A	2.45 kips
6.50 ft	Cohesive	745.00 psf	0.00	N/A	2.45 kips
7.49 ft	Cohesive	863.80 psf	0.00	N/A	2.45 kips
7.51 ft	Cohesive	866.10 psf	0.00	N/A	1.63 kips
8.50 ft	Cohesive	975.00 psf	0.00	N/A	1.63 kips
9.50 ft	Cohesive	1085.00 psf	0.00	N/A	1.63 kips
10.50 ft	Cohesive	1195.00 psf	0.00	N/A	1.63 kips
10.99 ft	Cohesive	1248.90 psf	0.00	N/A	1.63 kips
11.01 ft	Cohesionless	1251.10 psf	28.60	2.41 kips	2.41 kips
11.99 ft	Cohesionless	1358.90 psf	28.60	2.41 kips	2.41 kips
12.01 ft	Cohesionless	1360.48 psf	28.60	2.41 kips	2.41 kips
13.00 ft	Cohesionless	1407.60 psf	28.60	2.41 kips	2.41 kips
14.00 ft	Cohesionless	1455.20 psf	28.60	2.41 kips	2.41 kips
15.00 ft	Cohesionless	1502.80 psf	28.60	2.41 kips	2.41 kips
15.99 ft	Cohesionless	1549.92 psf	28.60	2.41 kips	2.41 kips
16.01 ft	Cohesionless	1550.88 psf	29.24	2.41 kips	2.41 kips
17.00 ft	Cohesionless	1598.00 psf	29.24	2.41 kips	2.41 kips
18.00 ft	Cohesionless	1645.60 psf	29.24	2.41 kips	2.41 kips
19.00 ft	Cohesionless	1693.20 psf	29.24	2.41 kips	2.41 kips
20.00 ft	Cohesionless	1740.80 psf	29.24	2.41 kips	2.41 kips
20.99 ft	Cohesionless	1787.92 psf	29.24	2.41 kips	2.41 kips
21.01 ft	Cohesionless	1789.08 psf	73.25	24.93 kips	16.37 kips
22.00 ft	Cohesionless	1856.00 psf	73.25	24.93 kips	16.98 kips
23.00 ft	Cohesionless	1923.60 psf	73.25	24.93 kips	17.60 kips
24.00 ft	Cohesionless	1991.20 psf	73.25	24.93 kips	18.22 kips
25.00 ft	Cohesionless	2058.80 psf	73.25	24.93 kips	18.83 kips
25.99 ft	Cohesionless	2125.72 psf	73.25	24.93 kips	19.43 kips
26.01 ft	Cohesionless	2126.98 psf	40.66	6.11 kips	6.11 kips
27.00 ft	Cohesionless	2184.00 psf	40.66	6.11 kips	6.11 kips
28.00 ft	Cohesionless	2241.60 psf	40.66	6.11 kips	6.11 kips
29.00 ft	Cohesionless	2299.20 psf	40.66	6.11 kips	6.11 kips

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
30.00 ft	Cohesionless	2356.80 psf	40.66	6.11 kips	6.11 kips
30.99 ft	Cohesionless	2413.82 psf	40.66	6.11 kips	6.11 kips
31.01 ft	Cohesionless	2415.08 psf	65.63	20.46 kips	19.44 kips
32.00 ft	Cohesionless	2482.00 psf	65.63	20.46 kips	19.96 kips
33.00 ft	Cohesionless	2549.60 psf	65.63	20.46 kips	20.46 kips
34.00 ft	Cohesionless	2617.20 psf	65.63	20.46 kips	20.46 kips
35.00 ft	Cohesionless	2684.80 psf	65.63	20.46 kips	20.46 kips
36.00 ft	Cohesionless	2752.40 psf	65.63	20.46 kips	20.46 kips
36.49 ft	Cohesionless	2785.52 psf	65.63	20.46 kips	20.46 kips
36.51 ft	Cohesionless	2786.93 psf	244.00	107.40 kips	95.40 kips
37.50 ft	Cohesionless	2858.80 psf	244.00	107.40 kips	97.86 kips
38.50 ft	Cohesionless	2931.40 psf	244.00	107.40 kips	100.34 kips
39.50 ft	Cohesionless	3004.00 psf	244.00	107.40 kips	102.83 kips
40.50 ft	Cohesionless	3076.60 psf	244.00	107.40 kips	105.31 kips
40.99 ft	Cohesionless	3112.17 psf	244.00	107.40 kips	106.53 kips
41.01 ft	Cohesionless	3113.63 psf	244.00	107.40 kips	106.58 kips
42.00 ft	Cohesionless	3185.50 psf	244.00	107.40 kips	107.40 kips
43.00 ft	Cohesionless	3258.10 psf	244.00	107.40 kips	107.40 kips
43.99 ft	Cohesionless	3329.97 psf	244.00	107.40 kips	107.40 kips

Driving - Summary of Capacities

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	0.09 kips	0.34 kips	0.43 kips
1.01 ft	0.14 kips	2.45 kips	2.59 kips
1.99 ft	5.08 kips	2.45 kips	7.53 kips
2.01 ft	5.18 kips	2.45 kips	7.63 kips
3.00 ft	10.16 kips	2.45 kips	12.61 kips
3.49 ft	12.63 kips	2.45 kips	15.08 kips
3.51 ft	12.73 kips	2.45 kips	15.18 kips
4.50 ft	17.72 kips	2.45 kips	20.16 kips
5.50 ft	22.75 kips	2.45 kips	25.20 kips
6.50 ft	27.79 kips	2.45 kips	30.23 kips
7.49 ft	32.77 kips	2.45 kips	35.22 kips
7.51 ft	32.86 kips	1.63 kips	34.49 kips
8.50 ft	36.62 kips	1.63 kips	38.25 kips
9.50 ft	40.42 kips	1.63 kips	42.05 kips
10.50 ft	44.22 kips	1.63 kips	45.85 kips
10.99 ft	46.08 kips	1.63 kips	47.71 kips
11.01 ft	46.14 kips	2.41 kips	48.56 kips
11.99 ft	48.28 kips	2.41 kips	50.69 kips
12.01 ft	48.32 kips	2.41 kips	50.74 kips
13.00 ft	50.61 kips	2.41 kips	53.02 kips
14.00 ft	53.00 kips	2.41 kips	55.41 kips
15.00 ft	55.46 kips	2.41 kips	57.88 kips
15.99 ft	57.98 kips	2.41 kips	60.40 kips
16.01 ft	58.04 kips	2.41 kips	60.45 kips
17.00 ft	60.67 kips	2.41 kips	63.08 kips
18.00 ft	63.41 kips	2.41 kips	65.82 kips
19.00 ft	66.23 kips	2.41 kips	68.65 kips
20.00 ft	69.13 kips	2.41 kips	71.55 kips
20.99 ft	72.08 kips	2.41 kips	74.50 kips
21.01 ft	72.17 kips	16.37 kips	88.53 kips
22.00 ft	77.51 kips	16.98 kips	94.49 kips
23.00 ft	83.11 kips	17.60 kips	100.71 kips
24.00 ft	88.91 kips	18.22 kips	107.13 kips
25.00 ft	94.91 kips	18.83 kips	113.74 kips
25.99 ft	101.05 kips	19.43 kips	120.47 kips
26.01 ft	101.15 kips	6.11 kips	107.26 kips
27.00 ft	105.65 kips	6.11 kips	111.76 kips
28.00 ft	110.31 kips	6.11 kips	116.42 kips
29.00 ft	115.09 kips	6.11 kips	121.20 kips
30.00 ft	120.00 kips	6.11 kips	126.11 kips

Depth	Skin Friction	End Bearing	Total Capacity
30.99 ft	124.97 kips	6.11 kips	131.08 kips
31.01 ft	125.09 kips	19.44 kips	144.53 kips
32.00 ft	131.78 kips	19.96 kips	151.73 kips
33.00 ft	138.71 kips	20.46 kips	159.17 kips
34.00 ft	145.84 kips	20.46 kips	166.30 kips
35.00 ft	153.15 kips	20.46 kips	173.61 kips
36.00 ft	160.65 kips	20.46 kips	181.11 kips
36.49 ft	164.39 kips	20.46 kips	184.85 kips
36.51 ft	164.60 kips	95.40 kips	259.99 kips
37.50 ft	177.90 kips	97.86 kips	275.76 kips
38.50 ft	191.68 kips	100.34 kips	292.02 kips
39.50 ft	205.80 kips	102.83 kips	308.63 kips
40.50 ft	220.27 kips	105.31 kips	325.58 kips
40.99 ft	227.49 kips	106.53 kips	334.02 kips
41.01 ft	227.78 kips	106.58 kips	334.36 kips
42.00 ft	242.62 kips	107.40 kips	350.02 kips
43.00 ft	257.96 kips	107.40 kips	365.36 kips
43.99 ft	273.48 kips	107.40 kips	380.88 kips



Bearing Capacity - Driving
Skin Friction
End Bearing
Total Capacity
Depth (ft)
Capacity (kips)
0
10
20
30
40
50
0
100
200
300
400
500

Nominal - Skin Friction

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	24.27	N/A	0.00 kips
0.99 ft	Cohesionless	54.45 psf	24.27	N/A	-0.09 kips
1.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-0.14 kips
1.99 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-5.08 kips
2.01 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-5.18 kips
3.00 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-10.16 kips
3.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-12.63 kips
3.51 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-12.73 kips
4.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-17.72 kips
5.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-22.75 kips
6.50 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-27.79 kips
7.49 ft	Cohesive	55.00 psf	24.27	1060.00 psf	-32.77 kips
7.51 ft	Cohesive	55.00 psf	24.27	800.00 psf	-32.86 kips
8.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	-36.62 kips
9.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	-40.42 kips
10.50 ft	Cohesive	55.00 psf	24.27	800.00 psf	-44.22 kips
10.99 ft	Cohesive	55.00 psf	24.27	800.00 psf	-46.08 kips
11.01 ft	Cohesionless	688.64 psf	24.04	N/A	-46.07 kips
11.99 ft	Cohesionless	711.96 psf	24.04	N/A	-44.91 kips
12.01 ft	Cohesionless	736.24 psf	24.04	N/A	-44.88 kips
13.00 ft	Cohesionless	759.80 psf	24.04	N/A	-43.63 kips
14.00 ft	Cohesionless	783.60 psf	24.04	N/A	-42.28 kips
15.00 ft	Cohesionless	807.40 psf	24.04	N/A	-40.85 kips
15.99 ft	Cohesionless	830.96 psf	24.04	N/A	-39.36 kips
16.01 ft	Cohesionless	926.64 psf	24.19	N/A	-39.33 kips
17.00 ft	Cohesionless	950.20 psf	24.19	N/A	-37.74 kips
18.00 ft	Cohesionless	974.00 psf	24.19	N/A	-36.06 kips
19.00 ft	Cohesionless	997.80 psf	24.19	N/A	-34.29 kips
20.00 ft	Cohesionless	1021.60 psf	24.19	N/A	-32.44 kips
20.99 ft	Cohesionless	1045.16 psf	24.19	N/A	-30.54 kips
21.01 ft	Cohesionless	1164.74 psf	28.97	N/A	-30.48 kips
22.00 ft	Cohesionless	1198.20 psf	28.97	N/A	-26.97 kips
23.00 ft	Cohesionless	1232.00 psf	28.97	N/A	-23.22 kips
24.00 ft	Cohesionless	1265.80 psf	28.97	N/A	-19.27 kips
25.00 ft	Cohesionless	1299.60 psf	28.97	N/A	-15.11 kips
25.99 ft	Cohesionless	1333.06 psf	28.97	N/A	-10.81 kips
26.01 ft	Cohesionless	1502.69 psf	26.02	N/A	-10.73 kips
27.00 ft	Cohesionless	1531.20 psf	26.02	N/A	-7.54 kips
28.00 ft	Cohesionless	1560.00 psf	26.02	N/A	-4.19 kips
29.00 ft	Cohesionless	1588.80 psf	26.02	N/A	-0.72 kips

Depth	Soil Type	Effective Stress at Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
30.00 ft	Cohesionless	1617.60 psf	26.02	N/A	2.87 kips
30.99 ft	Cohesionless	1646.11 psf	26.02	N/A	6.54 kips
31.01 ft	Cohesionless	1790.74 psf	28.52	N/A	6.63 kips
32.00 ft	Cohesionless	1824.20 psf	28.52	N/A	11.61 kips
33.00 ft	Cohesionless	1858.00 psf	28.52	N/A	16.83 kips
34.00 ft	Cohesionless	1891.80 psf	28.52	N/A	22.23 kips
35.00 ft	Cohesionless	1925.60 psf	28.52	N/A	27.82 kips
36.00 ft	Cohesionless	1959.40 psf	28.52	N/A	33.60 kips
36.49 ft	Cohesionless	1975.96 psf	28.52	N/A	36.49 kips
36.51 ft	Cohesionless	2162.56 psf	34.10	N/A	36.66 kips
37.50 ft	Cohesionless	2198.50 psf	34.10	N/A	47.02 kips
38.50 ft	Cohesionless	2234.80 psf	34.10	N/A	57.83 kips
39.50 ft	Cohesionless	2271.10 psf	34.10	N/A	68.98 kips
40.50 ft	Cohesionless	2307.40 psf	34.10	N/A	80.48 kips
40.99 ft	Cohesionless	2325.19 psf	34.10	N/A	86.24 kips
41.01 ft	Cohesionless	2489.26 psf	34.10	N/A	86.48 kips
42.00 ft	Cohesionless	2525.20 psf	34.10	N/A	98.38 kips
43.00 ft	Cohesionless	2561.50 psf	34.10	N/A	110.74 kips
43.99 ft	Cohesionless	2597.44 psf	34.10	N/A	123.32 kips

Nominal - End Bearing

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
0.01 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
0.99 ft	Cohesionless	0.00 psf	0.00	0.00 kips	0.00 kips
1.01 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
1.99 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
2.01 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
3.00 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
3.49 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
3.51 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
4.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
5.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
6.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
7.49 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
7.51 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
8.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
9.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
10.50 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
10.99 ft	Cohesive	0.00 psf	0.00	N/A	0.00 kips
11.01 ft	Cohesionless	688.88 psf	28.60	2.41 kips	2.04 kips
11.99 ft	Cohesionless	735.52 psf	28.60	2.41 kips	2.18 kips
12.01 ft	Cohesionless	736.48 psf	28.60	2.41 kips	2.18 kips
13.00 ft	Cohesionless	783.60 psf	28.60	2.41 kips	2.32 kips
14.00 ft	Cohesionless	831.20 psf	28.60	2.41 kips	2.41 kips
15.00 ft	Cohesionless	878.80 psf	28.60	2.41 kips	2.41 kips
15.99 ft	Cohesionless	925.92 psf	28.60	2.41 kips	2.41 kips
16.01 ft	Cohesionless	926.88 psf	29.24	2.41 kips	2.41 kips
17.00 ft	Cohesionless	974.00 psf	29.24	2.41 kips	2.41 kips
18.00 ft	Cohesionless	1021.60 psf	29.24	2.41 kips	2.41 kips
19.00 ft	Cohesionless	1069.20 psf	29.24	2.41 kips	2.41 kips
20.00 ft	Cohesionless	1116.80 psf	29.24	2.41 kips	2.41 kips
20.99 ft	Cohesionless	1163.92 psf	29.24	2.41 kips	2.41 kips
21.01 ft	Cohesionless	1165.08 psf	73.25	24.93 kips	10.66 kips
22.00 ft	Cohesionless	1232.00 psf	73.25	24.93 kips	11.27 kips
23.00 ft	Cohesionless	1299.60 psf	73.25	24.93 kips	11.89 kips
24.00 ft	Cohesionless	1367.20 psf	73.25	24.93 kips	12.51 kips
25.00 ft	Cohesionless	1434.80 psf	73.25	24.93 kips	13.12 kips
25.99 ft	Cohesionless	1501.72 psf	73.25	24.93 kips	13.72 kips
26.01 ft	Cohesionless	1502.98 psf	40.66	6.11 kips	6.11 kips
27.00 ft	Cohesionless	1560.00 psf	40.66	6.11 kips	6.11 kips
28.00 ft	Cohesionless	1617.60 psf	40.66	6.11 kips	6.11 kips
29.00 ft	Cohesionless	1675.20 psf	40.66	6.11 kips	6.11 kips

Depth	Soil Type	Effective Stress at Midpoint	Bearing Capacity Factor	End Bearing (Limiting)	End Bearing
30.00 ft	Cohesionless	1732.80 psf	40.66	6.11 kips	6.11 kips
30.99 ft	Cohesionless	1789.82 psf	40.66	6.11 kips	6.11 kips
31.01 ft	Cohesionless	1791.08 psf	65.63	20.46 kips	14.42 kips
32.00 ft	Cohesionless	1858.00 psf	65.63	20.46 kips	14.94 kips
33.00 ft	Cohesionless	1925.60 psf	65.63	20.46 kips	15.47 kips
34.00 ft	Cohesionless	1993.20 psf	65.63	20.46 kips	15.99 kips
35.00 ft	Cohesionless	2060.80 psf	65.63	20.46 kips	16.52 kips
36.00 ft	Cohesionless	2128.40 psf	65.63	20.46 kips	17.04 kips
36.49 ft	Cohesionless	2161.52 psf	65.63	20.46 kips	17.29 kips
36.51 ft	Cohesionless	2162.93 psf	244.00	107.40 kips	74.04 kips
37.50 ft	Cohesionless	2234.80 psf	244.00	107.40 kips	76.50 kips
38.50 ft	Cohesionless	2307.40 psf	244.00	107.40 kips	78.98 kips
39.50 ft	Cohesionless	2380.00 psf	244.00	107.40 kips	81.47 kips
40.50 ft	Cohesionless	2452.60 psf	244.00	107.40 kips	83.95 kips
40.99 ft	Cohesionless	2488.17 psf	244.00	107.40 kips	85.17 kips
41.01 ft	Cohesionless	2489.63 psf	244.00	107.40 kips	85.22 kips
42.00 ft	Cohesionless	2561.50 psf	244.00	107.40 kips	87.68 kips
43.00 ft	Cohesionless	2634.10 psf	244.00	107.40 kips	90.17 kips
43.99 ft	Cohesionless	2705.97 psf	244.00	107.40 kips	92.63 kips

Elev. 667' at Depth "0"

Nominal - Summary of Capacities

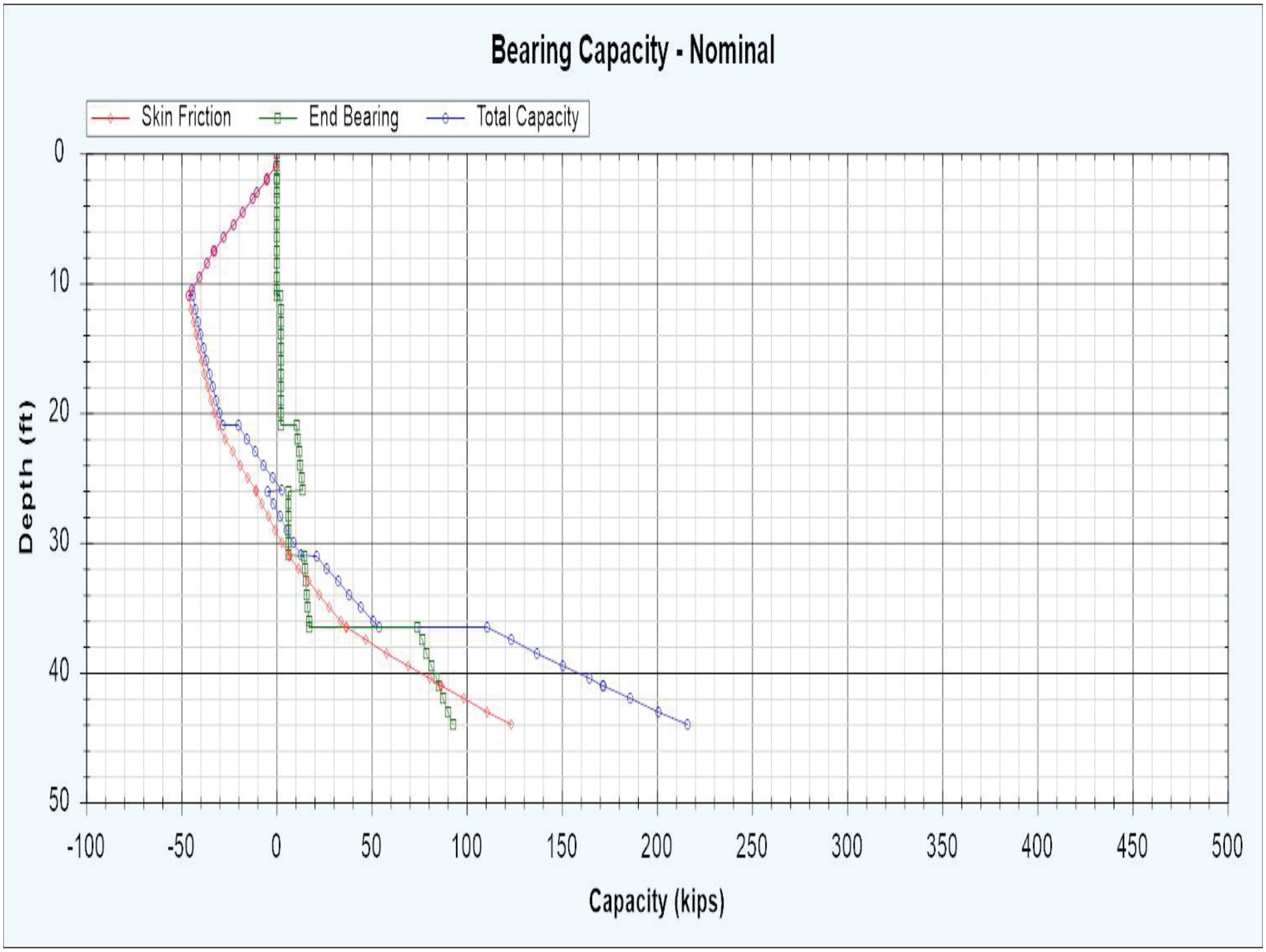
Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 kips	0.00 kips	0.00 kips
0.99 ft	-0.09 kips	0.00 kips	-0.09 kips
1.01 ft	-0.14 kips	0.00 kips	-0.14 kips
1.99 ft	-5.08 kips	0.00 kips	-5.08 kips
2.01 ft	-5.18 kips	0.00 kips	-5.18 kips
3.00 ft	-10.16 kips	0.00 kips	-10.16 kips
3.49 ft	-12.63 kips	0.00 kips	-12.63 kips
3.51 ft	-12.73 kips	0.00 kips	-12.73 kips
4.50 ft	-17.72 kips	0.00 kips	-17.72 kips
5.50 ft	-22.75 kips	0.00 kips	-22.75 kips
6.50 ft	-27.79 kips	0.00 kips	-27.79 kips
7.49 ft	-32.77 kips	0.00 kips	-32.77 kips
7.51 ft	-32.86 kips	0.00 kips	-32.86 kips
8.50 ft	-36.62 kips	0.00 kips	-36.62 kips
9.50 ft	-40.42 kips	0.00 kips	-40.42 kips
10.50 ft	-44.22 kips	0.00 kips	-44.22 kips
10.99 ft	-46.08 kips	0.00 kips	-46.08 kips
11.01 ft	-46.07 kips	2.04 kips	-44.03 kips
11.99 ft	-44.91 kips	2.18 kips	-42.73 kips
12.01 ft	-44.88 kips	2.18 kips	-42.70 kips
13.00 ft	-43.63 kips	2.32 kips	-41.31 kips
14.00 ft	-42.28 kips	2.41 kips	-39.87 kips
15.00 ft	-40.85 kips	2.41 kips	-38.44 kips
15.99 ft	-39.36 kips	2.41 kips	-36.95 kips
16.01 ft	-39.33 kips	2.41 kips	-36.92 kips
17.00 ft	-37.74 kips	2.41 kips	-35.33 kips
18.00 ft	-36.06 kips	2.41 kips	-33.64 kips
19.00 ft	-34.29 kips	2.41 kips	-31.88 kips
20.00 ft	-32.44 kips	2.41 kips	-30.03 kips
20.99 ft	-30.54 kips	2.41 kips	-28.12 kips
21.01 ft	-30.48 kips	10.66 kips	-19.82 kips
22.00 ft	-26.97 kips	11.27 kips	-15.70 kips
23.00 ft	-23.22 kips	11.89 kips	-11.33 kips
24.00 ft	-19.27 kips	12.51 kips	-6.76 kips
25.00 ft	-15.11 kips	13.12 kips	-1.99 kips
25.99 ft	-10.81 kips	13.72 kips	2.92 kips
26.01 ft	-10.73 kips	6.11 kips	-4.62 kips
27.00 ft	-7.54 kips	6.11 kips	-1.43 kips
28.00 ft	-4.19 kips	6.11 kips	1.92 kips
29.00 ft	-0.72 kips	6.11 kips	5.39 kips
30.00 ft	2.87 kips	6.11 kips	8.98 kips

DD= 46.08 kips

Driving Resistance = (1.05 x DD + Factored Load)/ 0.65 + DD

= (1.05 x 46.08 + 241)/ 0.65 + 46.08 = 491.29 kips, say 491 kips

Depth	Skin Friction	End Bearing	Total Capacity
30.99 ft	6.54 kips	6.11 kips	12.65 kips
31.01 ft	6.63 kips	14.42 kips	21.05 kips
32.00 ft	11.61 kips	14.94 kips	26.55 kips
33.00 ft	16.83 kips	15.47 kips	32.29 kips
34.00 ft	22.23 kips	15.99 kips	38.22 kips
35.00 ft	27.82 kips	16.52 kips	44.34 kips
36.00 ft	33.60 kips	17.04 kips	50.64 kips
36.49 ft	36.49 kips	17.29 kips	53.79 kips
36.51 ft	36.66 kips	74.04 kips	110.69 kips
37.50 ft	47.02 kips	76.50 kips	123.52 kips
38.50 ft	57.83 kips	78.98 kips	136.81 kips
39.50 ft	68.98 kips	81.47 kips	150.45 kips
40.50 ft	80.48 kips	83.95 kips	164.43 kips
40.99 ft	86.24 kips	85.17 kips	171.41 kips
41.01 ft	86.48 kips	85.22 kips	171.70 kips
42.00 ft	98.38 kips	87.68 kips	186.06 kips
43.00 ft	110.74 kips	90.17 kips	200.91 kips
43.99 ft	123.32 kips	92.63 kips	215.95 kips



Bearing Capacity - Nominal
Skin Friction
End Bearing
Total Capacity
Depth (ft)
0
10
20
30
40
50
-100
-50
0
50
100
150
200
250
300
350
400
450
500
Capacity (kips)

```
==========================================================================
                 APILE for Windows, Version 2015.7.2

                  Serial Number :  202613907

                  A Program for Analyzing the Axial Capacity
                  and Short-term Settlement of Driven Piles
                            under Axial Loading.
                (c) Copyright ENSOFT, Inc., 1987-2015
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==========================================================================


This program is licensed to :

United Consulting Group
Norcross, GA

Path to file locations      :
H:\GEOTECHNICAL\REPORTS\2020\INFCE-20-GA-04719-01 SR 1 (US 27) Over Long Cane
Creek\Working Files\Apile\Input\
Name of input data file     : Bent 1 HP 14X89.ap7d
Name of output file         : Bent 1 HP 14X89.ap7o
Name of plot output file    : Bent 1 HP 14X89.ap7p

--------------------------------------------------------------------------
                     Time and Date of Analysis
--------------------------------------------------------------------------

          Date:  January 25, 2021     Time:  09:39:29



1
     *********************
     * INPUT INFORMATION *
     *********************



     SR 1 (US 27) Over Long Cane Creek-Bent 1-HP 14X89

     DESIGNER   : Lonnie Rucker

     JOB NUMBER : INFCE-20-GA-04719-01


     METHOD FOR UNIT LOAD TRANSFERS :
```

- FHWA (Federal Highway Administration)
  Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 202.86 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 42.00 FT.
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 57.00 IN.
- TIP AREA OF PILE = 202.86 IN2
- INCREMENT OF PILE LENGTH
  USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	0.00	110.00	0.00	0.00
1.00	SAND	0.00	110.00	0.00	0.00
1.00	SAND	0.00	120.00	0.00	0.00
4.00	SAND	0.00	120.00	0.00	0.00

4.00	CLAY	0.00	120.00	0.00	0.00
6.00	CLAY	0.00	120.00	0.00	0.00
6.00	SAND	0.00	110.00	0.00	0.00
10.00	SAND	0.00	110.00	0.00	0.00
10.00	SAND	0.00	110.00	0.00	0.00
11.50	SAND	0.00	110.00	0.00	0.00
11.50	SAND	0.00	110.00	0.00	0.00
13.00	SAND	0.00	110.00	0.00	0.00
13.00	SAND	0.00	47.60	0.00	0.00
17.00	SAND	0.00	47.60	0.00	0.00
17.00	SAND	0.00	72.60	42.00	0.00
21.00	SAND	0.00	72.60	42.00	0.00
21.00	SAND	0.00	72.60	42.00	0.00
25.00	SAND	0.00	72.60	42.00	0.00
25.00	SAND	0.00	145.00	45.00	0.00
27.00	SAND	0.00	145.00	45.00	0.00
27.00	SAND	0.00	145.00	45.00	0.00
32.00	SAND	0.00	145.00	45.00	0.00
32.00	SAND	0.00	145.00	45.00	0.00
37.00	SAND	0.00	145.00	45.00	0.00
37.00	SAND	0.00	145.00	45.00	0.00
42.00	SAND	0.00	145.00	45.00	0.00
42.00	SAND	0.00	145.00	45.00	0.00
52.00	SAND	0.00	145.00	45.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	5.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	5.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	11.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	11.00	0.00	0.00
0.10E+08*	0.10E+08*	2.75	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	2.75	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	9.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	9.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
1.00	1.000	1.000
1.00	1.000	1.000
4.00	1.000	1.000
4.00	1.000	1.000
6.00	1.000	1.000
6.00	1.000	1.000
10.00	1.000	1.000
10.00	1.000	1.000
11.50	1.000	1.000
11.50	1.000	1.000
13.00	1.000	1.000
13.00	1.000	1.000
17.00	1.000	1.000
17.00	1.000	1.000
21.00	1.000	1.000
21.00	1.000	1.000
25.00	1.000	1.000
25.00	1.000	1.000
27.00	1.000	1.000
27.00	1.000	1.000
32.00	1.000	1.000
32.00	1.000	1.000
37.00	1.000	1.000
37.00	1.000	1.000
42.00	1.000	1.000
42.00	1.000	1.000
52.00	1.000	1.000

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**********************
* COMPUTATION RESULT *
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**********************
*  FED. HWY. METHOD  *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
Elev. 666.5' at depth 0 0.00	0.0	6.9	6.9
1.00	0.3	14.0	14.3
2.00	1.4	23.3	24.7
3.00	3.5	31.4	34.9
4.00	6.4	36.5	42.9
5.00	14.6	41.3	55.9
6.00	27.7	44.6	72.3
7.00	36.2	49.3	85.6
8.00	40.5	56.1	96.6
9.00	45.1	62.3	107.4
10.00	50.1	67.2	117.3
11.00	55.7	70.8	126.4
12.00	61.8	73.8	135.6
13.00	68.0	75.3	143.4
14.00	74.4	75.9	150.3
15.00	80.9	98.7	179.6
16.00	87.5	183.4	270.9
17.00	94.2	272.1	366.3
18.00	105.9	364.8	470.7
19.00	122.7	461.6	584.3
20.00	140.1	502.4	642.5
21.00	158.3	521.7	680.0
22.00	177.2	541.0	718.1
23.00	196.7	586.2	782.8
24.00	216.9	699.2	916.2
25.00	237.8	808.1	1045.9
26.00	260.4	912.6	1173.0
27.00	284.9	1012.9	1297.9
28.00	310.9	1039.1	1350.0
29.00	338.4	1039.1	1377.5
30.00	367.3	1039.1	1406.4
31.00	397.6	1039.1	1436.7
32.00	429.4	1039.1	1468.5
33.00	462.6	1039.1	1501.7
34.00	497.3	1039.1	1536.4

35.00	533.4	1039.1	1572.5
36.00	570.9	1039.1	1610.0
37.00	609.9	1039.1	1649.0
38.00	650.4	1039.1	1689.5
39.00	692.2	1039.1	1731.3
40.00	735.6	1039.1	1774.7
41.00	780.3	1039.1	1819.4
42.00	826.5	1039.1	1865.6

NOTES:
- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.1634E+00	0.1000E-01
			0.3268E+00	0.2000E-01
			0.6536E+00	0.4000E-01
			0.9805E+00	0.6000E-01
			0.1307E+01	0.8000E-01
			0.1471E+01	0.9000E-01
			0.1634E+01	0.1000E+00
			0.1634E+01	0.5000E+00
			0.1634E+01	0.2000E+01
2	10	0.5250E+00		
			0.0000E+00	0.0000E+00
			0.1634E+00	0.1000E-01
			0.3268E+00	0.2000E-01
			0.6536E+00	0.4000E-01
			0.9805E+00	0.6000E-01
			0.1307E+01	0.8000E-01
			0.1471E+01	0.9000E-01
			0.1634E+01	0.1000E+00
			0.1634E+01	0.5000E+00
			0.1634E+01	0.2000E+01
3	10	0.9583E+00		
			0.0000E+00	0.0000E+00

			0.1634E+00	0.1000E-01
			0.3268E+00	0.2000E-01
			0.6536E+00	0.4000E-01
			0.9805E+00	0.6000E-01
			0.1307E+01	0.8000E-01
			0.1471E+01	0.9000E-01
			0.1634E+01	0.1000E+00
			0.1634E+01	0.5000E+00
			0.1634E+01	0.2000E+01
4	10	0.1000E+01		
			0.0000E+00	0.0000E+00
			0.2377E+00	0.1000E-01
			0.4755E+00	0.2000E-01
			0.9509E+00	0.4000E-01
			0.1426E+01	0.6000E-01
			0.1902E+01	0.8000E-01
			0.2140E+01	0.9000E-01
			0.2377E+01	0.1000E+00
			0.2377E+01	0.5000E+00
			0.2377E+01	0.2000E+01
5	10	0.2525E+01		
			0.0000E+00	0.0000E+00
			0.3697E+00	0.1000E-01
			0.7395E+00	0.2000E-01
			0.1479E+01	0.4000E-01
			0.2218E+01	0.6000E-01
			0.2958E+01	0.8000E-01
			0.3328E+01	0.9000E-01
			0.3697E+01	0.1000E+00
			0.3697E+01	0.5000E+00
			0.3697E+01	0.2000E+01
6	10	0.3958E+01		
			0.0000E+00	0.0000E+00
			0.8119E+00	0.1000E-01
			0.1624E+01	0.2000E-01
			0.3248E+01	0.4000E-01
			0.4871E+01	0.6000E-01
			0.6495E+01	0.8000E-01
			0.7307E+01	0.9000E-01
			0.8119E+01	0.1000E+00
			0.8119E+01	0.5000E+00
			0.8119E+01	0.2000E+01
7	10	0.4000E+01		
			0.0000E+00	0.0000E+00
			0.4659E+01	0.2903E-01
			0.7765E+01	0.5625E-01
			0.1165E+02	0.1034E+00
			0.1398E+02	0.1451E+00
			0.1553E+02	0.1814E+00
			0.1398E+02	0.3629E+00

			0.1398E+02	0.5443E+00
			0.1398E+02	0.9072E+00
			0.1398E+02	0.3629E+01
8	10	0.5025E+01		
			0.0000E+00	0.0000E+00
			0.4742E+01	0.2903E-01
			0.7903E+01	0.5625E-01
			0.1185E+02	0.1034E+00
			0.1423E+02	0.1451E+00
			0.1581E+02	0.1814E+00
			0.1423E+02	0.3629E+00
			0.1423E+02	0.5443E+00
			0.1423E+02	0.9072E+00
			0.1423E+02	0.3629E+01
9	10	0.5958E+01		
			0.0000E+00	0.0000E+00
			0.4742E+01	0.2903E-01
			0.7903E+01	0.5625E-01
			0.1185E+02	0.1034E+00
			0.1423E+02	0.1451E+00
			0.1581E+02	0.1814E+00
			0.1423E+02	0.3629E+00
			0.1423E+02	0.5443E+00
			0.1423E+02	0.9072E+00
			0.1423E+02	0.3629E+01
10	10	0.6000E+01		
			0.0000E+00	0.0000E+00
			0.9362E+00	0.1000E-01
			0.1872E+01	0.2000E-01
			0.3745E+01	0.4000E-01
			0.5617E+01	0.6000E-01
			0.7489E+01	0.8000E-01
			0.8426E+01	0.9000E-01
			0.9362E+01	0.1000E+00
			0.9362E+01	0.5000E+00
			0.9362E+01	0.2000E+01
11	10	0.8025E+01		
			0.0000E+00	0.0000E+00
			0.7060E+00	0.1000E-01
			0.1412E+01	0.2000E-01
			0.2824E+01	0.4000E-01
			0.4236E+01	0.6000E-01
			0.5648E+01	0.8000E-01
			0.6354E+01	0.9000E-01
			0.7060E+01	0.1000E+00
			0.7060E+01	0.5000E+00
			0.7060E+01	0.2000E+01
12	10	0.9958E+01		
			0.0000E+00	0.0000E+00
			0.7731E+00	0.1000E-01

			0.1546E+01	0.2000E-01
			0.3092E+01	0.4000E-01
			0.4639E+01	0.6000E-01
			0.6185E+01	0.8000E-01
			0.6958E+01	0.9000E-01
			0.7731E+01	0.1000E+00
			0.7731E+01	0.5000E+00
			0.7731E+01	0.2000E+01
13	10	0.1000E+02		
			0.0000E+00	0.0000E+00
			0.8487E+00	0.1000E-01
			0.1697E+01	0.2000E-01
			0.3395E+01	0.4000E-01
			0.5092E+01	0.6000E-01
			0.6790E+01	0.8000E-01
			0.7639E+01	0.9000E-01
			0.8487E+01	0.1000E+00
			0.8487E+01	0.5000E+00
			0.8487E+01	0.2000E+01
14	10	0.1078E+02		
			0.0000E+00	0.0000E+00
			0.8487E+00	0.1000E-01
			0.1697E+01	0.2000E-01
			0.3395E+01	0.4000E-01
			0.5092E+01	0.6000E-01
			0.6790E+01	0.8000E-01
			0.7639E+01	0.9000E-01
			0.8487E+01	0.1000E+00
			0.8487E+01	0.5000E+00
			0.8487E+01	0.2000E+01
15	10	0.1146E+02		
			0.0000E+00	0.0000E+00
			0.9012E+00	0.1000E-01
			0.1802E+01	0.2000E-01
			0.3605E+01	0.4000E-01
			0.5407E+01	0.6000E-01
			0.7210E+01	0.8000E-01
			0.8111E+01	0.9000E-01
			0.9012E+01	0.1000E+00
			0.9012E+01	0.5000E+00
			0.9012E+01	0.2000E+01
16	10	0.1150E+02		
			0.0000E+00	0.0000E+00
			0.9012E+00	0.1000E-01
			0.1802E+01	0.2000E-01
			0.3605E+01	0.4000E-01
			0.5407E+01	0.6000E-01
			0.7210E+01	0.8000E-01
			0.8111E+01	0.9000E-01
			0.9012E+01	0.1000E+00

			0.9012E+01	0.5000E+00
			0.9012E+01	0.2000E+01
17	10	0.1228E+02		
			0.0000E+00	0.0000E+00
			0.9226E+00	0.1000E-01
			0.1845E+01	0.2000E-01
			0.3691E+01	0.4000E-01
			0.5536E+01	0.6000E-01
			0.7381E+01	0.8000E-01
			0.8304E+01	0.9000E-01
			0.9226E+01	0.1000E+00
			0.9226E+01	0.5000E+00
			0.9226E+01	0.2000E+01
18	10	0.1296E+02		
			0.0000E+00	0.0000E+00
			0.9226E+00	0.1000E-01
			0.1845E+01	0.2000E-01
			0.3691E+01	0.4000E-01
			0.5536E+01	0.6000E-01
			0.7381E+01	0.8000E-01
			0.8304E+01	0.9000E-01
			0.9226E+01	0.1000E+00
			0.9226E+01	0.5000E+00
			0.9226E+01	0.2000E+01
19	10	0.1300E+02		
			0.0000E+00	0.0000E+00
			0.9389E+00	0.1000E-01
			0.1878E+01	0.2000E-01
			0.3756E+01	0.4000E-01
			0.5634E+01	0.6000E-01
			0.7512E+01	0.8000E-01
			0.8450E+01	0.9000E-01
			0.9389E+01	0.1000E+00
			0.9389E+01	0.5000E+00
			0.9389E+01	0.2000E+01
20	10	0.1503E+02		
			0.0000E+00	0.0000E+00
			0.9776E+00	0.1000E-01
			0.1955E+01	0.2000E-01
			0.3910E+01	0.4000E-01
			0.5865E+01	0.6000E-01
			0.7821E+01	0.8000E-01
			0.8798E+01	0.9000E-01
			0.9776E+01	0.1000E+00
			0.9776E+01	0.5000E+00
			0.9776E+01	0.2000E+01
21	10	0.1696E+02		
			0.0000E+00	0.0000E+00
			0.1344E+01	0.1000E-01
			0.2688E+01	0.2000E-01

			0.5375E+01	0.4000E-01
			0.8063E+01	0.6000E-01
			0.1075E+02	0.8000E-01
			0.1209E+02	0.9000E-01
			0.1344E+02	0.1000E+00
			0.1344E+02	0.5000E+00
			0.1344E+02	0.2000E+01
22	10	0.1700E+02		
			0.0000E+00	0.0000E+00
			0.2078E+01	0.1000E-01
			0.4156E+01	0.2000E-01
			0.8312E+01	0.4000E-01
			0.1247E+02	0.6000E-01
			0.1662E+02	0.8000E-01
			0.1870E+02	0.9000E-01
			0.2078E+02	0.1000E+00
			0.2078E+02	0.5000E+00
			0.2078E+02	0.2000E+01
23	10	0.1903E+02		
			0.0000E+00	0.0000E+00
			0.2606E+01	0.1000E-01
			0.5211E+01	0.2000E-01
			0.1042E+02	0.4000E-01
			0.1563E+02	0.6000E-01
			0.2085E+02	0.8000E-01
			0.2345E+02	0.9000E-01
			0.2606E+02	0.1000E+00
			0.2606E+02	0.5000E+00
			0.2606E+02	0.2000E+01
24	10	0.2096E+02		
			0.0000E+00	0.0000E+00
			0.2706E+01	0.1000E-01
			0.5412E+01	0.2000E-01
			0.1082E+02	0.4000E-01
			0.1624E+02	0.6000E-01
			0.2165E+02	0.8000E-01
			0.2435E+02	0.9000E-01
			0.2706E+02	0.1000E+00
			0.2706E+02	0.5000E+00
			0.2706E+02	0.2000E+01
25	10	0.2100E+02		
			0.0000E+00	0.0000E+00
			0.2806E+01	0.1000E-01
			0.5612E+01	0.2000E-01
			0.1122E+02	0.4000E-01
			0.1684E+02	0.6000E-01
			0.2245E+02	0.8000E-01
			0.2525E+02	0.9000E-01
			0.2806E+02	0.1000E+00
			0.2806E+02	0.5000E+00

			0.2806E+02	0.2000E+01
26	10	0.2303E+02		
			0.0000E+00	0.0000E+00
			0.3006E+01	0.1000E-01
			0.6013E+01	0.2000E-01
			0.1203E+02	0.4000E-01
			0.1804E+02	0.6000E-01
			0.2405E+02	0.8000E-01
			0.2706E+02	0.9000E-01
			0.3006E+02	0.1000E+00
			0.3006E+02	0.5000E+00
			0.3006E+02	0.2000E+01
27	10	0.2496E+02		
			0.0000E+00	0.0000E+00
			0.3176E+01	0.1000E-01
			0.6353E+01	0.2000E-01
			0.1271E+02	0.4000E-01
			0.1906E+02	0.6000E-01
			0.2541E+02	0.8000E-01
			0.2859E+02	0.9000E-01
			0.3176E+02	0.1000E+00
			0.3176E+02	0.5000E+00
			0.3176E+02	0.2000E+01
28	10	0.2500E+02		
			0.0000E+00	0.0000E+00
			0.3444E+01	0.1000E-01
			0.6887E+01	0.2000E-01
			0.1377E+02	0.4000E-01
			0.2066E+02	0.6000E-01
			0.2755E+02	0.8000E-01
			0.3099E+02	0.9000E-01
			0.3444E+02	0.1000E+00
			0.3444E+02	0.5000E+00
			0.3444E+02	0.2000E+01
29	10	0.2603E+02		
			0.0000E+00	0.0000E+00
			0.3697E+01	0.1000E-01
			0.7393E+01	0.2000E-01
			0.1479E+02	0.4000E-01
			0.2218E+02	0.6000E-01
			0.2957E+02	0.8000E-01
			0.3327E+02	0.9000E-01
			0.3697E+02	0.1000E+00
			0.3697E+02	0.5000E+00
			0.3697E+02	0.2000E+01
30	10	0.2696E+02		
			0.0000E+00	0.0000E+00
			0.3697E+01	0.1000E-01
			0.7393E+01	0.2000E-01
			0.1479E+02	0.4000E-01

			0.2218E+02	0.6000E-01
			0.2957E+02	0.8000E-01
			0.3327E+02	0.9000E-01
			0.3697E+02	0.1000E+00
			0.3697E+02	0.5000E+00
			0.3697E+02	0.2000E+01
31	10	0.2700E+02		
			0.0000E+00	0.0000E+00
			0.3908E+01	0.1000E-01
			0.7815E+01	0.2000E-01
			0.1563E+02	0.4000E-01
			0.2345E+02	0.6000E-01
			0.3126E+02	0.8000E-01
			0.3517E+02	0.9000E-01
			0.3908E+02	0.1000E+00
			0.3908E+02	0.5000E+00
			0.3908E+02	0.2000E+01
32	10	0.2953E+02		
			0.0000E+00	0.0000E+00
			0.4329E+01	0.1000E-01
			0.8659E+01	0.2000E-01
			0.1732E+02	0.4000E-01
			0.2598E+02	0.6000E-01
			0.3464E+02	0.8000E-01
			0.3897E+02	0.9000E-01
			0.4329E+02	0.1000E+00
			0.4329E+02	0.5000E+00
			0.4329E+02	0.2000E+01
33	10	0.3196E+02		
			0.0000E+00	0.0000E+00
			0.4751E+01	0.1000E-01
			0.9503E+01	0.2000E-01
			0.1901E+02	0.4000E-01
			0.2851E+02	0.6000E-01
			0.3801E+02	0.8000E-01
			0.4276E+02	0.9000E-01
			0.4751E+02	0.1000E+00
			0.4751E+02	0.5000E+00
			0.4751E+02	0.2000E+01
34	10	0.3200E+02		
			0.0000E+00	0.0000E+00
			0.4962E+01	0.1000E-01
			0.9924E+01	0.2000E-01
			0.1985E+02	0.4000E-01
			0.2977E+02	0.6000E-01
			0.3970E+02	0.8000E-01
			0.4466E+02	0.9000E-01
			0.4962E+02	0.1000E+00
			0.4962E+02	0.5000E+00
			0.4962E+02	0.2000E+01

35	10	0.3453E+02		
			0.0000E+00	0.0000E+00
			0.5384E+01	0.1000E-01
			0.1077E+02	0.2000E-01
			0.2154E+02	0.4000E-01
			0.3230E+02	0.6000E-01
			0.4307E+02	0.8000E-01
			0.4846E+02	0.9000E-01
			0.5384E+02	0.1000E+00
			0.5384E+02	0.5000E+00
			0.5384E+02	0.2000E+01
36	10	0.3696E+02		
			0.0000E+00	0.0000E+00
			0.5806E+01	0.1000E-01
			0.1161E+02	0.2000E-01
			0.2322E+02	0.4000E-01
			0.3484E+02	0.6000E-01
			0.4645E+02	0.8000E-01
			0.5225E+02	0.9000E-01
			0.5806E+02	0.1000E+00
			0.5806E+02	0.5000E+00
			0.5806E+02	0.2000E+01
37	10	0.3700E+02		
			0.0000E+00	0.0000E+00
			0.6017E+01	0.1000E-01
			0.1203E+02	0.2000E-01
			0.2407E+02	0.4000E-01
			0.3610E+02	0.6000E-01
			0.4814E+02	0.8000E-01
			0.5415E+02	0.9000E-01
			0.6017E+02	0.1000E+00
			0.6017E+02	0.5000E+00
			0.6017E+02	0.2000E+01
38	10	0.3953E+02		
			0.0000E+00	0.0000E+00
			0.6439E+01	0.1000E-01
			0.1288E+02	0.2000E-01
			0.2576E+02	0.4000E-01
			0.3863E+02	0.6000E-01
			0.5151E+02	0.8000E-01
			0.5795E+02	0.9000E-01
			0.6439E+02	0.1000E+00
			0.6439E+02	0.5000E+00
			0.6439E+02	0.2000E+01
39	10	0.4196E+02		
			0.0000E+00	0.0000E+00
			0.6755E+01	0.1000E-01
			0.1351E+02	0.2000E-01
			0.2702E+02	0.4000E-01
			0.4053E+02	0.6000E-01

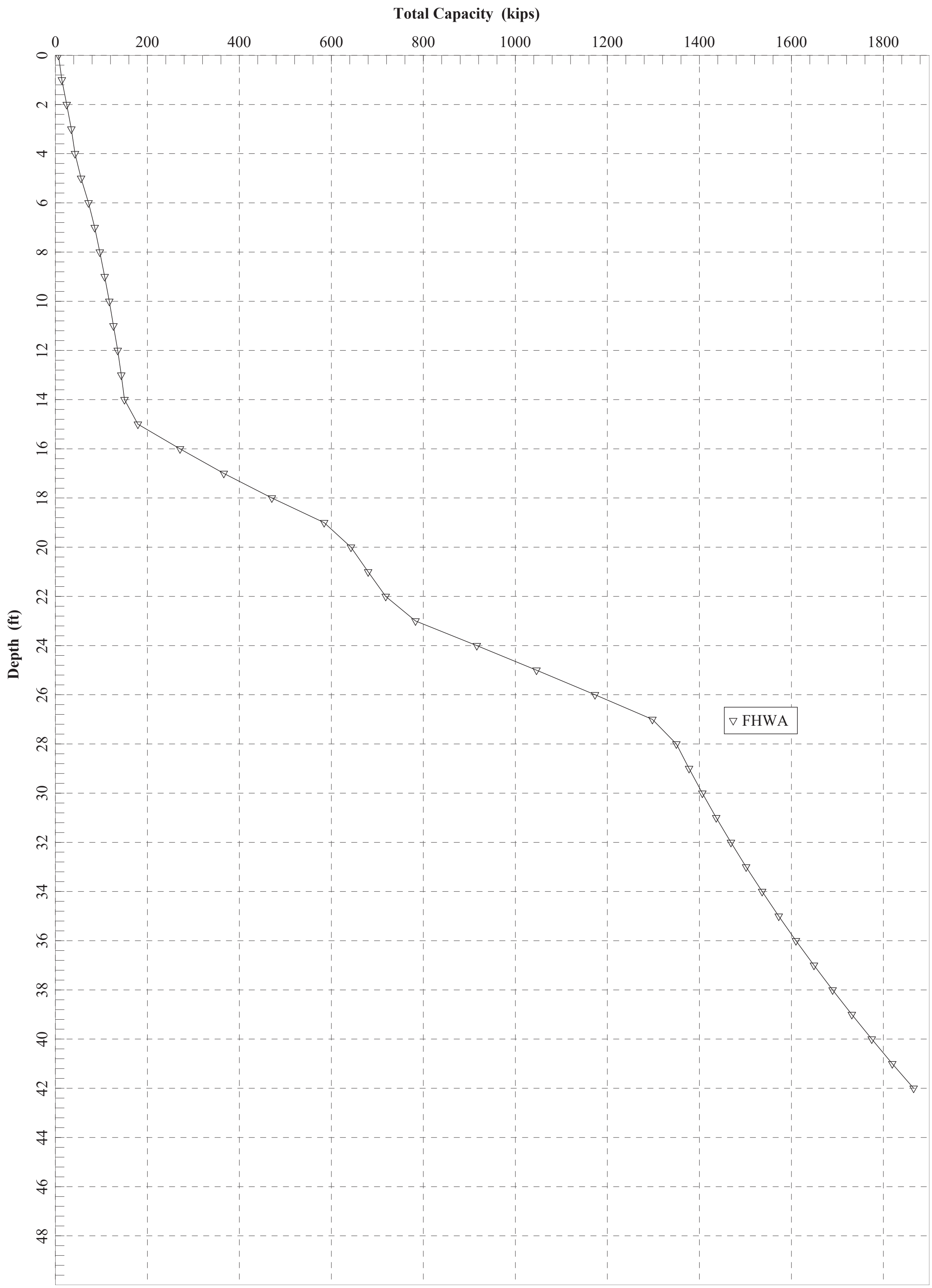
			0.5404E+02	0.8000E-01
			0.6080E+02	0.9000E-01
			0.6755E+02	0.1000E+00
			0.6755E+02	0.5000E+00
			0.6755E+02	0.2000E+01
40	10	0.4200E+02		
			0.0000E+00	0.0000E+00
			0.6755E+01	0.1000E-01
			0.1351E+02	0.2000E-01
			0.2702E+02	0.4000E-01
			0.4053E+02	0.6000E-01
			0.5404E+02	0.8000E-01
			0.6080E+02	0.9000E-01
			0.6755E+02	0.1000E+00
			0.6755E+02	0.5000E+00
			0.6755E+02	0.2000E+01
41	10	0.4703E+02		
			0.0000E+00	0.0000E+00
			0.6755E+01	0.1000E-01
			0.1351E+02	0.2000E-01
			0.2702E+02	0.4000E-01
			0.4053E+02	0.6000E-01
			0.5404E+02	0.8000E-01
			0.6080E+02	0.9000E-01
			0.6755E+02	0.1000E+00
			0.6755E+02	0.5000E+00
			0.6755E+02	0.2000E+01
42	10	0.5196E+02		
			0.0000E+00	0.0000E+00
			0.6755E+01	0.1000E-01
			0.1351E+02	0.2000E-01
			0.2702E+02	0.4000E-01
			0.4053E+02	0.6000E-01
			0.5404E+02	0.8000E-01
			0.6080E+02	0.9000E-01
			0.6755E+02	0.1000E+00
			0.6755E+02	0.5000E+00
			0.6755E+02	0.2000E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.6494E+02	0.9072E-02
0.1299E+03	0.1814E-01
0.2598E+03	0.3629E-01
0.5195E+03	0.2359E+00
0.7793E+03	0.7620E+00

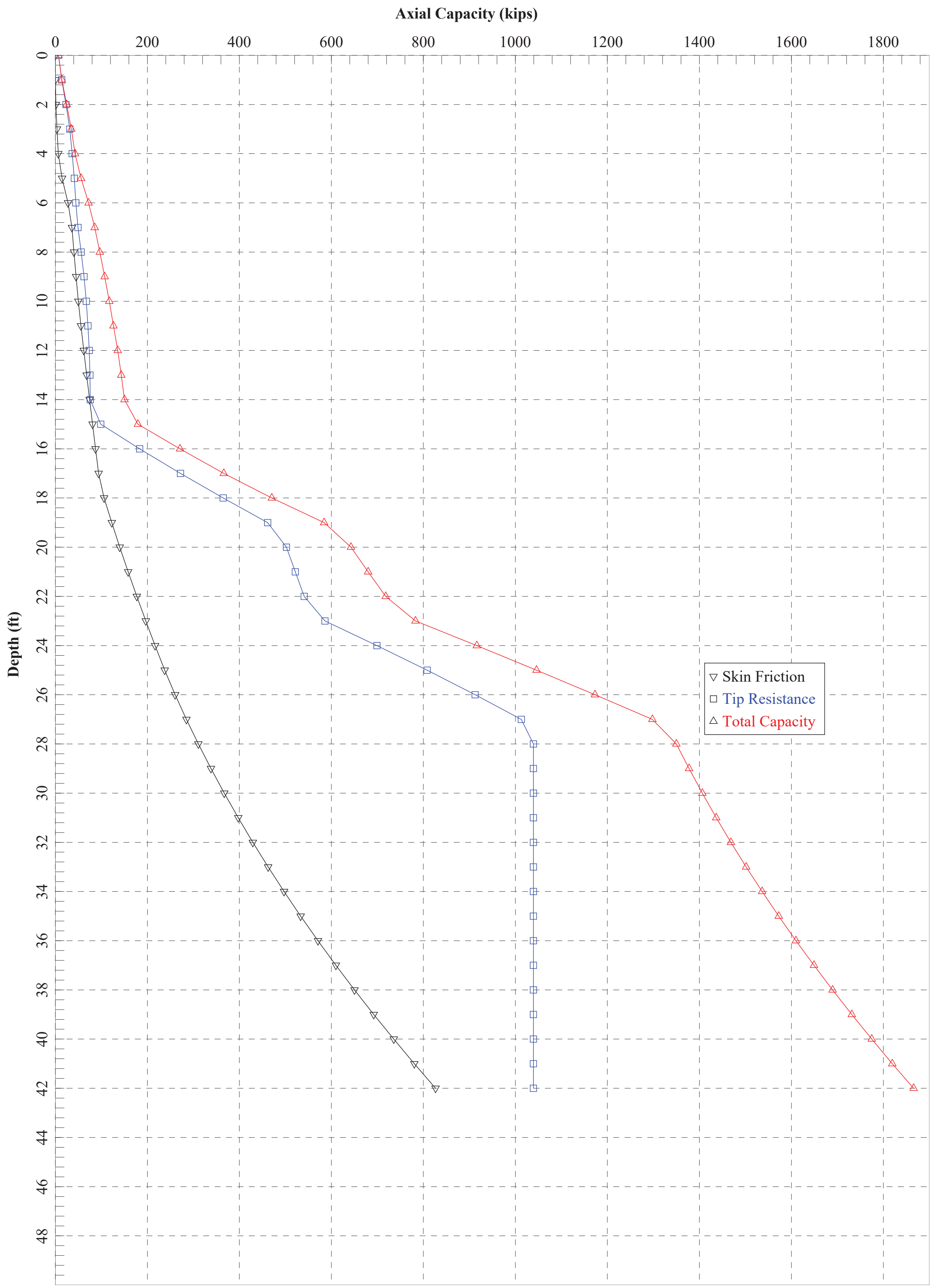
0.9352E+03	0.1324E+01
0.1039E+04	0.1814E+01
0.1039E+04	0.2722E+01
0.1039E+04	0.3629E+01

LOAD VERSUS SETTLEMENT CURVE
****

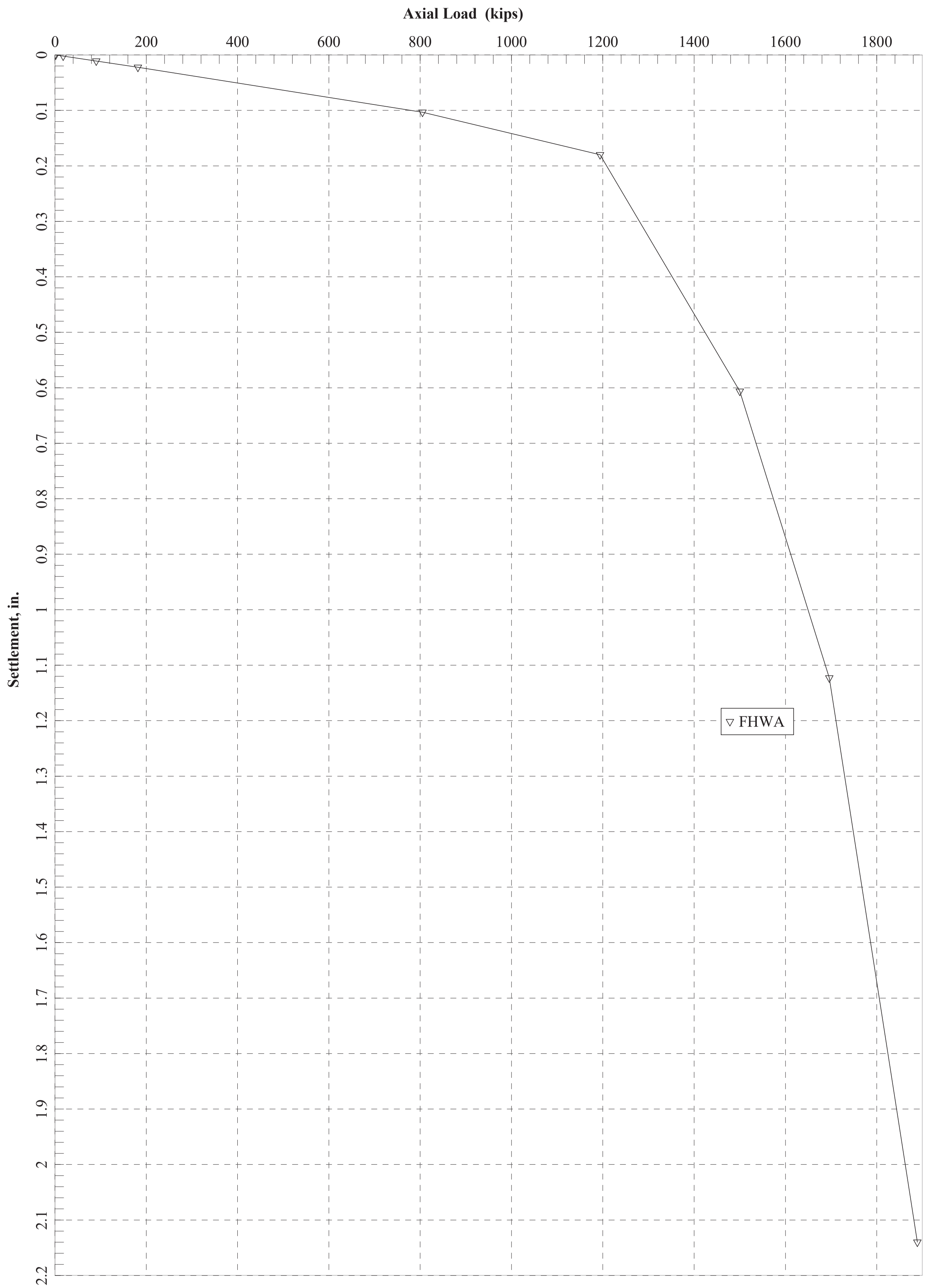
TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1810E+01	0.2217E-03	0.7159E+00	0.1000E-03
0.1810E+02	0.2217E-02	0.7159E+01	0.1000E-02
0.9048E+02	0.1109E-01	0.3579E+02	0.5000E-02
0.1818E+03	0.2221E-01	0.7159E+02	0.1000E-01
0.8052E+03	0.1034E+00	0.2776E+03	0.5000E-01
0.1194E+04	0.1800E+00	0.3427E+03	0.1000E+00
0.1500E+04	0.6063E+00	0.6500E+03	0.5000E+00
0.1696E+04	0.1123E+01	0.8453E+03	0.1000E+01
0.1889E+04	0.2140E+01	0.1039E+04	0.2000E+01



Total Capacity (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
FHWA



Axial Capacity (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Skin Friction
Tip Resistance
Total Capacity



Axial Load (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
Settlement, in.
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
FHWA

```
==========================================================================
                  APILE for Windows, Version 2015.7.2

                   Serial Number :  202613907

                   A Program for Analyzing the Axial Capacity
                   and Short-term Settlement of Driven Piles
                             under Axial Loading.
                 (c) Copyright ENSOFT, Inc., 1987-2015
                         All Rights Reserved

==========================================================================


     This program is licensed to :

     United Consulting Group
     Norcross, GA

     Path to file locations      :
H:\GEOTECHNICAL\REPORTS\2020\INFCE-20-GA-04719-01 SR 1 (US 27) Over Long Cane
Creek\Working Files\Apile\Input\
     Name of input data file     : Bent 2 HP 14X89.ap7d
     Name of output file         : Bent 2 HP 14X89.ap7o
     Name of plot output file    : Bent 2 HP 14X89.ap7p

     -------------------------------------------------------------------------
                         Time and Date of Analysis
     -------------------------------------------------------------------------

               Date:  January 25, 2021     Time:  10:30:01



1
          *********************
          * INPUT INFORMATION *
          *********************



          SR 1 (US 27) Over Long Cane Creek-Bent 2-HP 14X89

          DESIGNER   : Lonnie Rucker

          JOB NUMBER : INFCE-20-GA-04719-01


          METHOD FOR UNIT LOAD TRANSFERS :
```

- FHWA (Federal Highway Administration)
  Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 202.86 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 67.50 FT.
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 57.00 IN.
- TIP AREA OF PILE = 202.86 IN2
- INCREMENT OF PILE LENGTH
  USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	0.00	110.00	0.00	0.00
1.00	SAND	0.00	110.00	0.00	0.00
1.00	CLAY	0.00	110.00	0.00	0.00
3.00	CLAY	0.00	110.00	0.00	0.00

3.00	CLAY	0.00	57.60	0.00	0.00
5.50	CLAY	0.00	57.60	0.00	0.00
5.50	CLAY	0.00	47.60	0.00	0.00
11.00	CLAY	0.00	47.60	0.00	0.00
11.00	SAND	0.00	47.60	0.00	0.00
16.00	SAND	0.00	47.60	0.00	0.00
16.00	SAND	0.00	47.60	0.00	0.00
21.00	SAND	0.00	47.60	0.00	0.00
21.00	SAND	0.00	67.60	0.00	0.00
26.00	SAND	0.00	67.60	0.00	0.00
26.00	SAND	0.00	57.60	0.00	0.00
31.00	SAND	0.00	57.60	0.00	0.00
31.00	SAND	0.00	67.60	0.00	0.00
36.50	SAND	0.00	67.60	0.00	0.00
36.50	SAND	0.00	72.60	42.00	0.00
41.00	SAND	0.00	72.60	42.00	0.00
41.00	SAND	0.00	72.60	42.00	0.00
44.00	SAND	0.00	72.60	42.00	0.00
44.00	SAND	0.00	145.00	45.00	0.00
47.00	SAND	0.00	145.00	45.00	0.00
47.00	SAND	0.00	145.00	45.00	0.00
52.00	SAND	0.00	145.00	45.00	0.00
52.00	SAND	0.00	145.00	45.00	0.00
57.00	SAND	0.00	145.00	45.00	0.00
57.00	SAND	0.00	145.00	45.00	0.00
62.00	SAND	0.00	145.00	45.00	0.00
62.00	SAND	0.00	145.00	45.00	0.00
67.00	SAND	0.00	145.00	45.00	0.00
67.00	SAND	0.00	145.00	45.00	0.00
67.50	SAND	0.00	145.00	45.00	0.00
67.50	SAND	0.00	145.00	45.00	0.00
77.50	SAND	0.00	145.00	45.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	5.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	5.00	0.00	0.00
0.10E+08*	0.10E+08*	1.50	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.50	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.50	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.50	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	7.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	7.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00

0.10E+08*	0.10E+08*	0.00	0.00	8.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	26.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	26.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	16.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	16.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	27.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	27.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
1.00	1.000	1.000
1.00	1.000	1.000
3.00	1.000	1.000
3.00	1.000	1.000
5.50	1.000	1.000
5.50	1.000	1.000
11.00	1.000	1.000
11.00	1.000	1.000
16.00	1.000	1.000
16.00	1.000	1.000
21.00	1.000	1.000
21.00	1.000	1.000
26.00	1.000	1.000

26.00	1.000	1.000
31.00	1.000	1.000
31.00	1.000	1.000
36.50	1.000	1.000
36.50	1.000	1.000
41.00	1.000	1.000
41.00	1.000	1.000
44.00	1.000	1.000
44.00	1.000	1.000
47.00	1.000	1.000
47.00	1.000	1.000
52.00	1.000	1.000
52.00	1.000	1.000
57.00	1.000	1.000
57.00	1.000	1.000
62.00	1.000	1.000
62.00	1.000	1.000
67.00	1.000	1.000
67.00	1.000	1.000
67.50	1.000	1.000
67.50	1.000	1.000
77.50	1.000	1.000

1

****
* COMPUTATION RESULT *
****

****
* FED. HWY. METHOD *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
Elev. 667' at depth 0 → 0.00	0.0	6.0	6.0
1.00	0.3	9.5	9.8
2.00	4.1	13.7	17.8
3.00	11.2	18.2	29.4
4.00	18.3	18.6	37.0
5.00	25.4	17.2	42.7
6.00	32.6	15.8	48.4
7.00	38.5	14.5	53.0
8.00	43.3	13.1	56.3
9.00	48.0	14.6	62.6
10.00	52.8	22.0	74.8

11.00	57.5	29.9	87.4
12.00	61.7	38.2	99.9
13.00	65.5	47.0	112.4
14.00	69.4	51.1	120.5
15.00	73.5	54.0	127.6
16.00	77.8	56.9	134.8
17.00	82.4	59.8	142.2
18.00	87.3	62.6	149.9
19.00	92.3	78.4	170.8
20.00	97.5	133.2	230.8
21.00	102.9	188.7	291.6
22.00	111.7	244.5	356.2
23.00	124.0	300.6	424.6
24.00	136.9	309.8	446.8
25.00	150.4	280.2	430.6
26.00	164.5	249.4	413.9
27.00	177.5	217.7	395.2
28.00	189.3	185.1	374.5
29.00	201.3	185.2	386.4
30.00	213.4	220.1	433.5
31.00	225.6	254.8	480.4
32.00	240.5	289.9	530.3
33.00	258.2	325.1	583.2
34.00	276.3	334.3	610.6
35.00	294.8	350.2	645.0
36.00	313.6	411.8	725.4
37.00	332.5	477.5	810.1
38.00	353.1	547.4	900.5
39.00	375.3	621.6	996.9
40.00	398.2	656.1	1054.4
41.00	421.9	675.4	1097.3
42.00	446.2	712.7	1158.8
43.00	471.2	796.1	1267.3
44.00	496.8	875.3	1372.1
45.00	524.3	950.2	1474.5
46.00	553.9	1020.9	1574.8
47.00	584.9	1039.1	1624.0
48.00	617.4	1039.1	1656.5
49.00	651.3	1039.1	1690.4
50.00	686.7	1039.1	1725.8
51.00	723.5	1039.1	1762.6
52.00	761.7	1039.1	1800.8
53.00	801.4	1039.1	1840.5
54.00	842.6	1039.1	1881.7
55.00	885.1	1039.1	1924.2
56.00	929.2	1039.1	1968.2
57.00	974.6	1039.1	2013.7
58.00	1021.5	1039.1	2060.6
59.00	1069.9	1039.1	2109.0
60.00	1119.7	1039.1	2158.8

61.00	1170.9	1039.1	2210.0
62.00	1223.6	1039.1	2262.7
63.00	1277.7	1039.1	2316.8
64.00	1333.3	1039.1	2372.4
65.00	1390.3	1039.1	2429.4
66.00	1448.7	1039.1	2487.8
67.00	1508.6	1039.1	2547.7

NOTES:
- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN
  IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
  OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.5581E+00	0.1000E-01
			0.1116E+01	0.2000E-01
			0.2232E+01	0.4000E-01
			0.3348E+01	0.6000E-01
			0.4465E+01	0.8000E-01
			0.5023E+01	0.9000E-01
			0.5581E+01	0.1000E+00
			0.5581E+01	0.5000E+00
			0.5581E+01	0.2000E+01
2	10	0.5250E+00		
			0.0000E+00	0.0000E+00
			0.5581E+00	0.1000E-01
			0.1116E+01	0.2000E-01
			0.2232E+01	0.4000E-01
			0.3348E+01	0.6000E-01
			0.4465E+01	0.8000E-01
			0.5023E+01	0.9000E-01
			0.5581E+01	0.1000E+00
			0.5581E+01	0.5000E+00
			0.5581E+01	0.2000E+01
3	10	0.9583E+00		
			0.0000E+00	0.0000E+00
			0.5581E+00	0.1000E-01

			0.1116E+01	0.2000E-01
			0.2232E+01	0.4000E-01
			0.3348E+01	0.6000E-01
			0.4465E+01	0.8000E-01
			0.5023E+01	0.9000E-01
			0.5581E+01	0.1000E+00
			0.5581E+01	0.5000E+00
			0.5581E+01	0.2000E+01
4	10	0.1000E+01		
			0.0000E+00	0.0000E+00
			0.2400E+01	0.2903E-01
			0.3999E+01	0.5625E-01
			0.5999E+01	0.1034E+00
			0.7199E+01	0.1451E+00
			0.7999E+01	0.1814E+00
			0.7199E+01	0.3629E+00
			0.7199E+01	0.5443E+00
			0.7199E+01	0.9072E+00
			0.7199E+01	0.3629E+01
5	10	0.2025E+01		
			0.0000E+00	0.0000E+00
			0.3125E+01	0.2903E-01
			0.5208E+01	0.5625E-01
			0.7812E+01	0.1034E+00
			0.9375E+01	0.1451E+00
			0.1042E+02	0.1814E+00
			0.9375E+01	0.3629E+00
			0.9375E+01	0.5443E+00
			0.9375E+01	0.9072E+00
			0.9375E+01	0.3629E+01
6	10	0.2958E+01		
			0.0000E+00	0.0000E+00
			0.3125E+01	0.2903E-01
			0.5208E+01	0.5625E-01
			0.7812E+01	0.1034E+00
			0.9375E+01	0.1451E+00
			0.1042E+02	0.1814E+00
			0.9375E+01	0.3629E+00
			0.9375E+01	0.5443E+00
			0.9375E+01	0.9072E+00
			0.9375E+01	0.3629E+01
7	10	0.3000E+01		
			0.0000E+00	0.0000E+00
			0.3125E+01	0.2903E-01
			0.5208E+01	0.5625E-01
			0.7812E+01	0.1034E+00
			0.9375E+01	0.1451E+00
			0.1042E+02	0.1814E+00
			0.9375E+01	0.3629E+00
			0.9375E+01	0.5443E+00

			0.9375E+01	0.9072E+00
			0.9375E+01	0.3629E+01
8	10	0.4275E+01		
			0.0000E+00	0.0000E+00
			0.3125E+01	0.2903E-01
			0.5208E+01	0.5625E-01
			0.7812E+01	0.1034E+00
			0.9375E+01	0.1451E+00
			0.1042E+02	0.1814E+00
			0.9375E+01	0.3629E+00
			0.9375E+01	0.5443E+00
			0.9375E+01	0.9072E+00
			0.9375E+01	0.3629E+01
9	10	0.5458E+01		
			0.0000E+00	0.0000E+00
			0.2865E+01	0.2903E-01
			0.4774E+01	0.5625E-01
			0.7161E+01	0.1034E+00
			0.8594E+01	0.1451E+00
			0.9549E+01	0.1814E+00
			0.8594E+01	0.3629E+00
			0.8594E+01	0.5443E+00
			0.8594E+01	0.9072E+00
			0.8594E+01	0.3629E+01
10	10	0.5500E+01		
			0.0000E+00	0.0000E+00
			0.2865E+01	0.2903E-01
			0.4774E+01	0.5625E-01
			0.7161E+01	0.1034E+00
			0.8594E+01	0.1451E+00
			0.9549E+01	0.1814E+00
			0.8594E+01	0.3629E+00
			0.8594E+01	0.5443E+00
			0.8594E+01	0.9072E+00
			0.8594E+01	0.3629E+01
11	10	0.8275E+01		
			0.0000E+00	0.0000E+00
			0.2083E+01	0.2903E-01
			0.3472E+01	0.5625E-01
			0.5208E+01	0.1034E+00
			0.6250E+01	0.1451E+00
			0.6944E+01	0.1814E+00
			0.6250E+01	0.3629E+00
			0.6250E+01	0.5443E+00
			0.6250E+01	0.9072E+00
			0.6250E+01	0.3629E+01
12	10	0.1096E+02		
			0.0000E+00	0.0000E+00
			0.1965E+01	0.2903E-01
			0.3275E+01	0.5625E-01

			0.4912E+01	0.1034E+00
			0.5894E+01	0.1451E+00
			0.6549E+01	0.1814E+00
			0.5894E+01	0.3629E+00
			0.5894E+01	0.5443E+00
			0.5894E+01	0.9072E+00
			0.5894E+01	0.3629E+01
13	10	0.1100E+02		
			0.0000E+00	0.0000E+00
			0.5827E+00	0.1000E-01
			0.1165E+01	0.2000E-01
			0.2331E+01	0.4000E-01
			0.3496E+01	0.6000E-01
			0.4662E+01	0.8000E-01
			0.5244E+01	0.9000E-01
			0.5827E+01	0.1000E+00
			0.5827E+01	0.5000E+00
			0.5827E+01	0.2000E+01
14	10	0.1353E+02		
			0.0000E+00	0.0000E+00
			0.5898E+00	0.1000E-01
			0.1180E+01	0.2000E-01
			0.2359E+01	0.4000E-01
			0.3539E+01	0.6000E-01
			0.4719E+01	0.8000E-01
			0.5309E+01	0.9000E-01
			0.5898E+01	0.1000E+00
			0.5898E+01	0.5000E+00
			0.5898E+01	0.2000E+01
15	10	0.1596E+02		
			0.0000E+00	0.0000E+00
			0.6492E+00	0.1000E-01
			0.1298E+01	0.2000E-01
			0.2597E+01	0.4000E-01
			0.3895E+01	0.6000E-01
			0.5194E+01	0.8000E-01
			0.5843E+01	0.9000E-01
			0.6492E+01	0.1000E+00
			0.6492E+01	0.5000E+00
			0.6492E+01	0.2000E+01
16	10	0.1600E+02		
			0.0000E+00	0.0000E+00
			0.6907E+00	0.1000E-01
			0.1381E+01	0.2000E-01
			0.2763E+01	0.4000E-01
			0.4144E+01	0.6000E-01
			0.5525E+01	0.8000E-01
			0.6216E+01	0.9000E-01
			0.6907E+01	0.1000E+00
			0.6907E+01	0.5000E+00

			0.6907E+01	0.2000E+01
17	10	0.1853E+02		
			0.0000E+00	0.0000E+00
			0.7491E+00	0.1000E-01
			0.1498E+01	0.2000E-01
			0.2996E+01	0.4000E-01
			0.4494E+01	0.6000E-01
			0.5992E+01	0.8000E-01
			0.6742E+01	0.9000E-01
			0.7491E+01	0.1000E+00
			0.7491E+01	0.5000E+00
			0.7491E+01	0.2000E+01
18	10	0.2096E+02		
			0.0000E+00	0.0000E+00
			0.1032E+01	0.1000E-01
			0.2064E+01	0.2000E-01
			0.4128E+01	0.4000E-01
			0.6192E+01	0.6000E-01
			0.8256E+01	0.8000E-01
			0.9288E+01	0.9000E-01
			0.1032E+02	0.1000E+00
			0.1032E+02	0.5000E+00
			0.1032E+02	0.2000E+01
19	10	0.2100E+02		
			0.0000E+00	0.0000E+00
			0.1540E+01	0.1000E-01
			0.3081E+01	0.2000E-01
			0.6162E+01	0.4000E-01
			0.9243E+01	0.6000E-01
			0.1232E+02	0.8000E-01
			0.1386E+02	0.9000E-01
			0.1540E+02	0.1000E+00
			0.1540E+02	0.5000E+00
			0.1540E+02	0.2000E+01
20	10	0.2353E+02		
			0.0000E+00	0.0000E+00
			0.1931E+01	0.1000E-01
			0.3862E+01	0.2000E-01
			0.7725E+01	0.4000E-01
			0.1159E+02	0.6000E-01
			0.1545E+02	0.8000E-01
			0.1738E+02	0.9000E-01
			0.1931E+02	0.1000E+00
			0.1931E+02	0.5000E+00
			0.1931E+02	0.2000E+01
21	10	0.2596E+02		
			0.0000E+00	0.0000E+00
			0.1982E+01	0.1000E-01
			0.3964E+01	0.2000E-01
			0.7928E+01	0.4000E-01

			0.1189E+02	0.6000E-01
			0.1586E+02	0.8000E-01
			0.1784E+02	0.9000E-01
			0.1982E+02	0.1000E+00
			0.1982E+02	0.5000E+00
			0.1982E+02	0.2000E+01
22	10	0.2600E+02		
			0.0000E+00	0.0000E+00
			0.1814E+01	0.1000E-01
			0.3628E+01	0.2000E-01
			0.7256E+01	0.4000E-01
			0.1088E+02	0.6000E-01
			0.1451E+02	0.8000E-01
			0.1633E+02	0.9000E-01
			0.1814E+02	0.1000E+00
			0.1814E+02	0.5000E+00
			0.1814E+02	0.2000E+01
23	10	0.2853E+02		
			0.0000E+00	0.0000E+00
			0.1758E+01	0.1000E-01
			0.3517E+01	0.2000E-01
			0.7034E+01	0.4000E-01
			0.1055E+02	0.6000E-01
			0.1407E+02	0.8000E-01
			0.1583E+02	0.9000E-01
			0.1758E+02	0.1000E+00
			0.1758E+02	0.5000E+00
			0.1758E+02	0.2000E+01
24	10	0.3096E+02		
			0.0000E+00	0.0000E+00
			0.1981E+01	0.1000E-01
			0.3963E+01	0.2000E-01
			0.7925E+01	0.4000E-01
			0.1189E+02	0.6000E-01
			0.1585E+02	0.8000E-01
			0.1783E+02	0.9000E-01
			0.1981E+02	0.1000E+00
			0.1981E+02	0.5000E+00
			0.1981E+02	0.2000E+01
25	10	0.3100E+02		
			0.0000E+00	0.0000E+00
			0.2380E+01	0.1000E-01
			0.4760E+01	0.2000E-01
			0.9521E+01	0.4000E-01
			0.1428E+02	0.6000E-01
			0.1904E+02	0.8000E-01
			0.2142E+02	0.9000E-01
			0.2380E+02	0.1000E+00
			0.2380E+02	0.5000E+00
			0.2380E+02	0.2000E+01

26	10	0.3378E+02		
			0.0000E+00	0.0000E+00
			0.2679E+01	0.1000E-01
			0.5358E+01	0.2000E-01
			0.1072E+02	0.4000E-01
			0.1607E+02	0.6000E-01
			0.2143E+02	0.8000E-01
			0.2411E+02	0.9000E-01
			0.2679E+02	0.1000E+00
			0.2679E+02	0.5000E+00
			0.2679E+02	0.2000E+01
27	10	0.3646E+02		
			0.0000E+00	0.0000E+00
			0.2887E+01	0.1000E-01
			0.5774E+01	0.2000E-01
			0.1155E+02	0.4000E-01
			0.1732E+02	0.6000E-01
			0.2310E+02	0.8000E-01
			0.2598E+02	0.9000E-01
			0.2887E+02	0.1000E+00
			0.2887E+02	0.5000E+00
			0.2887E+02	0.2000E+01
28	10	0.3650E+02		
			0.0000E+00	0.0000E+00
			0.2887E+01	0.1000E-01
			0.5774E+01	0.2000E-01
			0.1155E+02	0.4000E-01
			0.1732E+02	0.6000E-01
			0.2310E+02	0.8000E-01
			0.2598E+02	0.9000E-01
			0.2887E+02	0.1000E+00
			0.2887E+02	0.5000E+00
			0.2887E+02	0.2000E+01
29	10	0.3878E+02		
			0.0000E+00	0.0000E+00
			0.3303E+01	0.1000E-01
			0.6606E+01	0.2000E-01
			0.1321E+02	0.4000E-01
			0.1982E+02	0.6000E-01
			0.2642E+02	0.8000E-01
			0.2973E+02	0.9000E-01
			0.3303E+02	0.1000E+00
			0.3303E+02	0.5000E+00
			0.3303E+02	0.2000E+01
30	10	0.4096E+02		
			0.0000E+00	0.0000E+00
			0.3503E+01	0.1000E-01
			0.7007E+01	0.2000E-01
			0.1401E+02	0.4000E-01
			0.2102E+02	0.6000E-01

			0.2803E+02	0.8000E-01
			0.3153E+02	0.9000E-01
			0.3503E+02	0.1000E+00
			0.3503E+02	0.5000E+00
			0.3503E+02	0.2000E+01
31	10	0.4100E+02		
			0.0000E+00	0.0000E+00
			0.3604E+01	0.1000E-01
			0.7207E+01	0.2000E-01
			0.1441E+02	0.4000E-01
			0.2162E+02	0.6000E-01
			0.2883E+02	0.8000E-01
			0.3243E+02	0.9000E-01
			0.3604E+02	0.1000E+00
			0.3604E+02	0.5000E+00
			0.3604E+02	0.2000E+01
32	10	0.4253E+02		
			0.0000E+00	0.0000E+00
			0.3704E+01	0.1000E-01
			0.7408E+01	0.2000E-01
			0.1482E+02	0.4000E-01
			0.2222E+02	0.6000E-01
			0.2963E+02	0.8000E-01
			0.3333E+02	0.9000E-01
			0.3704E+02	0.1000E+00
			0.3704E+02	0.5000E+00
			0.3704E+02	0.2000E+01
33	10	0.4396E+02		
			0.0000E+00	0.0000E+00
			0.3883E+01	0.1000E-01
			0.7766E+01	0.2000E-01
			0.1553E+02	0.4000E-01
			0.2330E+02	0.6000E-01
			0.3107E+02	0.8000E-01
			0.3495E+02	0.9000E-01
			0.3883E+02	0.1000E+00
			0.3883E+02	0.5000E+00
			0.3883E+02	0.2000E+01
34	10	0.4400E+02		
			0.0000E+00	0.0000E+00
			0.4169E+01	0.1000E-01
			0.8339E+01	0.2000E-01
			0.1668E+02	0.4000E-01
			0.2502E+02	0.6000E-01
			0.3336E+02	0.8000E-01
			0.3753E+02	0.9000E-01
			0.4169E+02	0.1000E+00
			0.4169E+02	0.5000E+00
			0.4169E+02	0.2000E+01
35	10	0.4553E+02		

			0.0000E+00	0.0000E+00
			0.4432E+01	0.1000E-01
			0.8864E+01	0.2000E-01
			0.1773E+02	0.4000E-01
			0.2659E+02	0.6000E-01
			0.3545E+02	0.8000E-01
			0.3989E+02	0.9000E-01
			0.4432E+02	0.1000E+00
			0.4432E+02	0.5000E+00
			0.4432E+02	0.2000E+01
36	10	0.4696E+02		
			0.0000E+00	0.0000E+00
			0.4643E+01	0.1000E-01
			0.9286E+01	0.2000E-01
			0.1857E+02	0.4000E-01
			0.2786E+02	0.6000E-01
			0.3714E+02	0.8000E-01
			0.4179E+02	0.9000E-01
			0.4643E+02	0.1000E+00
			0.4643E+02	0.5000E+00
			0.4643E+02	0.2000E+01
37	10	0.4700E+02		
			0.0000E+00	0.0000E+00
			0.4854E+01	0.1000E-01
			0.9707E+01	0.2000E-01
			0.1941E+02	0.4000E-01
			0.2912E+02	0.6000E-01
			0.3883E+02	0.8000E-01
			0.4368E+02	0.9000E-01
			0.4854E+02	0.1000E+00
			0.4854E+02	0.5000E+00
			0.4854E+02	0.2000E+01
38	10	0.4953E+02		
			0.0000E+00	0.0000E+00
			0.5276E+01	0.1000E-01
			0.1055E+02	0.2000E-01
			0.2110E+02	0.4000E-01
			0.3165E+02	0.6000E-01
			0.4220E+02	0.8000E-01
			0.4748E+02	0.9000E-01
			0.5276E+02	0.1000E+00
			0.5276E+02	0.5000E+00
			0.5276E+02	0.2000E+01
39	10	0.5196E+02		
			0.0000E+00	0.0000E+00
			0.5697E+01	0.1000E-01
			0.1139E+02	0.2000E-01
			0.2279E+02	0.4000E-01
			0.3418E+02	0.6000E-01
			0.4558E+02	0.8000E-01

			0.5128E+02	0.9000E-01
			0.5697E+02	0.1000E+00
			0.5697E+02	0.5000E+00
			0.5697E+02	0.2000E+01
40	10	0.5200E+02		
			0.0000E+00	0.0000E+00
			0.5908E+01	0.1000E-01
			0.1182E+02	0.2000E-01
			0.2363E+02	0.4000E-01
			0.3545E+02	0.6000E-01
			0.4727E+02	0.8000E-01
			0.5318E+02	0.9000E-01
			0.5908E+02	0.1000E+00
			0.5908E+02	0.5000E+00
			0.5908E+02	0.2000E+01
41	10	0.5453E+02		
			0.0000E+00	0.0000E+00
			0.6330E+01	0.1000E-01
			0.1266E+02	0.2000E-01
			0.2532E+02	0.4000E-01
			0.3798E+02	0.6000E-01
			0.5064E+02	0.8000E-01
			0.5697E+02	0.9000E-01
			0.6330E+02	0.1000E+00
			0.6330E+02	0.5000E+00
			0.6330E+02	0.2000E+01
42	10	0.5696E+02		
			0.0000E+00	0.0000E+00
			0.6752E+01	0.1000E-01
			0.1350E+02	0.2000E-01
			0.2701E+02	0.4000E-01
			0.4051E+02	0.6000E-01
			0.5402E+02	0.8000E-01
			0.6077E+02	0.9000E-01
			0.6752E+02	0.1000E+00
			0.6752E+02	0.5000E+00
			0.6752E+02	0.2000E+01
43	10	0.5700E+02		
			0.0000E+00	0.0000E+00
			0.6963E+01	0.1000E-01
			0.1393E+02	0.2000E-01
			0.2785E+02	0.4000E-01
			0.4178E+02	0.6000E-01
			0.5570E+02	0.8000E-01
			0.6267E+02	0.9000E-01
			0.6963E+02	0.1000E+00
			0.6963E+02	0.5000E+00
			0.6963E+02	0.2000E+01
44	10	0.5953E+02		
			0.0000E+00	0.0000E+00

			0.7385E+01	0.1000E-01
			0.1477E+02	0.2000E-01
			0.2954E+02	0.4000E-01
			0.4431E+02	0.6000E-01
			0.5908E+02	0.8000E-01
			0.6646E+02	0.9000E-01
			0.7385E+02	0.1000E+00
			0.7385E+02	0.5000E+00
			0.7385E+02	0.2000E+01
45	10	0.6196E+02		
			0.0000E+00	0.0000E+00
			0.7807E+01	0.1000E-01
			0.1561E+02	0.2000E-01
			0.3123E+02	0.4000E-01
			0.4684E+02	0.6000E-01
			0.6245E+02	0.8000E-01
			0.7026E+02	0.9000E-01
			0.7807E+02	0.1000E+00
			0.7807E+02	0.5000E+00
			0.7807E+02	0.2000E+01
46	10	0.6200E+02		
			0.0000E+00	0.0000E+00
			0.8018E+01	0.1000E-01
			0.1604E+02	0.2000E-01
			0.3207E+02	0.4000E-01
			0.4811E+02	0.6000E-01
			0.6414E+02	0.8000E-01
			0.7216E+02	0.9000E-01
			0.8018E+02	0.1000E+00
			0.8018E+02	0.5000E+00
			0.8018E+02	0.2000E+01
47	10	0.6453E+02		
			0.0000E+00	0.0000E+00
			0.8440E+01	0.1000E-01
			0.1688E+02	0.2000E-01
			0.3376E+02	0.4000E-01
			0.5064E+02	0.6000E-01
			0.6752E+02	0.8000E-01
			0.7596E+02	0.9000E-01
			0.8440E+02	0.1000E+00
			0.8440E+02	0.5000E+00
			0.8440E+02	0.2000E+01
48	10	0.6696E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01

			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
49	10	0.6700E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
50	10	0.6753E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
51	10	0.6796E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
52	10	0.6800E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
53	10	0.7278E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01

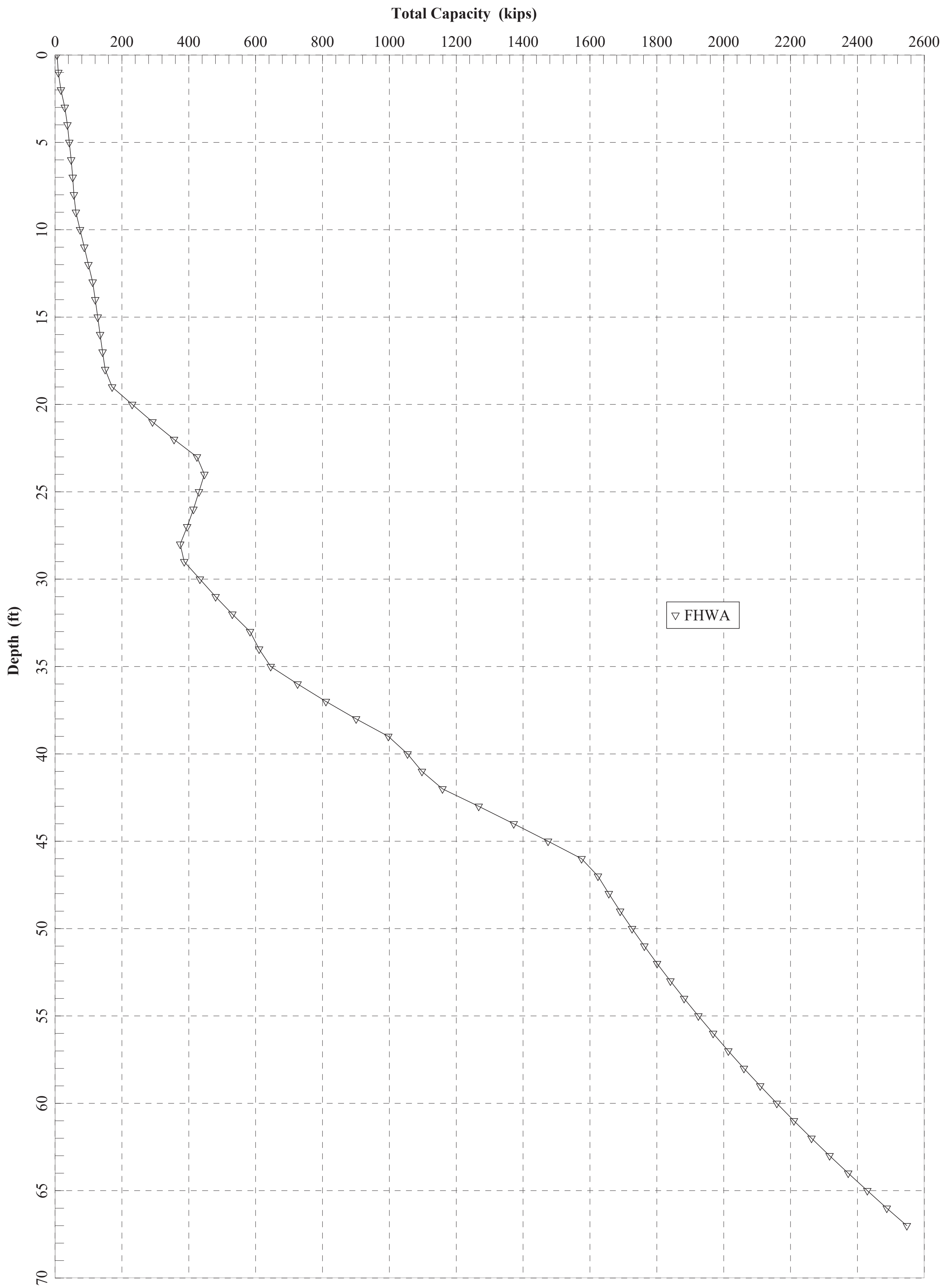
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01
54	10	0.7746E+02		
			0.0000E+00	0.0000E+00
			0.8756E+01	0.1000E-01
			0.1751E+02	0.2000E-01
			0.3502E+02	0.4000E-01
			0.5254E+02	0.6000E-01
			0.7005E+02	0.8000E-01
			0.7880E+02	0.9000E-01
			0.8756E+02	0.1000E+00
			0.8756E+02	0.5000E+00
			0.8756E+02	0.2000E+01

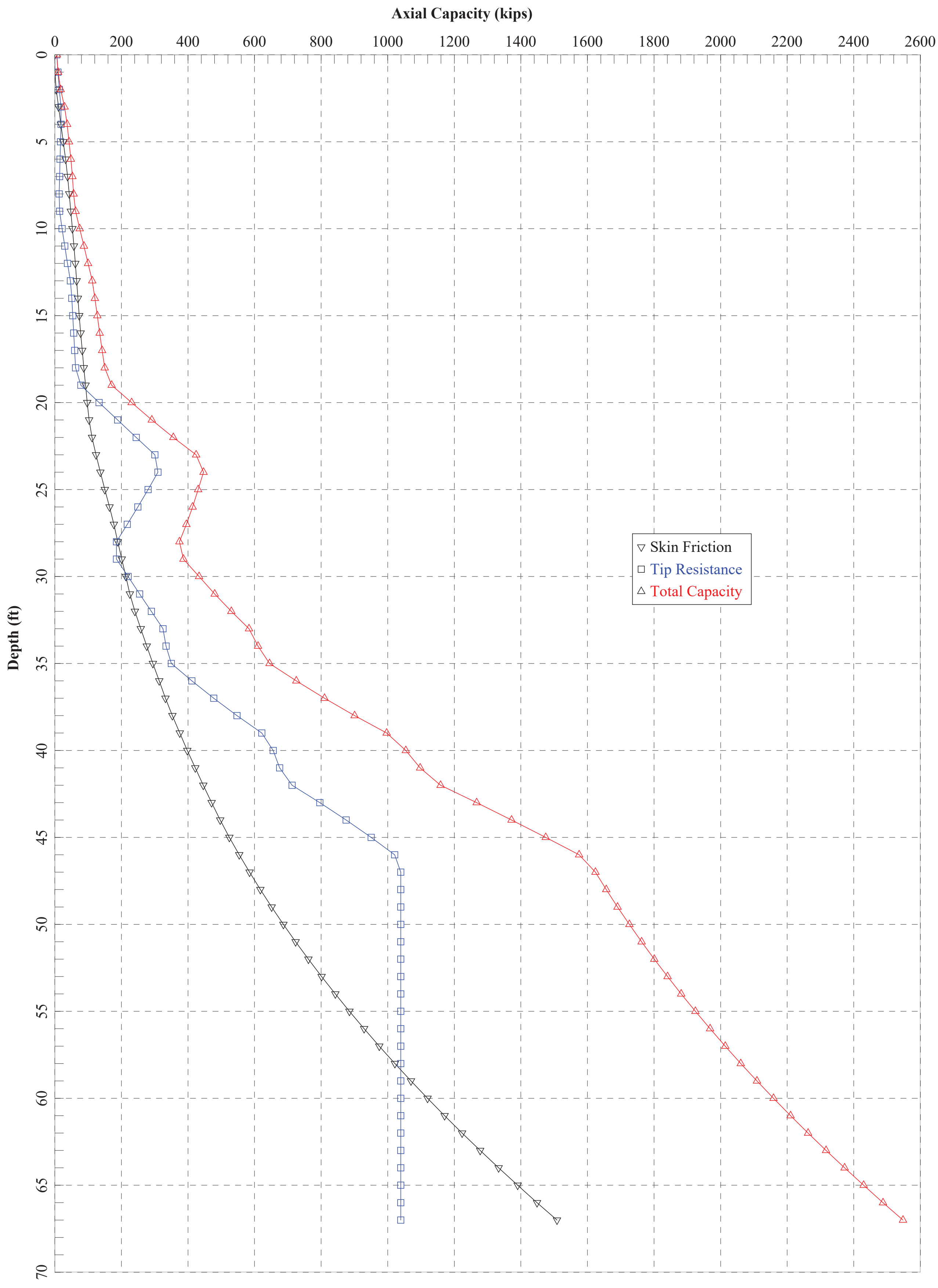
TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.6494E+02	0.9072E-02
0.1299E+03	0.1814E-01
0.2598E+03	0.3629E-01
0.5195E+03	0.2359E+00
0.7793E+03	0.7620E+00
0.9352E+03	0.1324E+01
0.1039E+04	0.1814E+01
0.1039E+04	0.2722E+01
0.1039E+04	0.3629E+01

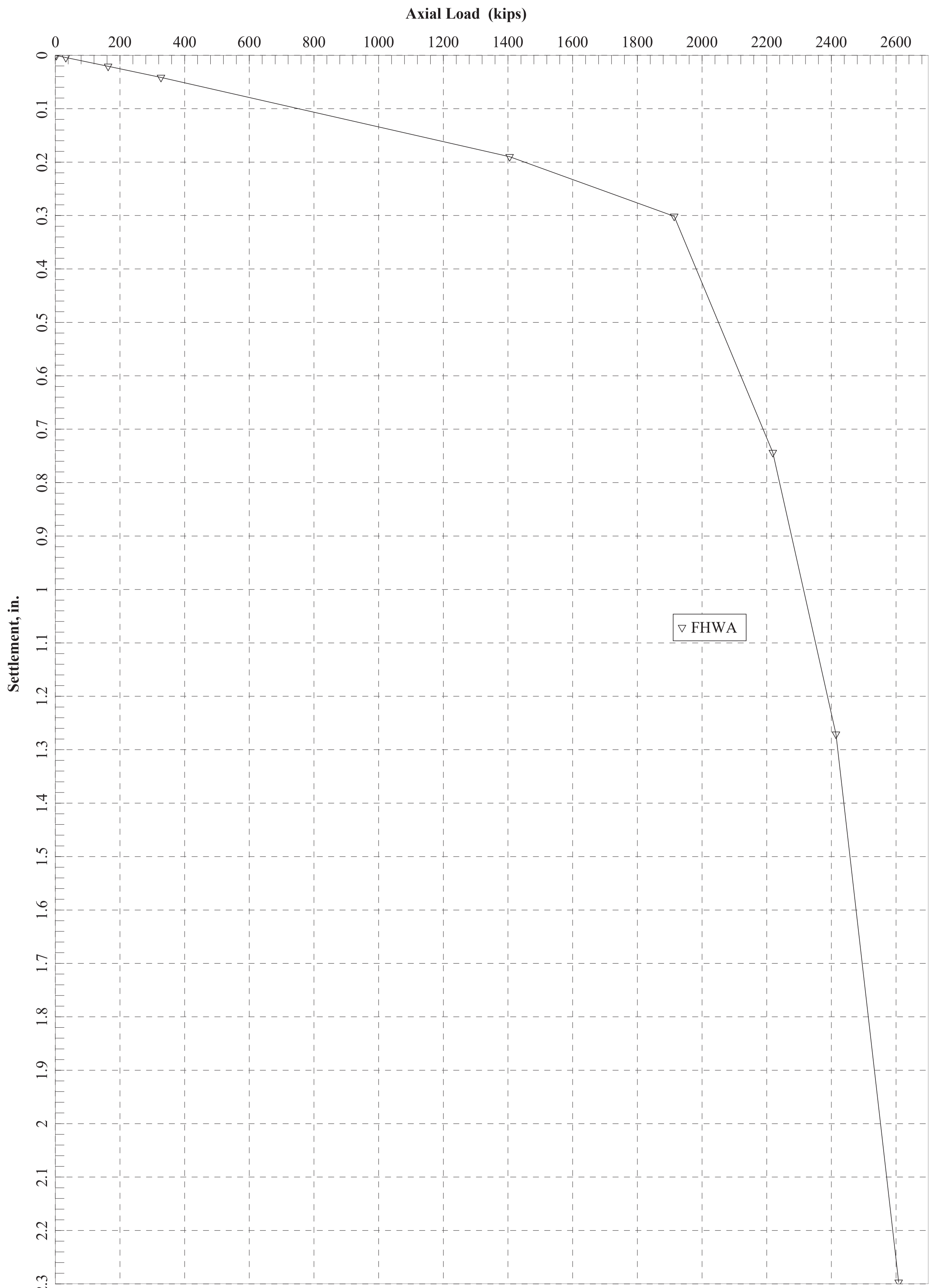
LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.3255E+01	0.4127E-03	0.7159E+00	0.1000E-03
0.3255E+02	0.4127E-02	0.7159E+01	0.1000E-02
0.1635E+03	0.2068E-01	0.3579E+02	0.5000E-02
0.3269E+03	0.4148E-01	0.7159E+02	0.1000E-01
0.1405E+04	0.1900E+00	0.2776E+03	0.5000E-01

0.1914E+04	0.3014E+00	0.3427E+03	0.1000E+00
0.2219E+04	0.7436E+00	0.6500E+03	0.5000E+00
0.2414E+04	0.1271E+01	0.8453E+03	0.1000E+01
0.2608E+04	0.2297E+01	0.1039E+04	0.2000E+01


Total Capacity (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
FHWA


Axial Capacity (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Skin Friction
Tip Resistance
Total Capacity



Axial Load (kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Settlement, in.
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
FHWA

Cushion: Nylon, E = 175 ksi, Thickness = 4 inches
Fuel: Max-1, Pressure = 1,413 psi - 90%

UNITED CONSULTING — Mar 31 2021
SR 1 (US 27)-Bent 1-HP 14X89-ICE I-30v2 — GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Elev. 666.5' at Depth "0"

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/in	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
5.0	41.7	6.8	34.9	0.2	10.382	-0.026	4.18	36.5
10.0	62.6	15.5	47.2	0.3	15.461	0.000	4.77	33.6
15.0	69.4	22.3	47.2	0.4	16.571	0.000	4.92	32.7
20.0	393.2	111.0	282.3	3.0	35.126	-1.235	8.25	28.1
20.1	396.1	113.8	282.3	3.0	35.230	-1.272	8.27	28.1
20.2	398.9	116.7	282.3	3.1	35.437	-1.308	8.29	28.2
20.3	401.8	119.5	282.3	3.1	35.377	-1.350	8.31	28.2
20.4	404.6	122.4	282.3	3.1	35.196	-1.396	8.33	28.3
20.5	407.5	125.2	282.3	3.2	35.053	-1.440	8.35	28.3
20.6	410.3	128.1	282.3	3.2	34.894	-1.485	8.37	28.4
20.7	413.2	130.9	282.3	3.2	34.689	-1.529	8.39	28.4
20.8	416.1	133.8	282.3	3.3	34.589	-1.573	8.41	28.4
20.9	418.9	136.6	282.3	3.3	34.403	-1.616	8.43	28.5
21.0	421.8	139.5	282.3	3.4	33.996	-1.668	8.36	28.1
22.0	450.3	168.0	282.3	3.7	33.712	-2.174	8.53	28.5
23.0	478.8	196.5	282.3	4.1	34.990	-2.668	8.70	28.8
24.0	507.3	225.1	282.3	4.6	34.619	-3.028	8.86	29.1
25.0	535.9	253.6	282.3	5.1	33.911	-3.376	9.00	29.4
26.0	772.1	348.7	423.4	12.4	39.902	-3.985	10.44	33.9
27.0	867.2	443.8	423.4	21.8	41.493	-3.995	10.94	35.6
28.0	962.2	538.8	423.4	55.0	42.256	-4.284	11.22	36.6
29.0	1057.3	633.9	423.4	832.9	42.851	-3.715	11.38	37.0
30.0	1152.4	729.0	423.4	832.9	43.470	-4.344	11.50	37.2
35.0	1627.8	1204.4	423.4	832.9	43.969	-1.598	11.50	36.2
40.0	2103.2	1679.8	423.4	832.9	46.540	-0.486	11.50	35.1
42.0	2293.4	1870.0	423.4	832.9	48.456	-0.470	11.50	34.6

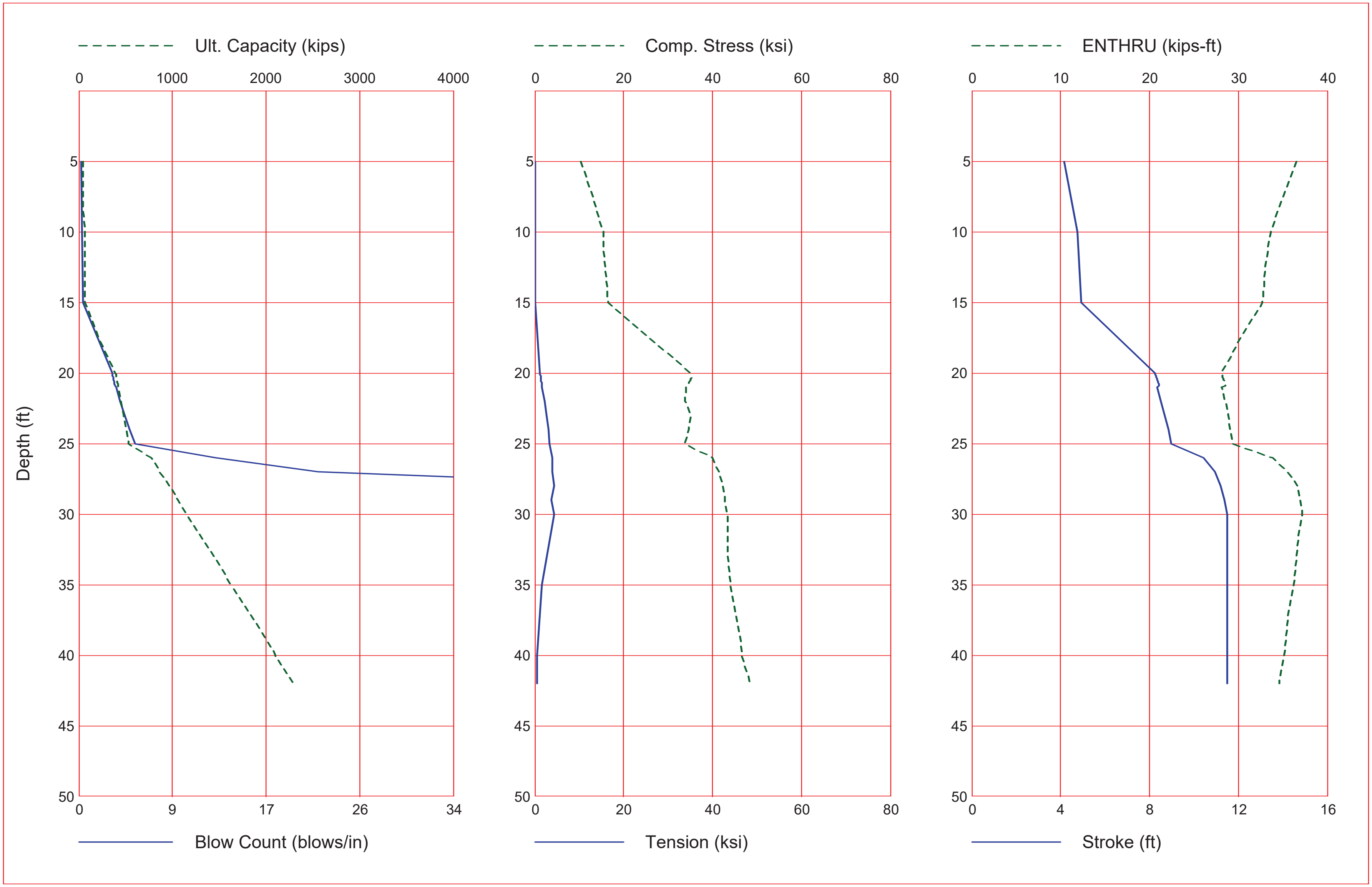
Driving Resistance= 399 kips

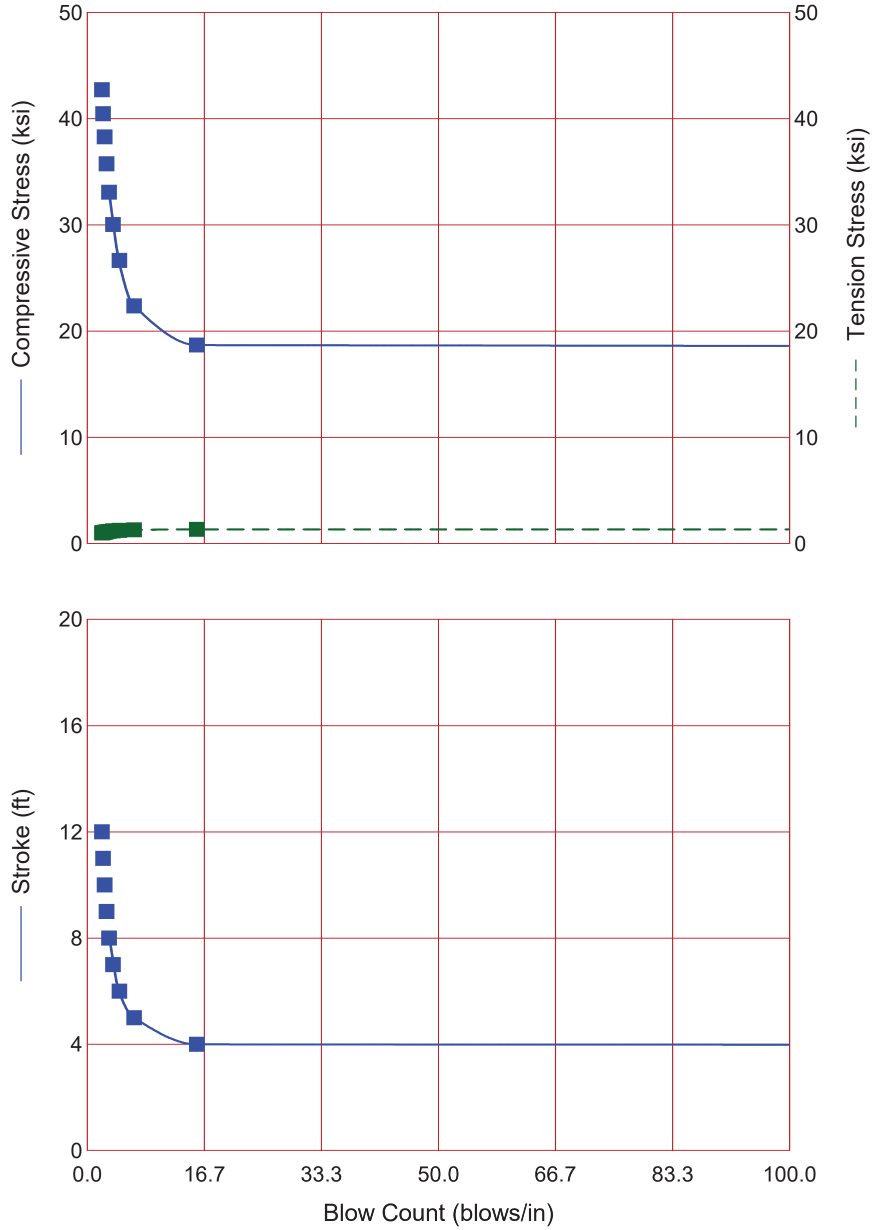
Refusal occurred; no driving time output possible

UNITED CONSULTING
SR 1 (US 27)-Bent 1-HP 14X89-ICE I-30v2

Mar 31 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



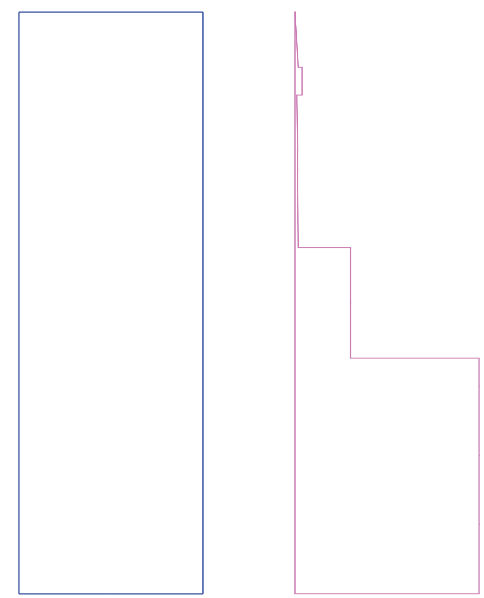


ICE I-30v2

Capacity	399.0	kips
Ram Weight	6.61	kips
Efficiency	0.800	
Pressure	1413 (90%)	psi
Helmet Weight	2.46	kips
Hammer Cushion	17395	kips/in
COR of H.C.	0.920	
Skin Quake	0.100	in
Toe Quake	0.100	in
Skin Damping	0.200	s/ft
Toe Damping	0.150	s/ft
Pile Length	42.00	ft
Pile Penetration	42.00	ft
Pile Top Area	26.10	in2

Pile Model

Skin Friction Distribution



Res. Shaft = 10 %
(Proportional)

Cushion: Nylon, E = 175 ksi, Thickness = 4 inches
Fuel: Max, Pressure = 1,570 psi - 100%

UNITED CONSULTING
SR 1 (US 27)-Bent 2-HP 14X89-ICE I-30v2

Mar 31 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

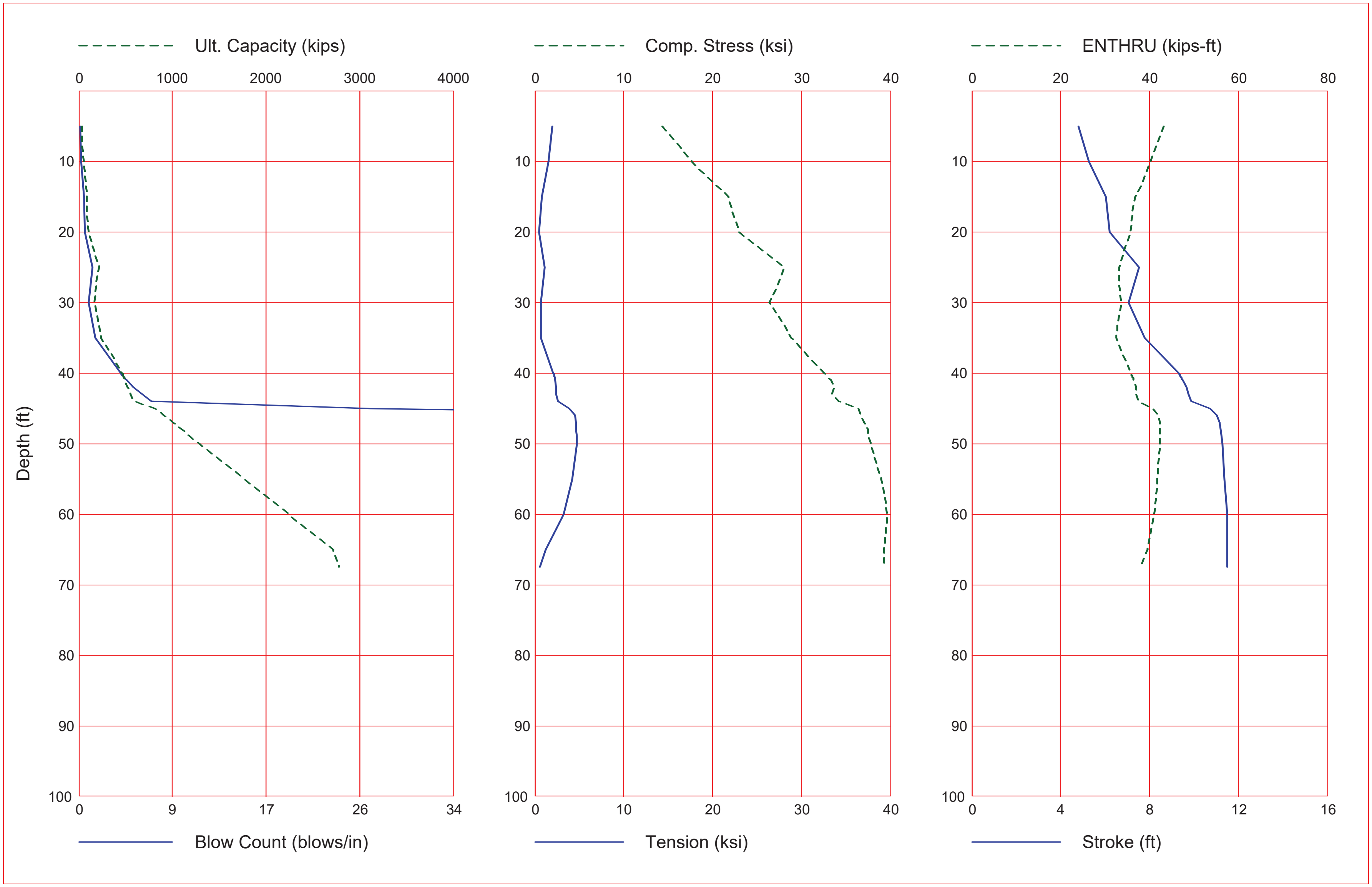
Elev. 667' at Depth "0"

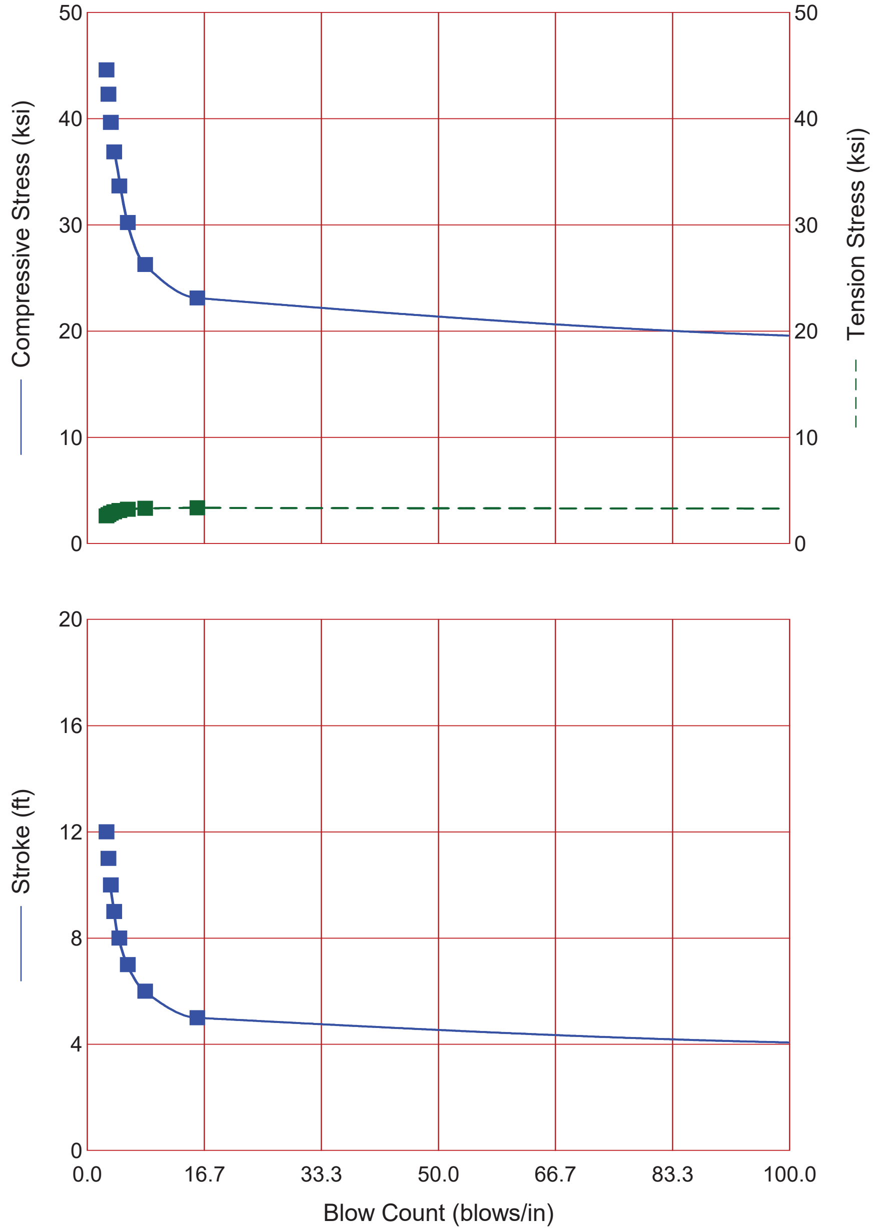
Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/in	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
5.0	37.8	18.7	19.0	0.2	14.352	-1.948	4.82	43.1
10.0	52.7	40.0	12.7	0.2	17.631	-1.549	5.29	40.3
15.0	89.7	48.5	41.3	0.4	21.803	-0.815	6.03	36.9
20.0	102.0	54.8	47.2	0.5	23.003	-0.533	6.19	35.8
25.0	214.9	61.6	153.3	1.3	28.138	-1.138	7.55	33.1
30.0	164.0	69.7	94.3	0.9	26.361	-0.709	7.04	33.5
35.0	237.6	78.4	159.2	1.5	28.866	-0.745	7.79	32.5
40.0	463.4	181.1	282.3	3.8	32.632	-2.115	9.31	35.9
40.1	466.3	184.0	282.3	3.8	32.701	-2.137	9.33	35.9
40.2	469.1	186.8	282.3	3.9	32.765	-2.159	9.35	35.9
40.3	472.0	189.7	282.3	3.9	32.803	-2.182	9.36	36.0
40.4	474.8	192.6	282.3	4.0	32.873	-2.204	9.38	36.1
40.5	477.7	195.4	282.3	4.1	32.937	-2.227	9.40	36.1
40.6	480.5	198.3	282.3	4.1	33.006	-2.250	9.42	36.2
40.7	483.4	201.1	282.3	4.2	33.094	-2.272	9.43	36.3
40.8	486.2	204.0	282.3	4.2	33.144	-2.295	9.45	36.3
40.9	489.1	206.8	282.3	4.3	33.251	-2.316	9.47	36.4
41.0	491.9	209.7	282.3	4.3	33.317	-2.337	9.49	36.4
42.0	520.4	238.2	282.3	4.9	33.630	-2.428	9.66	37.0
43.0	549.0	266.7	282.3	5.7	33.459	-2.429	9.73	37.1
44.0	577.5	295.2	282.3	6.5	34.145	-2.586	9.87	37.5
45.0	813.7	390.3	423.4	26.5	36.475	-3.895	10.75	40.9
46.0	908.8	485.4	423.4	69.0	36.667	-4.503	11.04	42.0
47.0	1003.9	580.5	423.4	832.9	37.039	-4.634	11.14	42.3
48.0	1099.0	675.6	423.4	832.9	37.526	-4.625	11.19	42.3
49.0	1194.0	770.6	423.4	832.9	37.516	-4.755	11.23	42.3
50.0	1289.1	865.7	423.4	832.9	37.820	-4.726	11.27	42.3
55.0	1764.5	1341.1	423.4	832.9	38.991	-4.179	11.36	41.6
60.0	2239.9	1816.5	423.4	832.9	39.590	-3.237	11.50	41.0
65.0	2715.3	2291.9	423.4	832.9	39.307	-1.185	11.50	39.6
67.5	2778.6	2496.3	282.3	832.9	39.286	-0.582	11.50	38.0

Driving Resistance= 491 kips

Refusal occurred; no driving time output possible

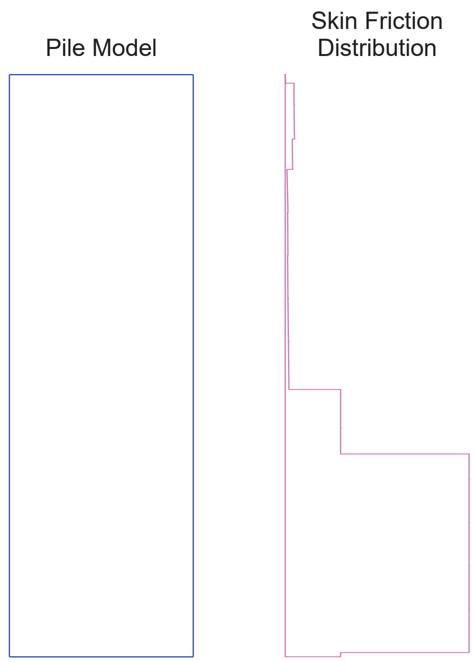
Gain/Loss 1 at Shaft and Toe 1.000 / 1.000





ICE I-30v2

Capacity	491.0	kips
Ram Weight	6.61	kips
Efficiency	0.800	
Pressure	1570 (100%)	psi
Helmet Weight	2.46	kips
Hammer Cushion	17395	kips/in
COR of H.C.	0.920	
Skin Quake	0.100	in
Toe Quake	0.122	in
Skin Damping	0.200	s/ft
Toe Damping	0.150	s/ft
Pile Length	67.50	ft
Pile Penetration	67.50	ft
Pile Top Area	26.10	in2



Res. Shaft = 10 %
(Proportional)

SR 1 (US 27) Over Long Cane Creek
Troup County
P.I. No. 0013942

Hammer Efficiency = 72.88 %

Boring BENT 1

Depth (ft)			Layer Thikcness (ft)	SPT N	SPT N_i	d_i/N_i
0	to	3	3	5	6.07333	0.49
3	to	6	3	11	13.3613	0.22
6	to	8	2	14	17.0053	0.12
8	to	12	4	8	9.71733	0.41
12	to	13.5	1.5	9	10.932	0.14
13.5	to	19	5.5	8	9.71733	0.57
19	to	23	4	100	100	0.04
23	to	27	4	100	100	0.04
27	to	100	73	100	100	0.73
			100			2.76
		N-bar=	36.22			
		Site Class=	**D**			

Boring BENT 2

Depth (ft)			Layer Thikcness (ft)	SPT N	SPT N_i	d_i/N_i
0	to	3	3	5	6.07333	0.49
3	to	5.5	2.5	6	7.288	0.34
5.5	to	8.5	3	10	12.1467	0.25
8.5	to	13	4.5	5	6.07333	0.74
13	to	18	5	7	8.50267	0.59
18	to	23	5	8	9.71733	0.51
23	to	28	5	26	31.5813	0.16
28	to	33	5	16	19.4347	0.26
33	to	38.5	5.5	27	32.796	0.17
38.5	to	43	4.5	100	100	0.05
43	to	46	3	100	100	0.03
46	to	100	54	100	100	0.54
			100			4.13
		N-bar=	24.24			
		Site Class=	**D**			

Average N-bar = 30.23
Recommended Site Class = **D**

Georgia Department of Transportation

Russell R. McMurry, P.E.,
Commissioner
One Georgia Center
600 West Peachtree Street, NW
Atlanta, GA 30308
(404) 631-1000 Main Office

FILE: **0013942 TROUP COUNTY**
SR 1 (US 27) Over Long Cane Creek
PI No. 0013942

DATE: January 14, 2021

FROM: Dexter Whaley, Bridge Design Group Leader

TO: Infrastructure Consulting and Engineering
4940 Peachtree Industrial Blvd., Suite 310
Norcross, Georgia 30071
Attention: Tyler McIntosh , P.E
tyler.mcintosh@ice-eng.com

SUBJECT: **FOUNDATION DESIGN DATA (LRFD)**

The following design loads, stress limits (as necessary), and structural capacities (as necessary) have been calculated for the above listed structure. Please use the provided values to complete the Bridge Foundation Investigation report for this project.

STRUCTURAL DATA FOR FOUNDATION DESIGN									
BENT(S)	BENT TYPE	MAX. DESIGN LOADS			PILE SIZE	PILE GRADE (ksi)	DRIVABILITY		Max. Factored Structure Resist. (kips)
		Strength Limit Load	Service Limit Load	Extreme Limit Load			Comp. (ksi)	Tension (ksi)	
1	Pile End Bent	243	171	142	HP 14x89	50	45.0	45.0	653
2	Pile End Bent	241	170	141	HP 14x89	50	45.0	45.0	653
	-				-	-			
	-				-	-			
	-				-	-			
	-				-	-			

ADDITIONAL COMMENTS
Design was updated by placing two piles under each beam in bent 1 and bent 2 , due to downdrag .

If you have any questions, please contact Marc Clark of the Office of Bridges and Structures at 404-347-0660 or by email at MClark@dot.ga.gov.

DLW:MAC
cc: Kimberly Nesbitt, State Program Delivery Engineer; attn: Victor Gill
Lyn Clements, Assistant State Bridge Engineer; attn: Dexter Whaley

Betts Environmental
361 Airport Square
Adel, Georgia 31620

April 18, 2019

Subject: **Dynamic Testing Report**
SPT Hammer Energy Measurement- CME-75 (S/N 164447)
156 N Johnson Street
Newborn, Georgia 30056
UES Project 0950.1900024.0000

UES has completed the high strain dynamic (i.e. PDA) testing for the Soil Test Boring drill rig designated CME-75 in use at the above referenced project. Dynamic monitoring was conducted during performance of a soil test boring in order to determine energy transferred by the Standard Penetration Test hammer to the drill rods during split spoon sampling. The dynamic testing was conducted using the Pile Driving Analyzer™ (PDA) Model 8G, which records, digitizes, and processes the force and acceleration signals. The dynamic testing was carried out in accordance with ASTM D4945 *Standard Test Method for High Strain Dynamic Testing of Piles and* ASTM D4633 *Standard Test Method for Energy Measurement for Dynamic Penetrometers.*

PROJECT DESCRIPTION

Overview

The SPT hammer calibration testing was performed on site at the property located at 156 N Johnson Street in Newborn, Georgia. The SPT hammer calibration testing was performed at five (5) depths during sampling of an SPT Test Boring on April 12, 2019. The SPT hammer calibration testing was performed the following sampling depths; 33.5 to 35.0 feet (Sample 1), 38.5 to 40.0 feet (Sample 2), 43.5 to 45.0 feet (Sample 3), 48.5 to 50.0 feet (Sample 4), and 53.5 to 55.0 feet (Sample 5).

SPT Testing Overview

Numerous technical publications exist regarding the Standard Penetration Test (SPT). Of these publications, ASTM D1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils* is considered to be the industry standard. This standard was last approved in January, 1999. In addition, U.S. Army Corp of Engineers Engineering Technical Letter (ETL) 1110-1-138 (dated March, 1988) is also a commonly used standard reference.

The Standard Penetration Test (SPT) consists of a drive weight assembly (i.e. hammer and anvil), split spoon sampler, and drill rods. The drive weight system consists of a 140 lb hammer raised by a number of mechanical means. The split spoon sampler is placed at the end of the drill rods in a borehole. The 140 lb hammer is raised 30 inches and then dropped to impact the drill rods. This procedure is repeated until the sampler has penetrated 18 inches into the underlying soil. The number of blows required to advance the split spoon sampler 12 inches is recorded as the "N" value for the test. Typically, the test is performed every 2 ½ ft for the upper 10 ft of a boring and then at 5 ft intervals thereafter. The standard dimensions of the split spoon sampler are shown in Figure 1, while a typical SPT setup is presented in Figure 2.

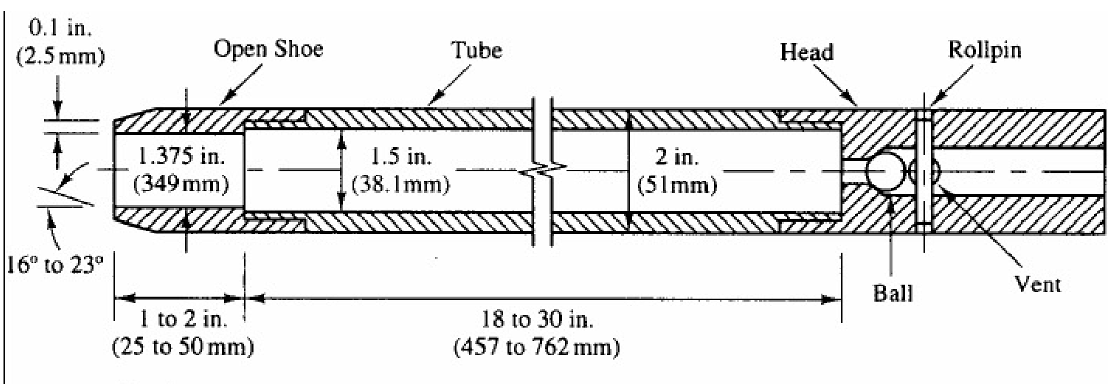


Figure 1. Split Spoon Sampler (after Rogers, 2004, adapted from ASTM D1586).

There are three (3) types of SPT hammers currently used in drilling practice today: the donut hammer, the automatic hammer, and the safety hammer. In addition, there are three (3) main types of hammer lifting mechanisms: cathead-rope system, spooling wench, or chain driven systems. Drill rods vary from AW (1 ¾ in O.D.) to NW (2 5/8 in O.D.), with drill rod lengths varying between 2 ft to 10 ft increments. Methods for advancing boreholes for the SPT test include mud rotary drilling, hollow stem augers, and water drilling with steel casing.

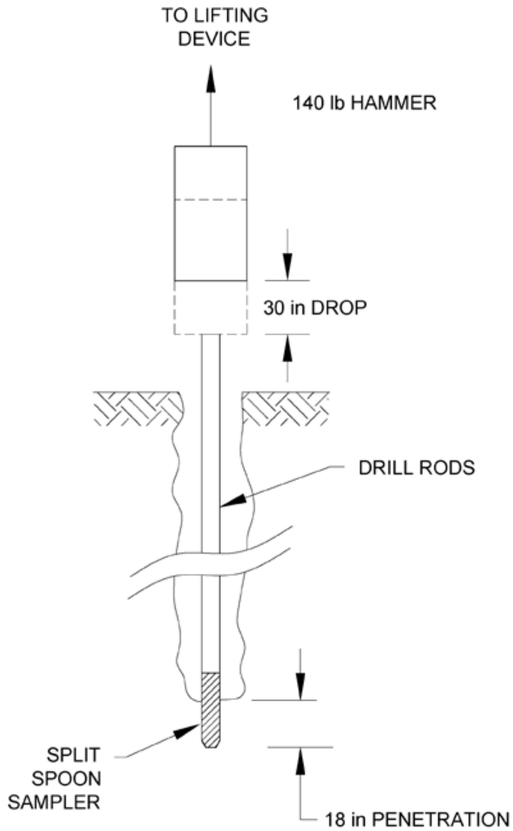


Figure 2. Typical SPT Setup.

SPT Energy Measurements

A number of factors can influence the SPT test and the subsequent N value. These include but are not limited to the following:

- Hammer
- Hammer Lifting System
- Operator Field Procedures
- Drill Rod Diameter and Length
- Borehole Drilling Method and Size
- Spilt Spoon Sampler

A graphical representation of various SPT system variables is provided in Figure 3.

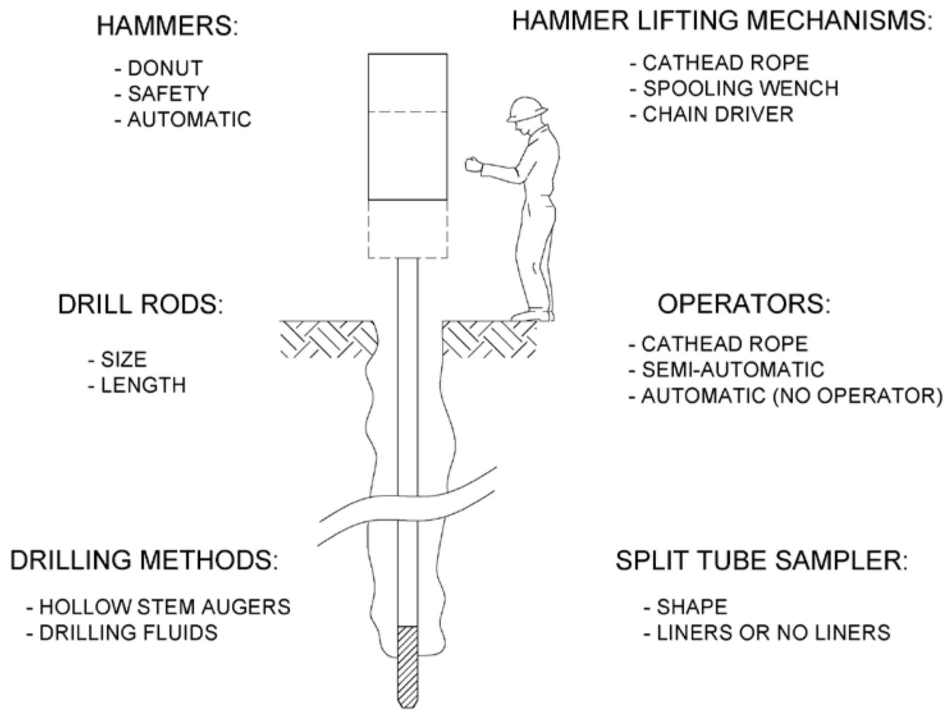


Figure 3. SPT Testing System Variables (after Lamb, 1997).

In order to account for these system variables, standardized SPT corrections have been developed. The corrected blow count is referred to as the N_{60} value. The N_{60} value is derived from the assumed efficiency of the original SPT (Mohr) hammer (Rogers, 2004). The following equation defines N_{60} values:

$$N_{60} = C_{60}C_bC_sC_rN$$

Where:
N_{60} = SPT N Value corrected for field procedures and apparatus
C_{60} = Hammer Efficiency Correction
C_b = Borehole Diameter Correction
C_s = Sample Barrel Correction
C_r = Rod Length Correction
N = Raw SPT value
In addition, the N value is influenced by the overburden pressure. Laio and Whitman (1986) proposed the following overburden correction for N_{60}, termed $(N_1)_{60}$:

$$(N_1)_{60} = N_{60}\frac{\sqrt{2000\,psf}}{\sigma'_v}$$

Where:
σ'_v = Effective vertical overburden stress

The hammer efficiency correction (C_{60}) is based on the Energy Transfer Efficiency (ER_i) and the 60% of the theoretical transferred hammer energy of 350 ft-lbs (i.e. 140 lbs multiplied by a 30 inch drop). The following equations show the derivation of C_{60}:

$$ER_i = \frac{E_i}{E_{th}}$$

Where:
ER_i = Energy Transfer Efficiency
E_i = Measured Transferred Energy
E_{th} = Theoretical Transferred Energy (i.e. 350 ft-lb)

and

$$C_{60} = \frac{ER_i}{60\%}$$

For liquefaction analysis using SPT N values, transferred energy measurements are required to determine $(N_1)_{60}$. The methods for determining the normalized penetration resistance for liquefaction potential are presented in ASTM D6066 *Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential.*

Transferred (i.e. delivered) energy measurements of SPT testing (i.e. the energy delivered by the hammer to the drill rods) are commonly taken in engineering practice through the use of several types of instruments. The most common of these is the Pile Driving Analyzer (PDA), developed and marketed by Pile Dynamics Inc. of Cleveland, Ohio. The PDA is a computer fitted with a data acquisition and a signal conditioning system and is typically used to conduct high strain dynamic load testing of driven piles, which is analogous to the SPT test. Strain gages and accelerometers which are connected to the PDA are attached to the pile or drill rods (for SPT testing). During pile driving or SPT testing, the strain and acceleration signals are recorded and processed for each hammer blow. The strain signal is converted to a force record and the acceleration signal is converted to a velocity record. The PDA saves selected hammer blows containing this information to disk and determines the compressive stresses, displacement, and energy at the point of measurement (pile top). The maximum transferred energy (EMX) is derived from the dynamic measurements using the following equation:

$$EMX = \int_{b}^{a} F(t)V(t)dt$$

Where:
a = Time Energy Transfer Begins
b = Time Energy Transfer End
F = Force
V = Velocity
t = Time

Refer to Abou-matar and Goble (1997) for additional details of SPT energy measurements using the PDA. Literature regarding the PDA is provided in the Appendix.

SPT Rig/Hammer System

The tested drill rig is designated CME-75 and is manufactured by Central Mine Equipment, Inc. The drill rig was parked on existing grade in a grassy area for this project. We understand that the drill rig was built on October 29, 1984 and is identified with Serial Number 164447. The CME-75 drill rig is fitted with an automatically operated hammer system. The drill rig and SPT hammer were operated by Mr. Chris Golden.

The method of drilling for the rig during testing was hollow stem auger (HSA), with Standard Penetration Testing being performed with AWJ drill rods. AWJ drill rod sections have nominal outside diameter of 1-5/8 inches and wall thickness of 3/16 inches. The instrumented sub-assembly (i.e. where gauges were attached) consisted of a two feet long section of AWJ rod that was threaded into the top drill rod at each testing interval.

Dynamic Load Test Instrumentation

The dynamic pile testing instrumentation consisted of a 2-feet long AWJ instrumented drill rod which is fitted with two strain gauges by Pile Dynamic Inc., in addition two (2) accelerometer transducers are attached a distance of approximately 1 foot below the top (i.e. in the center) of a two feet long instrumented AWJ drill rod. One strain gauge and one accelerometer are on opposite faces of the sub-assembly to minimize the effects of uneven hammer impact and rod bending.

A Model 8G Pile Driving Analyzer™ (PDA), manufactured by Pile Dynamics Inc., was used to collect the instrumentation data. The PDA is a computer fitted with a data acquisition and a signal conditioning system. During driving, the strain and acceleration signals are recorded and processed for each hammer blow. The strain signal is converted to a force record and the acceleration signal is converted to a velocity record. The sampling frequency used during the SPT Energy Measurement Testing was 20,000 hertz (20 kHz). The PDA saves selected hammer blows containing this information to disk and determines the energy at the point of measurement.

DYNAMIC TESTING RESULTS

Hammer Performance

The transferred energy monitored during the sampling is summarized in Table 1. Note that the values are those recorded during the second and third 6-inch sampling interval at each depth. Hammer Efficiency is based on measured transferred energy divided by the energy generated with a 140 pound hammer dropping 30 inches (0.35 kip-ft).

Table 1. CME-75 Rig SPT Energy Measurement Summary

SPT 1 Sample Depth (feet)	SPT Blow Count (Per 6 inch)	Hammer Efficiency (%)			
		Min	Max	**Average**	Standard Deviation
33.5 to 35.0	3-4-4	73.70	75.96	75.02	0.71
38.5 to 40.0	5-12-14	70.58	74.11	72.25	0.92
43.5 to 45.0	5-12-21	70.22	74.76	71.98	1.13
48.5 to 50.0	8-12-25	71.29	74.62	72.84	0.80
53.5 to 55.0	20-22-29	70.49	74.32	72.31	0.78
OVERALL[1]:		71.26	74.75	**72.88**	0.87

The following figure shows the SPT rig tested.

Figure 1: SPT drill rig.

CONCLUSIONS AND RECOMMENDATIONS

It is our opinion that the SPT hammer on the drill rig designated CME-75 is operating within a normal range for a semi-automatic SPT hammer.

UES appreciates the opportunity to provide this report. This report is for the sole use of this project and should not be relied upon otherwise. Should the project change significantly, we can review and modify our recommendations as needed. If you have questions concerning the contents herein, please contact us.

Sincerely,

UNIVERSAL ENGINEERING SCIENCES, INC.
Universal Florida Certificate of Authorization No. 549

Joshua C. Adams
Deep Foundation Engineer
HSDPT Certified – Master Level

Adam G. Kirk, P.E.
Senior Engineer
Florida P.E. Number 74552
Date: 4-18-19

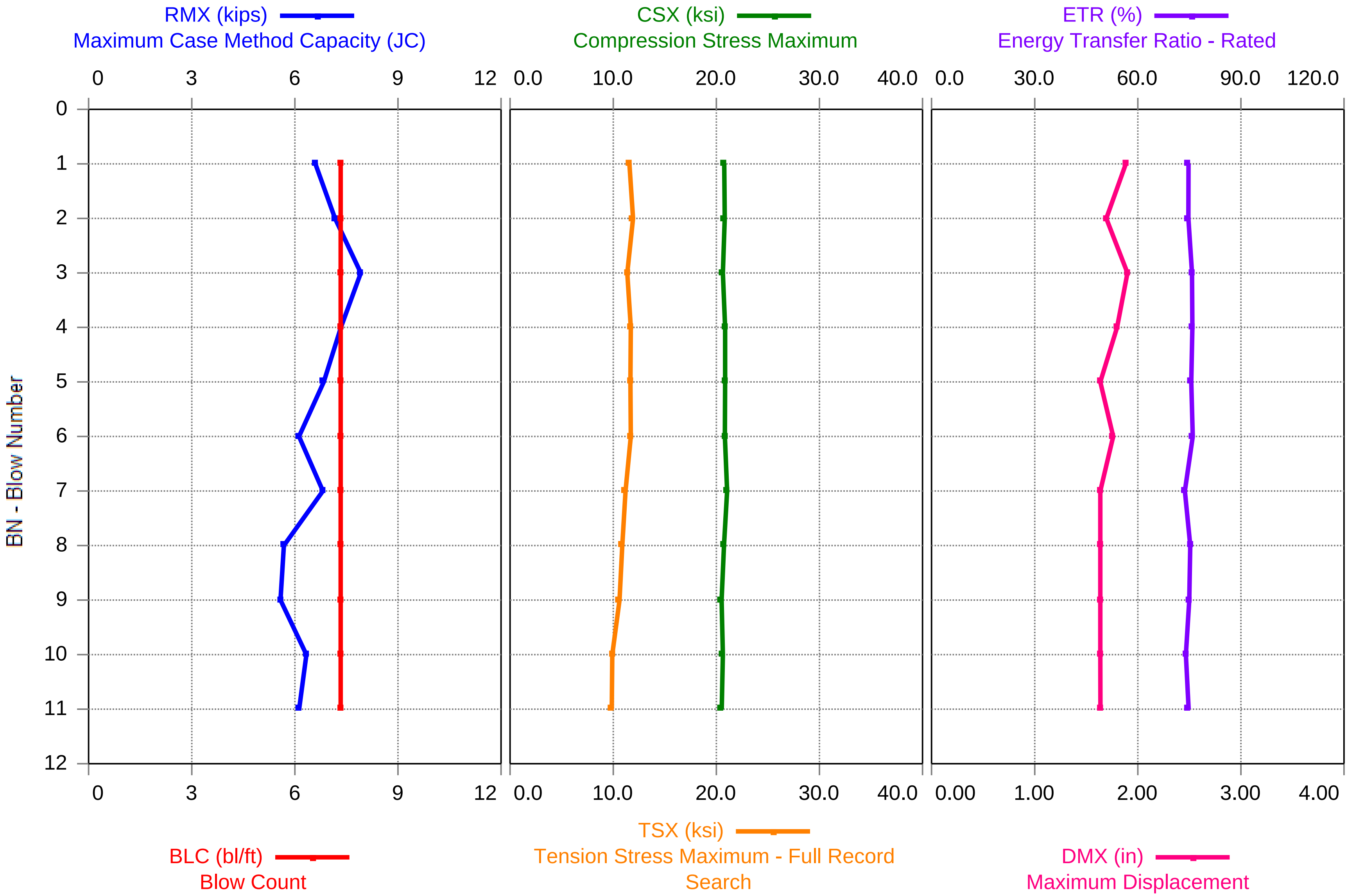
ADAM G. KIRK
LICENSE
No. 74552
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Attachments: PDA Data Output (PDIPLOT Graphs and Tables)

Universal Engineering Sciences, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 18-April-2019 Test started: 12-April-2019

Georgia SPT - SPT 2 Sample1



Georgia SPT - SPT 2 Sample1 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

AR: 1.18 in² SP: 0.492 k/ft³
LE: 44.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.60

RMX: Maximum Case Method Capacity (JC)
CSX: Compression Stress Maximum
TSX: Tension Stress Maximum - Full Record Search
STK: Hammer Stroke
CSI: Compression Stress Maximum - Individual Sensor
CSB: Compression Stress at Bottom of Pile
DMX: Maximum Displacement
SFR: Skin Friction (Crude Damping Correction)
ETR: Energy Transfer Ratio - Rated

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
1	33.64	7	6.6	20.8	11.6	0.00	20.8	15.0	1.88	3	74.72
2	33.77	7	7.2	20.8	11.9	0.00	21.0	14.5	1.69	4	74.72
3	33.91	7	7.9	20.6	11.4	0.00	21.1	15.1	1.90	4	75.75
4	34.05	7	7.3	20.8	11.7	0.00	21.1	14.6	1.80	4	75.86
5	34.18	7	6.8	20.9	11.7	0.00	21.1	14.6	1.64	3	75.54
6	34.32	7	6.1	20.8	11.7	0.00	21.1	15.0	1.76	2	75.96
7	34.45	7	6.8	21.0	11.2	0.00	21.3	15.3	1.64	3	73.70
8	34.59	7	5.7	20.7	10.9	0.00	21.0	14.7	1.64	2	75.25
9	34.73	7	5.6	20.5	10.6	0.00	20.8	14.6	1.64	2	74.95
10	34.86	7	6.3	20.6	9.9	0.00	20.9	14.4	1.64	3	73.99
11	35.00	7	6.1	20.5	9.9	0.00	20.8	14.6	1.64	3	74.78
		Average	6.6	20.7	11.1	**	21.0	14.8	1.71	3	75.02
		Std. Dev.	0.7	0.2	0.7	**	0.1	0.3	0.10	1	0.71
		Maximum	7.9	21.0	11.9	**	21.3	15.3	1.90	4	75.96
		Minimum	5.6	20.5	9.9	**	20.8	14.4	1.64	2	73.70

Total number of blows analyzed: 11

BL# Sensors

1-11 F1: [357AWJ1] 212.0 (1.02); F4: [357AWJ2] 211.2 (1.02); A2: [55385] 915.0 (0.98);
A3: [50148] 1065.0 (0.98)

BL# Comments

11 End of Set 1. n=10

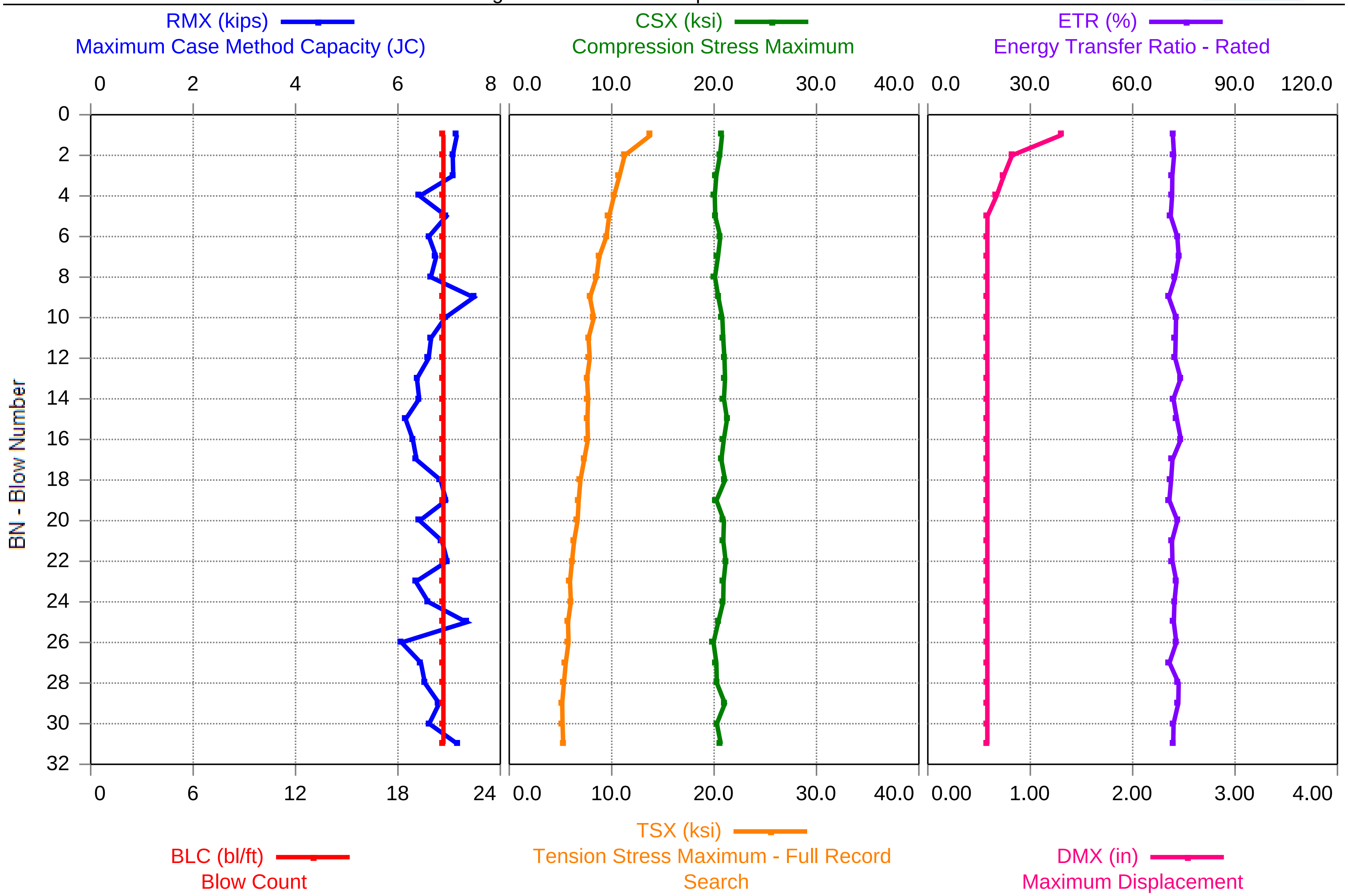
Time Summary

Drive 13 seconds 1:46 PM - 1:46 PM BN 1 - 11

Universal Engineering Sciences, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 18-April-2019 Test started: 12-April-2019

Georgia SPT - SPT 2 Sample 2



Georgia SPT - SPT 2 Sample 2 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

AR: 1.18 in² SP: 0.492 k/ft³
LE: 50.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.60

RMX: Maximum Case Method Capacity (JC)
CSX: Compression Stress Maximum
TSX: Tension Stress Maximum - Full Record Search
STK: Hammer Stroke
CSI: Compression Stress Maximum - Individual Sensor
CSB: Compression Stress at Bottom of Pile
DMX: Maximum Displacement
SFR: Skin Friction (Crude Damping Correction)
ETR: Energy Transfer Ratio - Rated

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
1	38.55	21	7.2	20.8	13.8	0.00	20.9	15.4	1.31	3	71.76
2	38.60	21	7.1	20.6	11.3	0.00	20.6	14.9	0.82	3	72.14
3	38.65	21	7.1	20.2	10.8	0.00	20.5	14.7	0.74	3	71.63
4	38.69	21	6.4	20.1	10.2	0.00	20.3	14.2	0.67	3	71.53
5	38.74	21	6.9	20.1	9.8	0.00	20.3	14.5	0.58	3	71.16
6	38.79	21	6.6	20.6	9.5	0.00	20.9	14.4	0.58	3	73.06
7	38.84	21	6.7	20.4	8.8	0.00	20.4	14.7	0.58	3	73.52
8	38.89	21	6.6	20.1	8.5	0.00	20.1	13.9	0.58	3	72.45
9	38.94	21	7.5	20.4	7.9	0.00	20.4	14.3	0.58	3	70.58
10	38.98	21	6.9	20.8	8.3	0.00	21.0	14.9	0.58	3	72.72
11	39.03	21	6.6	20.9	7.7	0.00	21.0	14.7	0.58	3	72.58
12	39.08	21	6.6	21.0	7.9	0.00	21.2	14.8	0.58	3	72.44
13	39.13	21	6.4	21.1	7.6	0.00	21.1	14.7	0.58	3	74.07
14	39.18	21	6.4	21.0	7.7	0.00	21.2	14.4	0.58	3	71.92
15	39.23	21	6.1	21.3	7.6	0.00	21.3	14.8	0.58	3	72.94
16	39.27	21	6.3	20.9	7.7	0.00	21.2	15.0	0.58	2	74.11
17	39.32	21	6.4	20.7	7.3	0.00	20.8	14.4	0.58	3	71.63
18	39.37	21	6.8	21.1	6.9	0.00	21.1	15.2	0.58	3	71.24
19	39.42	21	6.9	20.2	6.8	0.00	20.4	14.9	0.58	3	70.74
20	39.47	21	6.4	21.0	6.7	0.00	21.0	15.1	0.58	3	73.12
21	39.52	21	6.9	20.9	6.3	0.00	21.0	15.2	0.58	3	71.50
22	39.56	21	7.0	21.1	6.1	0.00	21.3	15.1	0.58	3	71.65
23	39.61	21	6.3	20.9	5.9	0.00	21.0	15.0	0.58	3	72.81
24	39.66	21	6.6	20.9	6.0	0.00	21.0	15.0	0.58	3	72.22
25	39.71	21	7.3	20.4	5.7	0.00	20.7	14.9	0.58	3	72.04
26	39.76	21	6.1	19.9	5.8	0.00	20.0	14.2	0.58	2	72.76
27	39.81	21	6.4	20.2	5.5	0.00	20.5	14.8	0.58	3	70.77
28	39.85	21	6.5	20.3	5.3	0.00	20.5	14.7	0.58	3	73.48
29	39.90	21	6.8	21.1	5.2	0.00	21.3	15.2	0.58	3	73.35
30	39.95	21	6.6	20.3	5.2	0.00	20.6	14.3	0.58	3	71.99
31	40.00	21	7.2	20.7	5.3	0.00	20.9	15.1	0.58	3	71.85
		Average	6.7	20.6	7.6	**	20.8	14.8	0.62	3	72.25
		Std. Dev.	0.3	0.4	2.0	**	0.4	0.4	0.14	0	0.92
		Maximum	7.5	21.3	13.8	**	21.3	15.4	1.31	3	74.11
		Minimum	6.1	19.9	5.2	**	20.0	13.9	0.58	2	70.58

Total number of blows analyzed: 31

BL# Sensors

1-31 F1: [357AWJ1] 212.0 (1.12); F4: [357AWJ2] 211.2 (1.12); A2: [55385] 915.0 (0.88);
A3: [50148] 1065.0 (0.88)

Georgia SPT - SPT 2 Sample 2 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

BL#	Comments
31	end of set 2. N=28

Time Summary

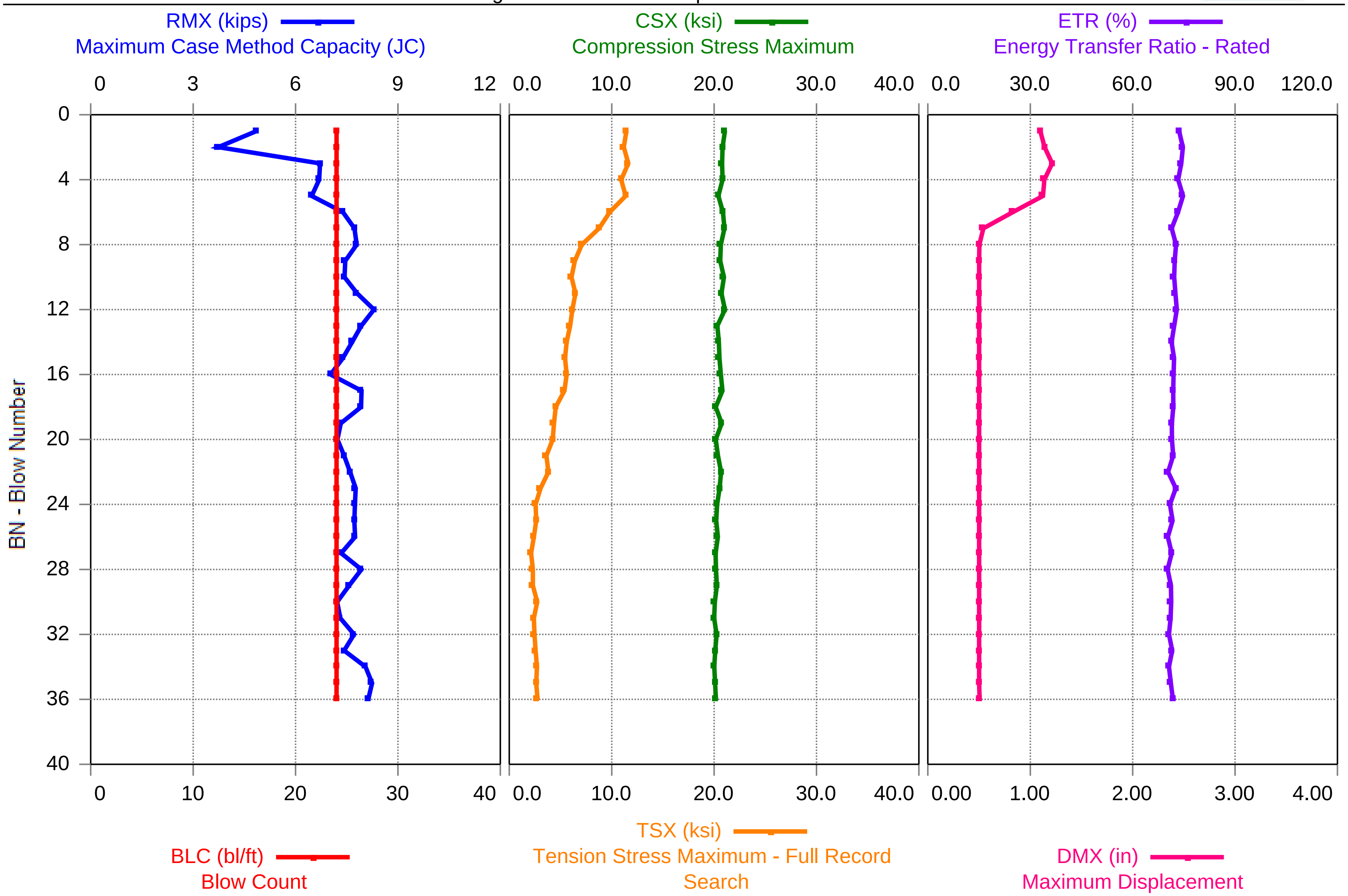
Drive 41 seconds 1:56 PM - 1:56 PM BN 1 - 31

Universal Engineering Sciences, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 18-April-2019

Test started: 12-April-2019

Georgia SPT - SPT 2 Sample 3



Georgia SPT - SPT 2 Sample 3 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

AR: 1.18 in² SP: 0.492 k/ft³
LE: 55.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.60

RMX: Maximum Case Method Capacity (JC)
CSX: Compression Stress Maximum
TSX: Tension Stress Maximum - Full Record Search
STK: Hammer Stroke
CSI: Compression Stress Maximum - Individual Sensor
CSB: Compression Stress at Bottom of Pile
DMX: Maximum Displacement
SFR: Skin Friction (Crude Damping Correction)
ETR: Energy Transfer Ratio - Rated

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
1	43.54	24	4.9	21.1	11.4	0.00	21.6	13.3	1.10	3	73.56
2	43.58	24	3.7	20.8	11.2	0.00	21.3	12.7	1.14	2	74.69
3	43.63	24	6.7	20.8	11.6	0.00	21.2	14.4	1.21	3	74.22
4	43.67	24	6.7	20.8	10.9	0.00	21.4	13.9	1.14	4	73.33
5	43.71	24	6.5	20.4	11.4	0.00	20.9	13.8	1.12	3	74.76
6	43.75	24	7.4	20.9	9.8	0.00	21.5	14.5	0.83	4	73.27
7	43.79	24	7.7	21.0	8.8	0.00	21.6	14.4	0.54	4	71.45
8	43.83	24	7.8	20.7	7.1	0.00	21.3	14.5	0.50	4	72.71
9	43.88	24	7.5	20.6	6.4	0.00	21.2	14.7	0.50	3	72.31
10	43.92	24	7.4	21.0	6.1	0.00	21.6	14.8	0.50	3	72.14
11	43.96	24	7.8	20.7	6.5	0.00	21.4	14.8	0.50	4	72.51
12	44.00	24	8.3	21.1	6.2	0.00	21.9	15.1	0.50	4	72.92
13	44.04	24	7.9	20.3	5.9	0.00	20.8	14.8	0.50	4	72.14
14	44.08	24	7.7	20.5	5.6	0.00	21.2	14.6	0.50	4	71.40
15	44.13	24	7.4	20.5	5.4	0.00	21.3	14.9	0.50	3	72.12
16	44.17	24	7.0	20.7	5.6	0.00	21.4	14.6	0.50	3	71.96
17	44.21	24	7.9	20.8	5.4	0.00	21.5	15.1	0.50	4	71.86
18	44.25	24	7.9	20.2	4.5	0.00	20.7	14.4	0.50	4	71.91
19	44.29	24	7.3	20.7	4.4	0.00	21.5	14.2	0.50	4	71.45
20	44.33	24	7.2	20.2	4.2	0.00	20.7	14.2	0.50	3	71.52
21	44.38	24	7.4	20.4	3.6	0.00	21.1	14.4	0.50	4	71.86
22	44.42	24	7.6	20.7	3.8	0.00	21.3	14.4	0.50	4	70.36
23	44.46	24	7.8	20.5	3.0	0.00	21.4	14.7	0.50	4	72.62
24	44.50	24	7.7	20.3	2.6	0.00	20.9	14.1	0.50	4	70.92
25	44.54	24	7.7	20.2	2.6	0.00	20.8	13.9	0.50	4	71.70
26	44.58	24	7.7	20.4	2.4	0.00	21.1	14.3	0.50	4	70.31
27	44.63	24	7.3	20.1	2.1	0.00	20.8	14.0	0.50	4	71.44
28	44.67	24	7.9	20.2	2.3	0.00	20.7	14.0	0.50	4	70.22
29	44.71	24	7.6	20.3	2.3	0.00	20.9	14.2	0.50	4	71.23
30	44.75	24	7.2	20.1	2.7	0.00	20.7	14.1	0.50	4	71.27
31	44.79	24	7.3	20.0	2.4	0.00	20.6	13.8	0.50	4	71.10
32	44.83	24	7.7	20.2	2.5	0.00	20.8	14.3	0.50	4	70.64
33	44.88	24	7.4	20.1	2.6	0.00	20.7	13.8	0.50	4	71.58
34	44.92	24	8.0	20.0	2.7	0.00	20.5	14.0	0.50	4	70.62
35	44.96	24	8.2	20.1	2.6	0.00	20.7	14.2	0.50	4	71.18
36	45.00	24	8.1	20.2	2.8	0.00	20.6	14.3	0.51	4	71.80
		Average	7.4	20.5	5.3	**	21.1	14.3	0.60	4	71.98
		Std. Dev.	0.9	0.3	3.1	**	0.4	0.5	0.23	0	1.13
		Maximum	8.3	21.1	11.6	**	21.9	15.1	1.21	4	74.76
		Minimum	3.7	20.0	2.1	**	20.5	12.7	0.50	2	70.22

Total number of blows analyzed: 36

Georgia SPT - SPT 2 Sample 3 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

BL# Sensors

1-36 F1: [357AWJ1] 212.0 (1.12); F4: [357AWJ2] 211.2 (1.12); A2: [55385] 915.0 (0.88);
A3: [50148] 1065.0 (0.88)

BL# Comments

36 End of Set 3. n=33

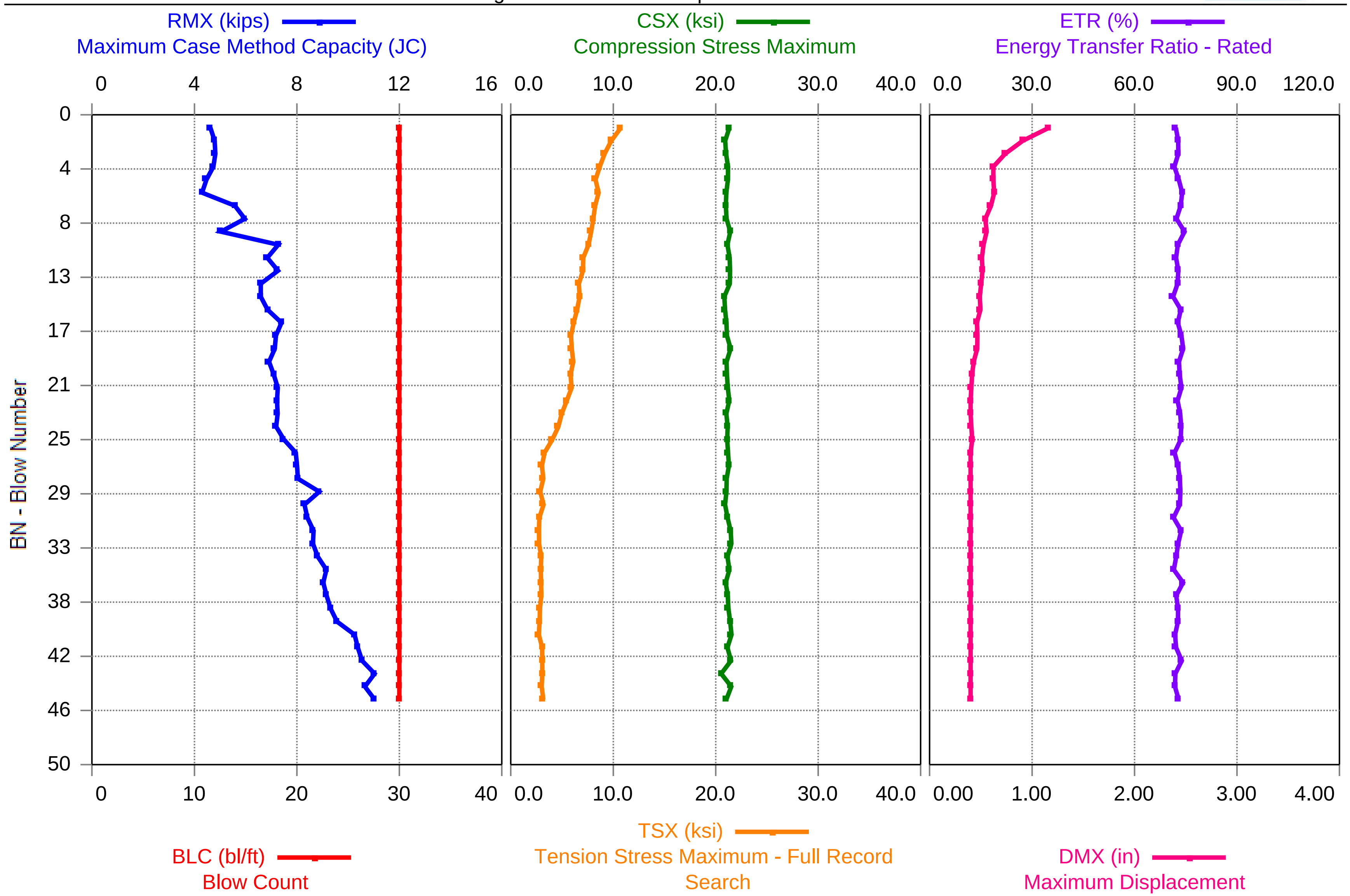
Time Summary

Drive 49 seconds 2:14 PM - 2:14 PM BN 1 - 36

Universal Engineering Sciences, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results

Printed: 18-April-2019 Test started: 12-April-2019

Georgia SPT - SPT 2 Sample 4



Georgia SPT - SPT 2 Sample 4 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

AR: 1.18 in² SP: 0.492 k/ft³
LE: 55.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.60

RMX: Maximum Case Method Capacity (JC)
CSX: Compression Stress Maximum
TSX: Tension Stress Maximum - Full Record Search
STK: Hammer Stroke
CSI: Compression Stress Maximum - Individual Sensor
CSB: Compression Stress at Bottom of Pile
DMX: Maximum Displacement
SFR: Skin Friction (Crude Damping Correction)
ETR: Energy Transfer Ratio - Rated

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
1	48.53	30	4.6	21.3	10.7	0.00	21.5	15.0	1.17	1	72.09
2	48.57	30	4.8	20.9	9.8	0.00	21.1	13.1	0.91	2	72.78
3	48.60	30	4.8	21.0	9.2	0.00	21.0	13.8	0.74	2	72.83
4	48.63	30	4.7	21.2	8.7	0.00	21.2	14.1	0.62	2	71.63
5	48.67	30	4.5	21.2	8.3	0.00	21.2	14.6	0.62	1	72.96
6	48.70	30	4.3	21.0	8.6	0.00	21.1	14.3	0.63	2	73.93
7	48.73	30	5.6	21.0	8.2	0.00	21.0	15.0	0.60	2	73.49
8	48.77	30	6.0	21.1	8.0	0.00	21.1	15.2	0.54	2	72.26
9	48.80	30	5.0	21.4	7.8	0.00	21.5	14.4	0.56	2	74.62
10	48.83	30	7.3	21.1	7.6	0.00	21.2	15.6	0.53	3	72.65
11	48.87	30	6.8	21.4	7.1	0.00	21.4	15.6	0.51	3	72.17
12	48.90	30	7.3	21.4	7.0	0.00	21.5	15.8	0.52	3	72.82
13	48.93	30	6.6	21.4	6.6	0.00	21.5	15.5	0.50	2	72.61
14	48.97	30	6.6	20.8	6.7	0.00	20.9	15.4	0.49	2	71.29
15	49.00	30	6.9	20.9	6.5	0.00	21.0	15.8	0.50	2	73.55
16	49.03	30	7.4	21.0	6.1	0.00	21.1	15.7	0.46	3	72.67
17	49.07	30	7.2	21.1	5.9	0.00	21.2	15.9	0.47	3	73.71
18	49.10	30	7.1	21.5	6.0	0.00	21.7	15.8	0.46	3	74.24
19	49.13	30	6.9	21.1	6.1	0.00	21.1	15.3	0.43	2	73.00
20	49.17	30	7.1	21.1	5.8	0.00	21.1	15.9	0.41	2	73.21
21	49.20	30	7.3	21.2	5.9	0.00	21.3	16.0	0.41	2	73.71
22	49.23	30	7.2	21.3	5.5	0.00	21.5	15.9	0.40	2	72.58
23	49.27	30	7.2	21.0	5.0	0.00	21.1	15.9	0.40	2	73.35
24	49.30	30	7.2	21.2	4.6	0.00	21.2	16.1	0.41	2	73.66
25	49.33	30	7.5	21.1	4.0	0.00	21.1	15.8	0.42	3	73.49
26	49.37	30	8.0	21.2	3.3	0.00	21.4	14.8	0.40	3	71.73
27	49.40	30	8.0	21.3	3.0	0.00	21.4	15.8	0.40	3	72.73
28	49.43	30	8.0	21.1	3.2	0.00	21.1	15.8	0.40	3	73.24
29	49.47	30	8.9	21.0	2.9	0.00	21.1	16.0	0.40	3	73.44
30	49.50	30	8.3	20.9	3.2	0.00	21.0	15.8	0.40	3	73.26
31	49.53	30	8.4	21.2	2.8	0.00	21.2	15.5	0.40	3	71.45
32	49.57	30	8.7	21.5	2.8	0.00	21.7	15.7	0.40	3	73.66
33	49.60	30	8.6	21.5	2.8	0.00	21.8	16.2	0.40	3	72.79
34	49.63	30	8.8	21.1	3.0	0.00	21.3	15.8	0.40	3	72.19
35	49.67	30	9.2	21.3	2.9	0.00	21.6	15.2	0.40	4	71.50
36	49.70	30	9.0	21.0	3.0	0.00	21.2	15.9	0.40	3	74.18
37	49.73	30	9.2	21.2	3.0	0.00	21.2	15.7	0.40	3	72.21
38	49.77	30	9.3	21.2	2.9	0.00	21.4	15.9	0.40	4	72.74
39	49.80	30	9.6	21.4	2.8	0.00	21.6	15.9	0.40	4	72.69
40	49.83	30	10.3	21.5	2.7	0.00	21.8	15.9	0.40	4	71.86
41	49.87	30	10.4	21.1	3.1	0.00	21.3	16.2	0.40	4	72.14
42	49.90	30	10.5	21.5	3.1	0.00	21.7	15.8	0.40	4	73.82
43	49.93	30	11.0	20.5	3.1	0.00	20.6	15.9	0.40	4	71.92
44	49.97	30	10.7	21.5	3.0	0.00	21.6	16.4	0.40	4	71.82
45	50.00	30	11.0	21.0	3.2	0.00	21.1	15.8	0.40	4	72.92

Georgia SPT - SPT 2 Sample 4 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
		Average	7.6	21.2	5.2	**	21.3	15.5	0.48	3	72.84
		Std. Dev.	1.8	0.2	2.3	**	0.3	0.7	0.15	1	0.80
		Maximum	11.0	21.5	10.7	**	21.8	16.4	1.17	4	74.62
		Minimum	4.3	20.5	2.7	**	20.6	13.1	0.40	1	71.29

Total number of blows analyzed: 45

BL# Sensors

1-45 F1: [357AWJ1] 212.0 (1.12); F4: [357AWJ2] 211.2 (1.12); A2: [55385] 915.0 (0.88);
A3: [50148] 1065.0 (0.88)

BL# Comments

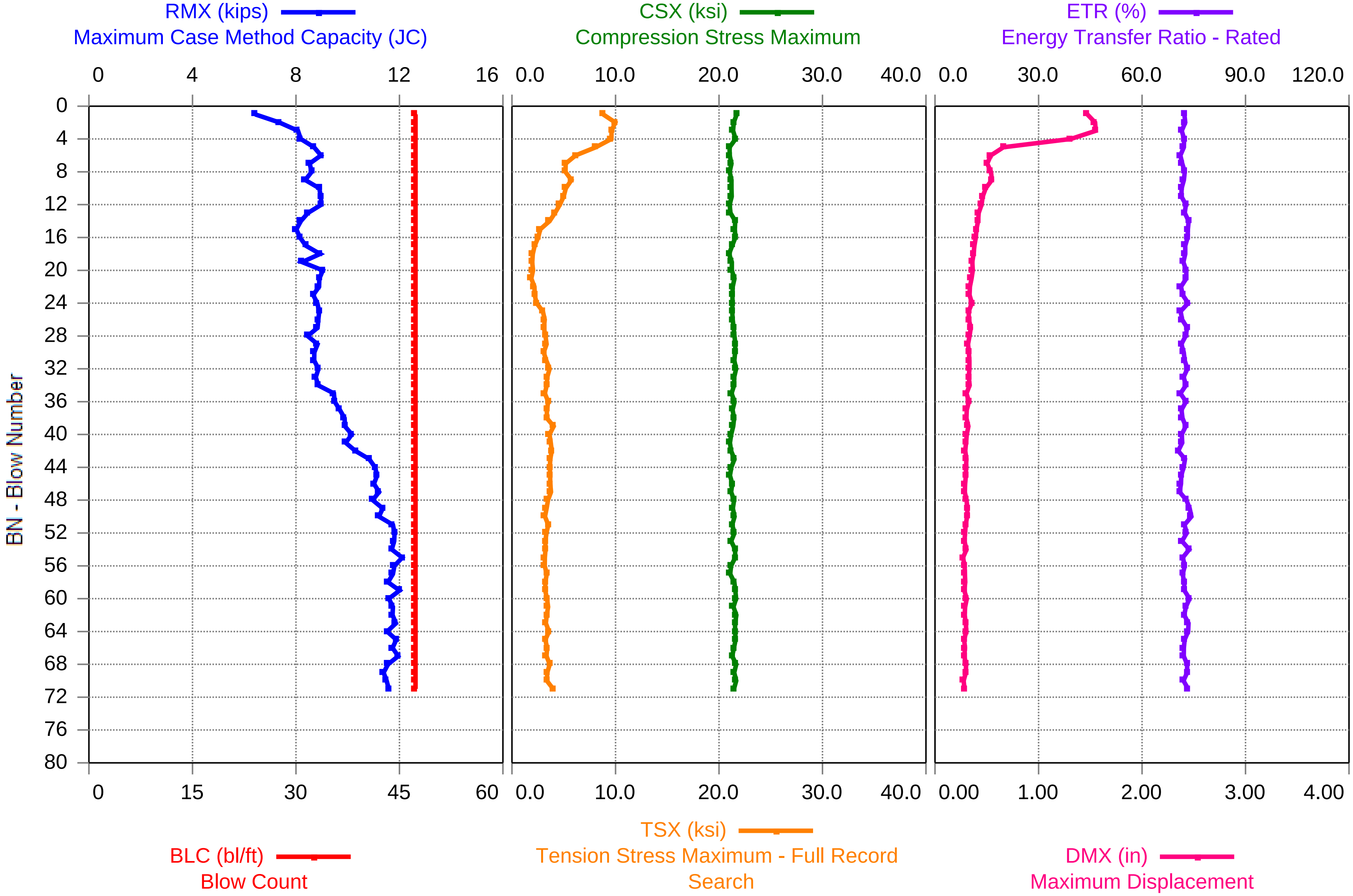
45 end of set 4. n=39

Time Summary

Drive 1 minute 2 seconds 2:27 PM - 2:28 PM BN 1 - 45

Universal Engineering Sciences, Inc. - PDIPLOT2 Ver 2017.2.58.3 - Case Method & iCAP® Results
Printed: 18-April-2019 Test started: 12-April-2019

Georgia SPT - SPT 2 Sample 5



Georgia SPT - SPT 2 Sample 5 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

AR: 1.18 in² SP: 0.492 k/ft³
LE: 60.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.60

RMX: Maximum Case Method Capacity (JC)
CSX: Compression Stress Maximum
TSX: Tension Stress Maximum - Full Record Search
STK: Hammer Stroke
CSI: Compression Stress Maximum - Individual Sensor
CSB: Compression Stress at Bottom of Pile
DMX: Maximum Displacement
SFR: Skin Friction (Crude Damping Correction)
ETR: Energy Transfer Ratio - Rated

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
1	53.52	47	6.4	21.7	8.8	0.00	21.8	17.7	1.47	1	72.27
2	53.54	47	7.4	21.4	10.0	0.00	21.5	15.4	1.55	3	72.51
3	53.56	47	8.1	21.4	9.6	0.00	21.4	15.5	1.55	4	71.52
4	53.58	47	8.2	21.6	9.6	0.00	21.6	16.4	1.31	3	72.20
5	53.61	47	8.7	21.0	8.1	0.00	21.2	15.8	0.66	4	72.13
6	53.63	47	9.0	21.0	6.1	0.00	21.2	16.1	0.54	3	71.12
7	53.65	47	8.5	21.2	5.2	0.00	21.3	16.4	0.50	3	71.64
8	53.67	47	8.6	21.0	5.2	0.00	21.2	16.6	0.54	3	72.37
9	53.69	47	8.4	21.2	5.7	0.00	21.4	16.1	0.55	3	72.11
10	53.71	47	8.9	21.2	5.2	0.00	21.3	16.7	0.49	3	71.46
11	53.73	47	9.0	21.2	5.0	0.00	21.5	16.8	0.46	3	71.39
12	53.75	47	9.0	21.0	4.6	0.00	21.2	16.7	0.45	3	72.71
13	53.77	47	8.5	21.1	4.2	0.00	21.2	16.0	0.42	3	72.38
14	53.80	47	8.2	21.6	3.6	0.00	21.6	16.8	0.42	3	73.49
15	53.82	47	8.0	21.5	2.7	0.00	21.6	16.6	0.40	3	73.30
16	53.84	47	8.2	21.6	2.5	0.00	21.6	16.6	0.39	3	73.22
17	53.86	47	8.4	21.3	2.2	0.00	21.3	16.0	0.38	3	72.54
18	53.88	47	8.9	21.0	2.0	0.00	21.1	16.8	0.37	3	72.52
19	53.90	47	8.2	21.2	2.0	0.00	21.3	16.6	0.36	3	71.99
20	53.92	47	9.0	21.2	2.0	0.00	21.5	16.7	0.36	3	72.82
21	53.94	47	8.9	21.5	1.9	0.00	21.7	16.7	0.35	3	72.80
22	53.96	47	8.9	21.3	2.2	0.00	21.6	16.5	0.34	3	71.30
23	53.99	47	8.7	21.3	2.2	0.00	21.4	16.5	0.33	3	71.79
24	54.01	47	8.8	21.3	2.4	0.00	21.4	16.4	0.36	3	73.37
25	54.03	47	8.9	21.3	3.0	0.00	21.4	16.8	0.32	3	71.17
26	54.05	47	8.9	21.3	3.2	0.00	21.5	16.6	0.33	3	71.61
27	54.07	47	8.8	21.4	3.1	0.00	21.4	17.5	0.35	2	73.06
28	54.09	47	8.5	21.5	3.2	0.00	21.5	16.7	0.33	3	72.63
29	54.11	47	8.8	21.6	3.3	0.00	21.7	16.8	0.32	3	71.40
30	54.13	47	8.7	21.6	3.1	0.00	21.8	16.6	0.33	3	72.10
31	54.15	47	8.7	21.5	3.3	0.00	21.7	16.9	0.33	3	72.38
32	54.18	47	8.9	21.7	3.6	0.00	21.8	17.1	0.33	3	73.15
33	54.20	47	8.8	21.5	3.4	0.00	21.6	17.1	0.33	3	72.04
34	54.22	47	8.9	21.5	3.3	0.00	21.6	16.8	0.33	3	72.75
35	54.24	47	9.5	21.2	3.2	0.00	21.5	16.8	0.30	3	71.13
36	54.26	47	9.5	21.5	3.5	0.00	21.6	17.0	0.33	3	72.73
37	54.28	47	9.7	21.3	3.4	0.00	21.5	16.8	0.31	3	71.44
38	54.30	47	9.9	21.5	3.4	0.00	21.7	16.4	0.30	4	71.71
39	54.32	47	9.9	21.4	4.0	0.00	21.4	17.0	0.32	3	72.68
40	54.35	47	10.2	21.2	3.6	0.00	21.3	16.6	0.31	4	71.51
41	54.37	47	9.9	21.1	3.7	0.00	21.2	16.6	0.30	4	71.63
42	54.39	47	10.3	21.2	3.8	0.00	21.3	16.5	0.29	4	70.49
43	54.41	47	10.8	21.5	3.7	0.00	21.7	16.6	0.30	4	72.44
44	54.43	47	11.1	21.2	3.7	0.00	21.2	16.5	0.30	4	72.04
45	54.45	47	11.1	21.1	3.7	0.00	21.2	16.6	0.30	4	71.36

Georgia SPT - SPT 2 Sample 5 Rod of area 1.18 square inches on CME 75
OP: NVT Date: 12-April-2019

BL#	Depth	BLC	RMX	CSX	TSX	STK	CSI	CSB	DMX	SFR	ETR
	ft	bl/ft	kips	ksi	ksi	ft	ksi	ksi	in	kips	(%)
46	54.47	47	11.0	21.3	3.7	0.00	21.5	16.5	0.29	4	71.27
47	54.49	47	11.2	21.2	3.8	0.00	21.3	16.3	0.29	4	70.87
48	54.51	47	11.0	21.5	3.5	0.00	21.6	16.6	0.30	4	72.83
49	54.54	47	11.4	21.3	3.3	0.00	21.4	16.7	0.31	4	73.80
50	54.56	47	11.2	21.5	3.2	0.00	21.7	16.9	0.31	4	74.32
51	54.58	47	11.7	21.3	3.5	0.00	21.3	16.3	0.30	4	72.31
52	54.60	47	11.8	21.5	3.3	0.00	21.7	16.5	0.29	5	72.94
53	54.62	47	11.8	21.2	3.2	0.00	21.3	16.7	0.28	4	71.57
54	54.64	47	11.7	21.6	3.2	0.00	21.6	16.3	0.30	5	73.68
55	54.66	47	12.1	21.6	3.2	0.00	21.6	16.2	0.27	5	71.81
56	54.68	47	11.8	21.2	3.2	0.00	21.3	16.5	0.29	5	72.43
57	54.70	47	11.7	21.1	3.4	0.00	21.2	16.6	0.29	4	71.75
58	54.73	47	11.6	21.5	3.2	0.00	21.7	16.3	0.29	5	72.23
59	54.75	47	12.0	21.6	3.2	0.00	21.7	16.1	0.28	5	72.28
60	54.77	47	11.6	21.6	3.4	0.00	21.7	16.4	0.31	5	73.76
61	54.79	47	11.7	21.4	3.5	0.00	21.5	15.7	0.29	5	72.69
62	54.81	47	11.7	21.7	3.4	0.00	21.7	16.8	0.29	4	72.24
63	54.83	47	11.9	21.5	3.3	0.00	21.6	15.9	0.30	5	73.48
64	54.85	47	11.5	21.6	3.6	0.00	21.6	15.8	0.30	5	73.37
65	54.87	47	11.9	21.6	3.2	0.00	21.7	16.5	0.28	5	72.35
66	54.89	47	11.7	21.4	3.4	0.00	21.5	16.4	0.29	5	72.12
67	54.92	47	12.0	21.3	3.3	0.00	21.3	16.5	0.28	5	72.10
68	54.94	47	11.6	21.7	3.6	0.00	21.8	16.7	0.30	5	73.06
69	54.96	47	11.4	21.5	3.4	0.00	21.5	16.6	0.30	5	73.07
70	54.98	47	11.5	21.7	3.4	0.00	21.8	16.4	0.28	5	72.03
71	55.00	47	11.6	21.4	4.0	0.00	21.5	16.1	0.28	5	73.35
		Average	9.9	21.4	3.9	**	21.5	16.5	0.41	4	72.31
		Std. Dev.	1.5	0.2	1.7	**	0.2	0.4	0.27	1	0.78
		Maximum	12.1	21.7	10.0	**	21.8	17.7	1.55	5	74.32
		Minimum	6.4	21.0	1.9	**	21.1	15.4	0.27	1	70.49

Total number of blows analyzed: 71

BL# Sensors

1-71 F1: [357AWJ1] 212.0 (1.12); F4: [357AWJ2] 211.2 (1.12); A2: [55385] 915.0 (0.88);
A3: [50148] 1065.0 (0.88)

BL# Comments

71 end of set 5. n=51

Time Summary

Drive 1 minute 41 seconds 2:42 PM - 2:43 PM BN 1 - 71

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

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