STRUCTURE GEOTECHNICAL REPORT

IL-7 Will Cook Road to US 45

Extension of Land Bridge #3 – Eastbound

Existing and Proposed SN: 016-D012

Section: 2010-081-R; Contract No.: 60L72

IDOT Job: D-91-011-11

PTB 157, Item No. 005

Cook County, Illinois

STRUCTURAL ENGINEER:

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JOB NO. 10195

November 5th, 2021
Revised: December 14th, 2021

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm

November 5, 2021
Revised December 14, 2021

H.W. Lochner
20 North Wacker Drive,
Suite 1200
Chicago, Illinois 60606

Attention: Mr. Robert Hong, P.E., S.E.

Job No. 10195

Re: Structural Geotechnical Report – Extension of Land Bridge #3 - Eastbound
Structure Number 016-D012
IDOT Project No.: D-91-011-11 (PTB 157, Item 005)
FAP Route 351, Section 2010-081-R, Cook County, Orland Park, IL

Dear Mr. Hong:

The following report presents the supplemental geotechnical analysis and recommendations for Land Bridge #3 - Eastbound for the IL-7 Will-Cook Road to US 45 (PTB 157, Item 5) Project in Cook County, Orland Park, IL. The additional borings are needed to define the western limits of a proposed extension to the existing eastbound Land Bridge #3. There is ongoing settlement and movement on the existing roadway that is adjacent to the roadway on eastbound 159th Street between 104th Avenue and South Ravinia Road due to peat and organic soils under eastbound Land Bridge #3. A total of three (3) soil borings (SB-43, SB-44 and SB-45) and nine (9) peat probe borings (P-01 though P-09) were completed at the site by Geo Services, Inc. (GEO). Copies of the boring logs, boring location diagrams and soil profiles are included in this report.

Very truly yours,

GEO SERVICES, Inc.

Alexandra Weatherwax
Project Engineer
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Andrew Ptak, P.E.
Principal Engineer
Email: drew@geoserviceinc.net

enc.

ANDREW J. PTAK
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PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

EXPIRES 11/30/23

TABLE OF CONTENTS

SECTION 01: INTRODUCTION

This report presents the results of the supplement geotechnical investigation for the extension of the existing Land Bridge #3 Eastbound for the IL-7 Will-Cook Road to US 45 (PTB 157, Item 5) Project, IDOT Project Number: D-91-011-11 (PTB 157, Item 005) that is located in Orland Park, Cook County, IL. The results of the three (3) structure borings (SB-43, SB-44 and SB-45) and nine (9) peat probe borings (P-01 through P-09) completed by Geo Services, Inc. (GEO) are outlined in this report. General notes in Appendix A, site location map found in Appendix B, boring location diagram and soil profiles found in Appendix C, are included with this report.

Boring locations were selected by Geo Services, Inc. (GEO) and were reviewed and approved by H.W. Lochner and the Illinois Department of Transportation (IDOT). Boring locations were laid out in the field by GEO personnel at the proposed locations.

This report includes recommendations pertaining to the design and construction of the extension of the land bridge - eastbound, a description of soil and groundwater conditions, general construction considerations for the site, site location map, boring location diagram, profiles and boring logs.

SECTION 02: PROJECT DESCRIPTION

Previously, as part of the IL-7 Will-Cook Road to US 45 (PTB 157, Item 5) Project, IL-7 (159th Street) is to be widened to accommodate a four-lane road (with two lanes in each direction) with a center median. The project is designated as IDOT Project Number: D-91-011-11 (PTB 157, Item 005). Due to poor soil conditions that extend from 10-ft to 25-ft below the surface, an extension of the existing eastbound land bridge to the west is proposed for the improvements. The existing land bridge is designated as SN 016-D012. The existing dry land bridge construction was completed in 2017, starting at stationing 398+33.60 to 401+35.60 for a total length of 302-ft and is composed of two (2) eastbound lanes for width of 29.17-ft (out-to-out of the deck). The land bridge is composed of 16-in thick concrete slabs supported on concrete pile bents and metal shell piles.

Additional soil borings were needed west of the existing eastbound Land Bridge #3 due to the roadway movement and settling from the existing land bridge west termination at station 398+33.60 to approximately station 394+50. Three (3) structure borings (SB-43 thru SB-45) and nine (9) peat probe borings (P-01 thru P-09) were drilled to confirm where the peat soil terminates.

SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES

The soil boring and peat probe borings (SB-43, SB-44 and SB-45, and P-01 through P-09) were performed during the month of October 2021 with a truck-mounted drill rig and were advanced by means of hollow stem augers from 10-ft to 15-ft depth from the surface and continued with rotary drilling techniques to the completion of the boring. Representative soil samples were obtained employing split spoon sampling procedures in accordance with AASHTO Method T-206. Samples obtained in the field were returned to our laboratory for further examination and testing.

Split spoon sampling involves driving a 2.0-inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. Blow counts are recorded at 6-in intervals and the blow counts are shown on the boring logs. The number of blows required to advance the sampler the last 12-in is termed the Standard Penetration Resistance (N). The N value is an indication of the relative density of the soil.

SECTION 04: LAB TESTING PROGRAM

The test procedures were performed in accordance with test procedures discussed in the IDOT Geotechnical Manual. All split-spoon, hand auger and Geoprobe samples obtained from the drilling operation were visually classified in the field. Cohesive samples were tested for unconfined compressive strength using an IDOT modified RIMAC test device and/or calibrated penetrometer in the field.

The soil testing program included performing water content, density and either unconfined compression and/or calibrated penetrometer tests on the cohesive samples recovered. Water content tests were performed on the non-cohesive samples recovered. These tests were performed upon representative portions of the samples obtained in the field. The results of the above testing, along with a visual classification of the material based upon both the Illinois textural classification and the AASHTO Soil Classification System, are indicated on the boring logs.

In addition to the regular lab testing program, Atterberg Limits (AASHTO T-89/90), Particle Size Analysis (AASHTO T-88) or Grain Size Analysis (AASHTO T-311), Consolidated-Undrained Compressive Strength (AASHTO T-297) and organic matter in soil (AASHTO T-267) tests were performed on select samples from the borings. The tests were performed upon representative portions of the samples obtained in the field. The results are noted in the BBS 2640 forms located in Appendix F.

SECTION 05: GEOLOGY

According to the physiographic divisions of Illinois, the site area falls into the Great Lake Section of the Central Lowland Province. Within the Great Lake Section, the site area is

further divided into the Wheaton Morainal Country.

According to the 1971 ISGS Circular #460: Summary of the Geology of the Chicago Area/ISGS Geologic Materials to a Depth of 20' - South Cook County, the project site intersection is located in an area where most of the surficial soils are noted to have been excavated and the surficial soils in the immediate surrounding area are noted to belong to the Wadsworth Till Member of the Wedron Formation. The Wadsworth Till Member soils were deposited during Woodfordian Substage of the Wisconsinan glaciation between 12,500 to 22,000 years ago and generally consist of gray clayey and silty clay tills.

It should be noted the readily available historical records indicate that the Orland Park area was the site of significant peat farming operations for commercial activities and it is assumed the excavated areas that predominate in this area are related to past peat farming. A review of historical aerial photographs and topographic maps confirms that this area was mapped as a large marshy area in the early 1900's and significant excavating occurred in the general area between the early 1950's to 1960's. It is therefore likely that the above noted excavated areas are related to past peat farming operations.

The ISGS Circular C542 15 Meter Stack Map confirms that surficial soils in the vicinity of the project site consist of Wedron Formation soils and that bedrock is in excess of 50.0-ft below-ground surface. A review of ISGS well records reviewed on-line identified one nearby well where bedrock was encountered at a depth of 114' below ground surface.

According to the 1984 ISGS Berg Circular #532: “Potential for Contamination of Shallow Aquifers in Illinois, the project site is located in an area identified as an E Zone. E Zones are defined as an area within excess of 50-ft of relatively impermeable silty or clayey tills with no evidence of interbedded granular layers.

The Wetland Inventory database reviewed on-line at the US Fish & Wildlife Service website indicates that there are wetland areas at or near the project site. Located to the north and northwest, across from 159th Street is an approximately 78-acre Lacustrine System Limnetic Subsystem/Unconsolidated Bottom Class wetland that is in a Permanently Flooded Water Regime which was excavated.

The USDA Natural Resources Conservation Service Soil Survey database indicates that surficial soils in the vicinity of the project site area generally consist of disturbed soils with an area of soils classified as Muskego and/or Houghton Mucks, which can be highly organic and have a High Frost Action Rating. The USDA Soil Survey (1971-1975) shows the soils along the project to be primarily urban land with localized areas of peat and silt loam. Urban land soil units are areas that have been radically altered by excavation and other earth work operations.

According to readily available ISGS sources, there are no documented coal mining operations in near vicinity to the project site and seismic activity is noted to be very low.

The available geologic information indicates that the native subgrade soils within the limits of the project site should generally consist of clay tills since most of the significant deposits of organic soils that had predominated in this area were removed when past peat farming was performed. It should be noted, however, that it is possible that there may still be isolated deposits of organic soils where the peat farming was not performed.

In general, the boring logs match the geology described in this section. As shown in this geology section, the Wetland Inventory database confirms the nearby wetland, resulting in the need for the bridge, without extensive embankment improvements.

SECTION 06: SUBSURFACE CONDITIONS

The following soil conditions are general description of the soil profiles. Specific soil conditions can be found in the boring logs located in Appendix D.

The pavement section consisted of approximately 9-in to 12-in of concrete. Underlying the concrete section, borings typically encountered crushed stone as a subbase of the concrete road and stiff to very stiff clay fill to a depth of 8-ft to10-ft underlain by 10-ft to 15-ft of stiff to very stiff clay soil (moisture contents in the middle twenties). Underlying the fill layer is a layer of peat and organic silty clay that is thickest at 24-ft at station 398+01 (in soil boring SB-45) with high moisture content ranging from 34% to 393% and an average of 128.25%. The peat layer thins to the west where is ends at approximately station 394+50 where the moisture contents lower to 38%. Underlying these materials, soil transitioned to varying interstratified stratums of stiff to very stiff clay and medium dense to dense sands, gravels, silts and loams that extended to the maximum boring depth of 75-ft. Moisture content percents of the clay soils were generally in the middle twenties and of the sand, silts and gravel in the high teens.

Although some borings exhibited better soil conditions than as shown in the previous description, it is possible there are isolated and sporadic soil conditions consisting of high moisture peat, organics and soft clays. Due to the variable, irregular and occasional occurrences and the quantity of the peat/organic in the area of the existing Land Bridge #3, an extension to the west of the existing eastbound Land Bridge#3 is recommended for support of the proposed roadway.

SECTION 07: WATER TABLE CONDITIONS

Due to the rotary drilling techniques, water level readings below 10-ft could not be accurately obtained. Six (6) soil borings, P-09, P-07, P-04, P-06, P-05, and P-03 showed water level readings, at an elevation of range of 671.6-ft to 684.7-ft. Considering these water level readings, the coloration change in the soils of brown and gray to gray, that the project is near wetlands and the boring logs from other portions of this project, we anticipate the water table to be at an elevation of 665-ft to 680-ft. Fluctuations in the amount of water accumulated and in the hydrostatic water table can be anticipated depending on variations in precipitation and surface runoff.

SECTION 08: ANALYSIS

Seismic Data

According to the AASHTO LRFD Bridge Design Specification 2007 (with 2010 Interim), the project site has a horizontal Response Spectral Acceleration of 0.037 at a period of 1.0 second and 5% critical dampening (S_1) and 0.095 at a period of 0.2 seconds and 5% critical dampening (S_s), Site Class: E and is designated as an area with a Seismic Performance Zone = 1. This results in a Design Spectral Acceleration at 1.0 second = 0.130 (S_{D1}) and at 0.2 seconds = 0.238 (S_{Ds}) according to the AASHTO LRFD Bridge Design Specification 2007 (with 2010 Interim). The project site is considered to be in a low seismic area and is considered a non-extreme event. Liquefiable layers and are not expected to impact the design of the new bridge.

Settlement

The road and the adjacent multi-use bike path were monitored for settlement after construction from June 2019 to May 2021 due to observed settlement of the eastbound roadway immediately west of the eastbound land bridge. The roadway was built in 2017, while the multi-use bike path was built in 2019. Settlement monitoring points were placed on the roadway and the multi-use bike path between stations 395+00 to 398+00. The roadway between station 398+00 to 397+00 has settled up to 5.5-in between June 2019 to May 2021 and continues to settle at a rate of approximately 0.2-in per month as of May 2021. At stationing 396+00 to 395+00, there has been no observed movement in the roadway in the past two (2) years, while adjacent to the road, the multi-use bike path has continued to settle with time. Due to the observed settlement that has been monitored from June 2019 to May 2021, an extension of the eastbound Land Bridge #3 from Sta. 398+ 33.60 to 394+50.0 is recommended.

Slope Stability

The bridge will be based on piles, and the piles will be supporting the bridge against slope failure. In additions no high embankment (over 5-ft) will be placed to raise the grade of the structures. There are no slope stability concerns for the bridge structure.

SECTION 09: RECOMMENDATIONS

Deep Foundation Recommendations

Based on the results of the borings and type of structure and loading, a deep foundation system consisting of friction piles can be used for the support of the proposed bridge and is recommended from Sta. 398+33 to Sta. 394+50 due to peat strata existing up to this stationing location. Due to the organic and weak soils below the surficial soils, leading to insufficient bearing resistance and large settlements, spread footings are not recommended for support of the land bridge. Stratums of hard clay soils are insufficient, inconsistent and sporadic; the use of drilled-shaft caissons is not recommended. For a deep foundation system, we recommend the use of driven steel piles. As the existing land bridge is supported on 14-in diameter metal shell piles, we recommend the same for this extension of the existing land bridge. Pile Tables are provided in Appendix E for varying pile type, resistance and length. When utilizing the pile tables, note that the following should be used for pile bents when determining which pile table to use to select an estimated length for the plans:

Pile Table for boring SB-43
West end to Pile Bent 1K

Pile Table for boring SB-44
Pile Bent 1L to 1P

Pile Table for boring SB-45
Pile Bent 1Q to East End

Due to the clay soils, end bearing capacity will be low per stratum. The majority of the pile capacity will be achieved through skin friction. Pile capacities and lengths were calculated to the piles' Maximum Nominal Required Bearing. Sporadic high blow count soils have not been encountered; the use of use of pile shoes for piles is not needed.

As per the IDOT Design Guide AGMU Memo 10.2, dated October 2011, the Washington State DOT (WSDOT) formula has replaced the FHWA Gates Formula as the standard method of construction verification. A modified IDOT static method was used to develop the SGR pile design tables. Nominal required bearing was calculated from LRFD skin-friction (with pile type correction factors) and end-bearing calculations. A value of 1.04 is used for Bias Factor Ratio (I_G). A geotechnical resistance factor (Φ_G) of 0.55 was used in calculations for the factored resistance available (FRA). Pile lengths were picked with respect to the loadings and geometry of the proposed structures.

Pile capacities and lengths were calculated to the piles' Maximum Nominal Required Bearing. Based on the existing peat soils being very compressible, downdrag has been assumed to occur on the piles to approximately the bottom of the peat layer, El. 679-ft (for SB-43), El. 663-ft (SB-44), and El. 653-ft (SB-45). See Appendix for the pile tables

and graphs to use for design. Per Lochner, the design load needed for the piles is approximately 140 kips.

As metal 14-in shells were used in the original construction of existing eastbound Land Bridge #3, GEO calculations focused on only this kind of shell pile. However, selection of the H-pile or shell pile should be based on economic and construction considerations. When Steel H-piles are used, the Steel H-piles shall be according to AASHTO M270 Grade 50.

Due to the variable nature of the natural and urban soils shown on the boring logs, some variation in the pile lengths should be anticipated. The pile tables, provided in Appendix E, are estimates and test piles should be used for final pile length selections. We recommend that at least 5 to 6 test piles be performed at a spacing of 80-ft to 100-ft along the alignment of the bridges. The piles should be driven until satisfactory driving resistance is developed in accordance with an appropriate pile driving formula. The test piles shall be driven to 110 percent of the Nominal Required Bearing indicated in the pile data information. The pile size and capacity selected should be based on economic considerations and the loads imposed on the structures.

Bottom of footing cap foundation is proposed at vary elevations from 682-ft to 684-ft. With a proposed grade elevation of varying from 688-ft to 689-ft, maximum excavation is anticipated to be less than 10-ft. However, peat, organic and soft soils can be encountered to an elevation of 650-ft. Effective “exposed” wall length can be considered to be 18-ft to 19-ft high. The designer should use temporary soil retention systems instead of the IDOT Temporary Sheet Pile Design Tables during stage construction.

Note that an existing 5-ft diameter MWRD sewer tunnel exists approximately 25-ft to 30-ft below the existing roadway, below Lane 2 (south lane in the eastbound 159th Street) that piles need to be spaced or battered to avoid conflicts with this line.

General Design

Embankment fill should be placed in compliance with Section 205 of the IDOT Standard Specifications for Road and Bridge Construction. Backfill behind the bridge substructures should consist of a compacted, free-draining granular material. A proper drainage system should be designed and provided behind the footing designs. To provide adequate frost protection, we recommend the bottom footing be a minimum of 4-ft below final grade.

Lateral Resistance Recommendations

For the evaluation of the lateral loads on the pile foundations and temporary retaining walls, we recommend that the following soil properties on the following table be used:

Table 1 – Lateral Soil Properties from Sta. 396+20 to 398+01

Material Boring SB-43, SB-44, & SB-45 (elevation, ft)	Unit Weight (pcf)	Drained Friction Angle (°)	Undrained Cohesion (psf)	Lateral Modulus of Subgrade Reaction (pci)	Strain
Medium Dense Concrete & Crushed Stone (684 to 681)	125	30	--	60	--
Stiff to Very Stiff Silty Clay (681 to 677)	120	26	2,000	650	0.006
Very Soft to Medium Stiff Peat & Organic Silty Clay (677 to 665)	90	20	250	20	0.02
Soft to Stiff Silty Clay (665 to 650)	120	26	1,500	500	0.007
Medium Dense to Dense Sand, Gravel & Loam (650 to 611)	120	32	-	125	0.004

Notes:
1. Values recommended for use in design from L-pile Software Manual

SECTION 10: GENERAL CONSTRUCTION CONSIDERATIONS

If excavation for the proposed improvements are in excess of 4-ft, we recommend slopes be in accordance with Occupational Safety and Health Administration (OSHA) safety standards and requirements for temporary side slopes. Movement of adjacent soils near the edge of and into excavation areas should be prevented. All excavations should be performed in accordance with the latest OSHA requirements. Allowances should be made for any surcharge loads adjacent to the excavation areas.

Borings indicate that the water table will be located within clay soils; in general, ground water should be able to be controlled with sump pump and pit procedures. Due to the project site being in/around wetlands, it is anticipated that surficial runoff may have to be controlled with sandbags and/or a temporary berm wall.

Portions of the existing land bridge are to remain in place, and some portions of the westbound land bridge will overlap. The new proposed land bridge bents should be spaced to miss the existing land bridge bents.

SECTION 11: GENERAL QUALIFICATIONS

The analysis and recommendations presented in this report are based upon the data obtained from the soil borings performed at the indicated locations and from any other information discussed in this report. This report does not reflect any variations that may occur between borings or across the site. In addition, the soil samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of the report. In addition, it is recommended that Geo Services Inc. be retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are intended or made. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing by the geotechnical engineer. Also note that Geo Services Inc. is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of the report's subsurface data or engineering analyses without the express written authorization of Geo Services Inc.

APPENDIX A

GENERAL NOTES

GENERAL NOTES

CLASSIFICATION

American Association of State Highway & Transportation Officials (AASHTO) System used for soil classification.

Cohesionless Soils

Relative Density	No. of Blows per foot N
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	Over 50

Cohesive Soils

Consistency	Unconfined Compressive Strength - qu (tsf)
Very Soft	Less than 0.25
Soft	0.25 - 0.5
Medium Stiff	0.5 - 1.0
Stiff	1.0 - 2.0
Very Stiff	2.0 - 4.0
Hard	Over 4.0

TERMINOLOGY

Streaks are considered to be paper thick. **Lenses** are considered to be less than 2 inches thick. **Layers** are considered to be less than 6 inches thick. **Stratum** are considered to be greater than 6 inches thick.

DRILLING AND SAMPLING SYMBOLS

SS:	Split Spoon 1-3/8" I.D., 2" O.D.	HS:	Housel Sampler
ST:	Shelby Tube 2" O.D., except where noted	WS:	Wash Sample
AS:	Auger Sample	FT:	Fish Tail
DB:	Diamond Bit - NX: BX: AX	RB:	Rock Bit
CB:	Carboloy Bit - NX: BX: AX	WO:	Wash Out
OS:	Osterberg Sampler		

Standard "N" Penetration: Blows per foot of a 140 lb. hammer falling 30" on a 2" O.D. Split Spoon

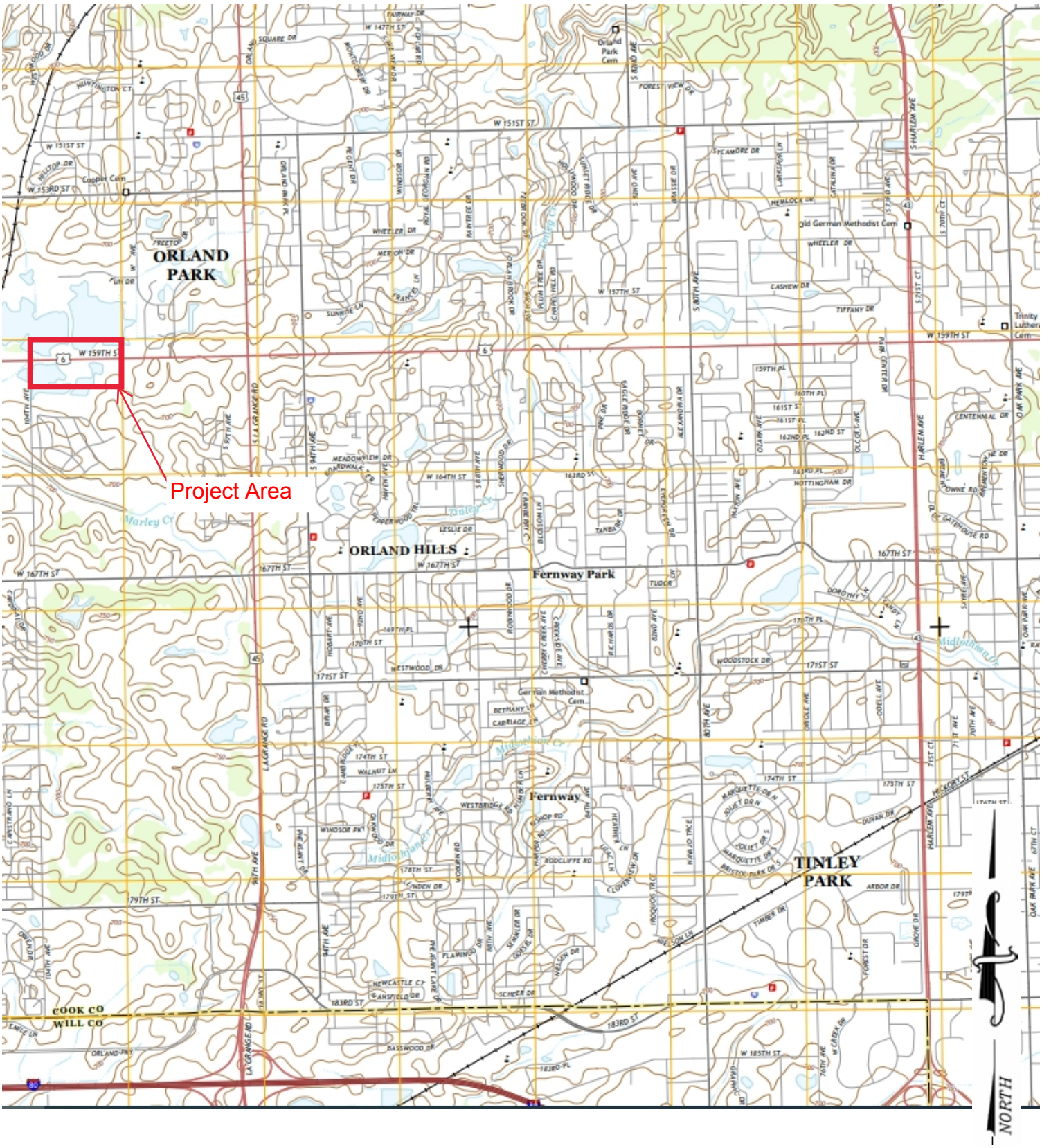
WATER LEVEL MEASUREMENT SYMBOLS

WL:	Water	WD:	While Drilling
WCI:	Wet Cave In	BCR:	Before Casing Removal
DCI:	Dry Cave In	ACR:	After Casing Removal
WS:	While sampling	AB:	After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

APPENDIX B

SITE LOCATION MAP



SITE LOCATION PLAN
Extension of Land Bridge #3 IL Will-Cook Rd. to US 45 IDOT Project No. D-91-001-11 PTB1 157-05 Orland Park, Cook County, IL

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

DRAWN BY	AGW
APPROVED BY	AJP
DATE	November 3, 2021
GSI JOB No.	10195
SCALE	NTS

APPENDIX C

TS&L, BORING LOCATION DIAGRAMS AND SOIL PROFILES

PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.____
DATE
BY

PROFILE
SURVEYED
PLOTTED
BORINGS CHECKED
BAL. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.____
DATE
BY

US ROUTE 6/159th ST.

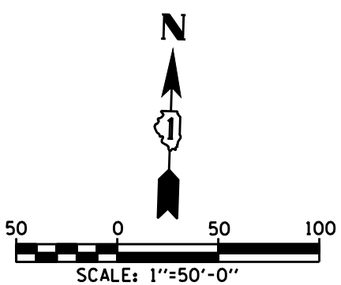
395+00

400+00

ONLY

P-09 P-08 P-07 P-06 SB-43 SB-44 SB-45

P-04 P-05 P-01 P-02 P-03



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USER NAME =	DESIGNED - RWC	REVISED -
	DRAWN - RWC	REVISED -
PLOT SCALE =	CHECKED - AJP	REVISED -
PLOT DATE =	DATE - 10/28/2021	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

U.S. RTE. 6 /IL. RTE. 7 (159TH ST.)
SUPPLEMENTAL SOIL BORING PLAN
IDOT PROJECT: D91-011-11

SCALE: 1"=50' | SHEET NO. 1 OF 1 SHEETS | STA. 394+00 TO STA. 400+00

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
351	2010-081-R	WILL & COOK		
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

...\10195_supplemental borings loc.dgn 10/28/2021 1:50:36 PM

EXISTING LAND BRIDGE #1 (S.N. 016-D010)

℄ US ROUTE 6/159TH STREET =
STA. 20+00.00
℄ 104TH AVENUE

RESERVOIR DAM

EXISTING LAND BRIDGE #2 (S.N. 016-D011)

℄ EX US6 / 159TH ST

MATCHLINE STA. 380+00

MATCHLINE STA. 395+00

EXIST. R.O.W.

380+00 | 385+00 | 390+00

POT STA. 20+00.00

90°6'19"

MWRD LOCKED

MARLEY CREEK

EXISTING BOX CULVERT

5

4

PLACE EMBANKMENT IN SETTLED AREA IN PARKWAY TO MEET TOP OF CURB. SEE EROSION CONTROL & LANDSCAPING PLAN.

+98.87

+56.95

SEE STRUCTURAL SHEET
DRY LAND BRIDGE NO. 2
SIDEWALK RETROFIT

EXISTING PAVEMENT CONNECTOR LIMITS (TYP.)

SAN

BIT. P.E.

ACC. P.E.

HMA / ACC. C.E.

P-09 P-08 P-07

PRODUCE STAND

6

+99.60 +14.60 +44.60

BRIDGE APPROACH SLAB
(SEE STRUCTURAL PLANS)

N

PROPOSED LEGEND

1. PROPOSED LAND BRIDGE (SEE STRUCTURAL SHEETS)
2. LANDSCAPED MEDIAN (SEE LANDSCAPING SHEETS)
3. MULTI-USE PATH
   HOT-MIX ASPHALT SURFACE COURSE, IL-9.5FG, MIX "D", N50 (40604010)
   HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N50 (40603080)
4. PORTLAND CEMENT CONCRETE SIDEWALK, 5 INCH (42400200)
5. SEE STRUCTURAL SHEETS FOR PROPOSED CURB AND GUTTER ON DRY LAND BRIDGE
6. PROPOSED PAVEMENT CONNECTOR (PCC) FOR BRIDGE APPROACH SLAB

PLAN
SURVEYED
PLOTTED
QUANTITIES CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
QUANTITIES CHECKED
B.M. NOTED
STRUCTURE NO'S/PNS CHKD
NOTE BOOK
NO.
BY
DATE

EXIST GRADE LINE PROFILE FOR 159TH ST.

LEGEND

BORING NUMBER
STATION
OFFSET
ELEVATION

N-VALUE

SOIL STRENGTH (TSF)
B-BULGE
S-SHEAR
P-POCKET PENETROMETER

MOISTURE CONTENT (%)
NR=NO RECOVERY

GROUNDWATER ELEVATION
FIRST ENCOUNTER
AT COMPLETION
▽ 24 HRS WATER LEVEL

EOB=END OF BORING

	N	Qu	W%
AS			
	10	2.5P	22
	9	NP	7
	16	1.5B	14
	27	-	12

EOB

P-09
395+56
33.7' Right
685.7

	N	Qu	W%
PAVEMENT			
CRUSHED STONE	31		13
CLAY LOAM (FILL)	14	1.3B	17
SANDY SILT	11		12
SANDY CLAY LOAM	6		17
CLAY LOAM	4	1.1B	22
	9	1.2B	21

EOB

P-08
394+06
33.7' Right
685.5

	N	Qu	W%
PAVEMENT			
CRUSHED STONE	27		13
CLAY LOAM (FILL)	12	3.1B	16
SANDY SILT	10		15
	7		16
CLAY LOAM	9	1.8B	20
	9	2.1B	21

EOB

P-07
394+56
33.7' Right
686.2

	N	Qu	W%
PAVEMENT			
	17	2.4B	16
CLAY LOAM (FILL)	5	1.2B	26
CLAYEY SAND & GRAVEL (FILL)	13		8
ORGANIC SILTY CLAY	3	0.4B	38
	8		13
SANDY SILT	4		17
	11	2.4B	18
CLAY	4	0.3B	25

EOB

P-04
395+06
33.7' Right
685.1

	N	Qu	W%
PAVEMENT			
	10	4.1B	14
CLAY LOAM (FILL)	11	3.9B	14
	12		15
SILTY SAND & GRAVEL (FILL)	2		NR
SILTY CLAY	9	0.4B	39
SILTY LOAM	4		15

EOB

P-06
395+22
37.0' Right
686.0

	N	Qu	W%
PAVEMENT			
CRUSHED STONE	12		6
	9	2.3B	18
CLAY LOAM (FILL)	7	2.1B	26
PEAT	5	0.2B	107
ORGANIC SILTY CLAY	2	0.6B	36
SILTY SAND & GRAVEL	3		16
	3	0.7B	25
CLAY LOAM	12	1.7B	20

EOB

P-05
395+49
37.8' Right
689.0

	N	Qu	W%
PAVEMENT			
CRUSHED STONE	10		5
	5	0.9B	20
CLAY LOAM (FILL)	10	2.1B	23
PEAT	6	0.2B	120
	2	0.3B	43
ORGANIC SILTY CLAY	4	0.2B	34
SILTY SAND & GRAVEL	4		19
	4		17

EOB

700 695 690 685 680 675 670 665 660

689.83 690.07 690.18 690.13 689.94 689.59 689.12 688.63 688.13 687.76 687.60 687.63 687.82 688.02 688.22 688.42 688.62 688.82 689.02 689.22 689.42 689.62 689.82 690.02 690.22 690.42 690.62 690.76 690.75 690.58 690.25

380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00 389+00 390+00 391+00 392+00 393+00 394+00 395+00

MODEL: $MODELNAME$
FILE NAME: $FILE$

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(630) 355-2838

USER NAME = $USER$	DESIGNED - AW	REVISED -	
	DRAWN - RWC	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - AJP	REVISED -	
PLOT DATE = $DATE$	DATE - 11/3/2021	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED ROADWAY SOIL BORING PLAN & PROFILE
159TH STREET

SCALE: H: 1" = 50' V: 1" = 5' | SHEET 1 OF 2 SHEETS | STA. 380+00 TO STA. 395+00

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
351	2021-150-BY	COOK	$TOT	$RDY-01
		CONTRACT NO. 62P68		
	ILLINOIS FED. AID PROJECT			

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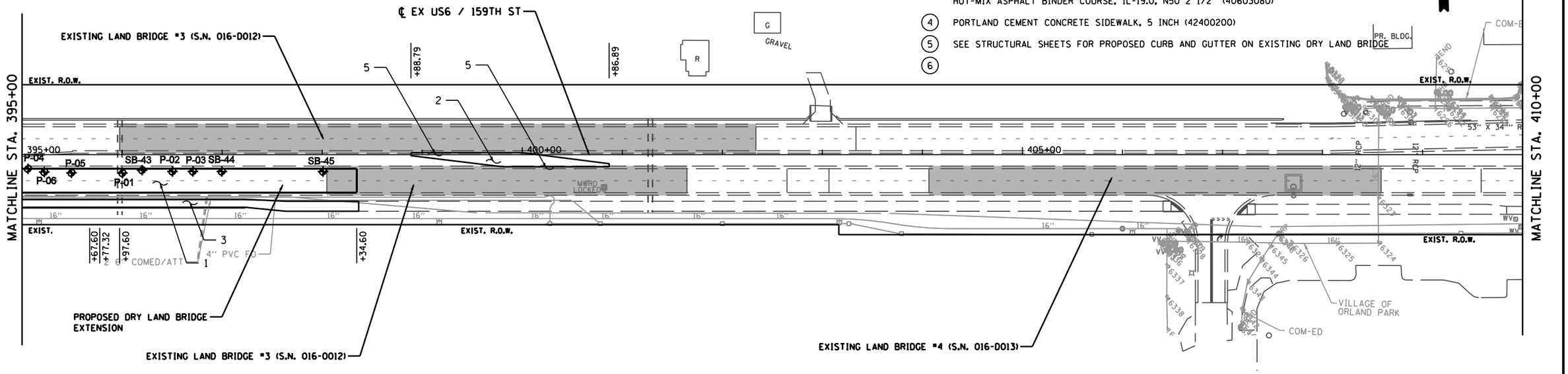
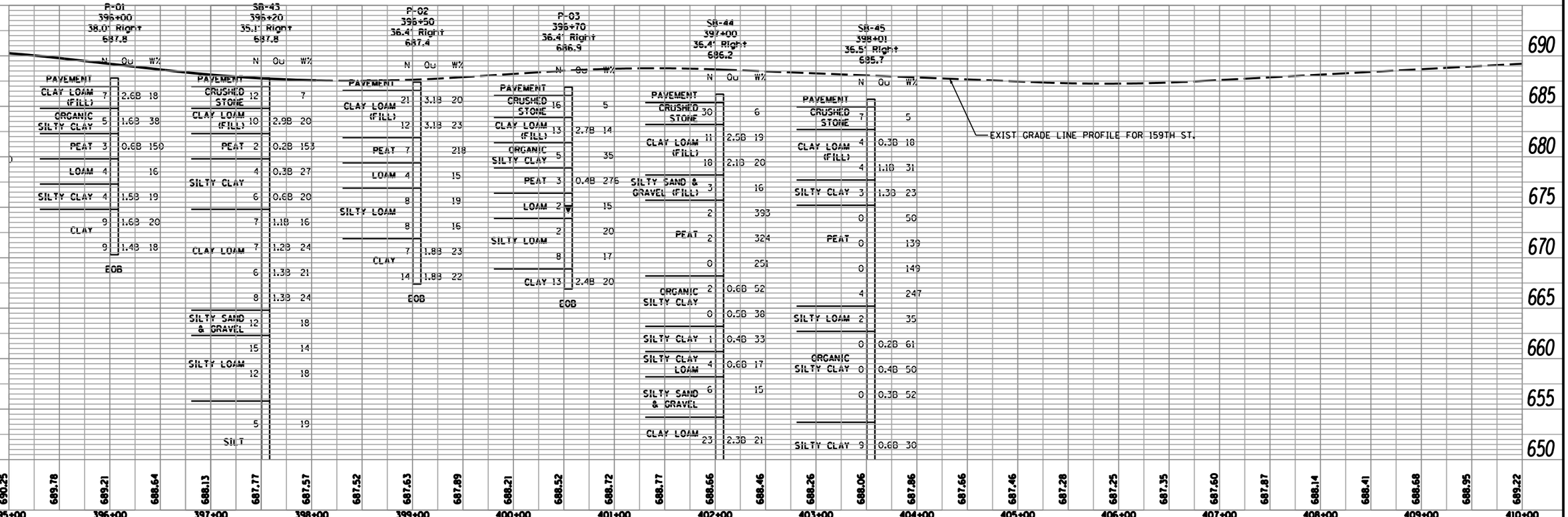
PROPOSED LEGEND

1. PROPOSED LAND BRIDGE (SEE STRUCTURAL SHEETS)
2. LANDSCAPED MEDIAN (SEE LANDSCAPING SHEETS)
3. MULTI-USE PATH
   HOT-MIX ASPHALT SURFACE COURSE, IL-9.5FG, MIX "D", N50 1 1/2" (40604010)
   HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N50 2 1/2" (40603080)
4. PORTLAND CEMENT CONCRETE SIDEWALK, 5 INCH (42400200)
5. SEE STRUCTURAL SHEETS FOR PROPOSED CURB AND GUTTER ON EXISTING DRY LAND BRIDGE
6.





PAVEMENT	7	2.6B	18		
CLAY LOAM (FILL)	5	1.6B	38		
ORGANIC SILTY CLAY	3	0.6B	150		
PEAT	4		16		
LOAM	4	1.5B	19		
SILTY CLAY	9	1.6B	20		
CLAY	9	1.4B	18		
EOB					

PAVEMENT	12		7		
CRUSHED STONE	10	2.9B	20		
CLAY LOAM (FILL)	2	0.2B	153		
PEAT	4	0.3B	27		
SILTY CLAY	6	0.6B	20		
CLAY LOAM	7	1.2B	24		
	6	1.3B	21		
	8	1.3B	24		
SILTY SAND & GRAVEL	12		18		
	15		14		
SILTY LOAM	12		18		
	5		19		
SILT					

PAVEMENT	21	3.1B	20		
CLAY LOAM (FILL)	12	3.1B	23		
PEAT	7		218		
LOAM	4		15		
	8		19		
SILTY LOAM	8		16		
CLAY	7	1.8B	23		
	14	1.8B	22		
EOB					

PAVEMENT	16		5		
CRUSHED STONE	13	2.7B	14		
CLAY LOAM (FILL)	5		35		
ORGANIC SILTY CLAY	3	0.4B	276		
PEAT	2		15		
LOAM	2		20		
	8		17		
SILTY LOAM	13	2.4B	20		
CLAY					
EOB					

PAVEMENT	30		6		
CRUSHED STONE	11	2.5B	19		
CLAY LOAM (FILL)	18	2.1B	20		
SILTY SAND & GRAVEL (FILL)	3		16		
	2		393		
PEAT	2		324		
	0		251		
ORGANIC SILTY CLAY	2	0.6B	52		
	0	0.5B	38		
SILTY CLAY	1	0.4B	33		
SILTY CLAY LOAM	4	0.6B	17		
SILTY SAND & GRAVEL	6		15		
CLAY LOAM	23	2.3B	21		

PAVEMENT	7		5		
CRUSHED STONE	4	0.3B	18		
CLAY LOAM (FILL)	4	1.1B	31		
SILTY CLAY	3	1.3B	23		
	0		50		
PEAT	0		139		
	0		149		
	4		247		
SILTY LOAM	2		35		
	0	0.2B	61		
ORGANIC SILTY CLAY	0	0.4B	50		
	0	0.3B	52		
SILTY CLAY	9	0.6B	30		

PLAN / PROFILE — SURVEYED — PLOTTED — CROSS SECTIONS CHECKED — B.M. NOTED — STRUCTURE NOTATNS CHKD — NOTE BOOK — NO. — BY — DATE

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MODEL: $MODELNAME$
FILE NAME: $FILE$

USER NAME = $USER$	DESIGNED - AW	REVISED -	
	DRAWN - RWC	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - AJP	REVISED -	
PLOT DATE = $DATE$	DATE - 11/3/2021	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED ROADWAY SOIL BORING PLAN & PROFILE
159TH STREET

SCALE: H: 1" = 50' V: 1" = 5' | SHEET 2 OF 2 SHEETS | STA. 395+00 TO STA. 410+00

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
351	2021-150-BY	COOK	$TOT	$RDY-02
		CONTRACT NO. 62P68		
	ILLINOIS FED. AID PROJECT			

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APPENDIX D

BORING LOGS

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GSI Job No. 10195

SOIL BORING LOG

Page 1 **of** 1

Date 10/11/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** SP

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. P-01
Station 396+00
Offset 38.00ft Right
Ground Surface Elev. 687.84 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion **ft**
After **Hrs.** **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
10.0" CONCRETE				
687.00				
CLAY LOAM-brown & gray spotted black-very stiff (Fill)		4		
		4 3	2.60 B	18
684.84				
ORGANIC SILTY CLAY-black-stiff		1		
	-5	2 3	1.60 B	38
682.34				
PEAT-black-very loose		2		
		1 2	0.60 B	150
679.84				
LOAM-gray-very loose		2		
	-10	2 2		16
677.34				
SILTY CLAY-gray-very stiff		1		
		1 3	1.50 B	19
674.84				
CLAY-gray-stiff		3		
	-15	3 6	1.60 B	20
		3		
		4 5	1.40 B	18
670.34				
End Of Boring @ -17.5'. Boring backfilled with cuttings.	-20			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 10195

Page 1 **of** 1

Date 10/11/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** SP

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. P-02
Station 396+50
Offset 36.40ft Right
Ground Surface Elev. 687.39 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				10.0" CONCRETE
				686.56
	20			CLAY LOAM-brown & gray spotted black-very stiff (Fill)
	16	3.10	20	
	5	B		
	3			
	5	3.10	23	
-5	7	B		
				681.89
	2			PEAT-black-loose
	3		218	
	4			
				679.39
	1			LOAM-gray-very loose
	2		15	
-10	2			
				676.89
	5			SILTY LOAM-gray-loose
	3		19	
	5			
	2			
	3		16	
-15	5			
				671.89
	3			CLAY-gray-stiff
	3	1.80	23	
	4	B		
	3			
	5	1.80	22	
	667.39	9	B	
-20				

End Of Boring @ -20.0'. Boring backfilled with cuttings.

-25 -30 -35 -40

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SOIL BORING LOG

GSI Job No. 10195

Page 1 **of** 1

Date 10/11/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** SP

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. P-03
Station 396+70
Offset 36.40ft Right
Ground Surface Elev. 686.89 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 674.4 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
10.0" CONCRETE				
686.06				
CRUSHED STONE-medium dense		11		
		10		5
		6		
683.89				
CLAY LOAM-brown & gray-very stiff		4		
		6	2.70	14
	-5	7	B	
681.39				
ORGANIC SILTY CLAY-black-loose		2		
		2		35
		3		
678.89				
PEAT-black-very loose		2		
		1	0.40	276
	-10	2	B	
676.39				
LOAM-gray-very loose		1		
		1		15
▼		1		
673.89				
SILTY LOAM-gray-very loose to loose		1		
		1		20
	-15	1		
		2		
		3		17
		5		
668.89				
CLAY-gray-very stiff		4		
		6	2.40	20
666.89	-20	7	B	

End Of Boring @ -20.0'. Boring backfilled with cuttings.

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
-25			
-30			
-35			
-40			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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SOIL BORING LOG

GSI Job No. 10195

Page 1 **of** 1

Date 10/12/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. P-04
Station 395+06
Offset 33.70ft Right
Ground Surface Elev. 685.07 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 682.6 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
10.0" CONCRETE				
684.23				
CLAY LOAM-brown & gray-hard (Fill)		8		
		5 5	4.10 B	14
	▼			
		3		
		6 5	3.90 B	14
	-5			
679.57				
SILTY SAND & GRAVEL-gray-medium dense		4		
		11 1		15
677.07				
No Recovery		1		
		1 1		NR
	-10			
674.57				
SILTY CLAY-gray-soft		3		
		4 5	0.40 B	39
672.07				
SILTY LOAM-gray-very loose		1		
		2 2		16
670.07	-15			
End Of Boring @ -15.0'. Boring backfilled with cuttings.				
	-20			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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GSI Job No. 10195

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Date 10/13/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. P-05
Station 395+49
Offset 37.80ft Right
Ground Surface Elev. 688.95 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 682.9 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				9.0" CONCRETE
688.20				
	5			CRUSHED STONE-medium dense
	6 4		5	
685.95				
	2			CLAY LOAM-brown & gray spotted black-stiff to very stiff (Fill)
	1 4	0.90 B	20	
-5				
▼	3			
	3 7	2.10 B	23	
680.95				
	2			PEAT-black-loose
	2 4	0.20 B	120	
-10				
678.45				
	2			ORGANIC SILTY CLAY-dark gray to gray-stiff
	1 1	0.30 B	43	
	1			
	1 3	0.18 B	34	
-15				
673.45				
	1			SILTY SAND & GRAVEL-gray-very loose
	2 2		19	
	2			
	2 2		17	
668.95				
-20				

End Of Boring @ -20.0'. Boring backfilled with cuttings.

-25 -30 -35 -40

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 10195

Date 10/13/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. P-06
Station 395+22
Offset 37.00ft Right
Ground Surface Elev. 686.56 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 671.6 ft ▼
Upon Completion ft
After **Hrs.** ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
9.0" CONCRETE 685.81				
CRUSHED STONE-medium dense		9		
		7 5		6
683.56				
CLAY LOAM-brown & gray-very stiff (Fill)		2		
	-5	3 6	2.30 B	18
		3		
		3 4	2.10 B	26
678.56				
PEAT-black-loose		1		
	-10	2 3	0.20 B	107
676.06				
ORGANIC SILTY CLAY-dark gray-soft		1		
		1 1	0.60 B	36
673.56				
SILTY SAND & GRAVEL-gray-very loose		2		
	▼-15	2 1		16
671.06				
CLAY LOAM-gray-medium stiff to stiff		1		
		1 2	0.70 B	25
		3		
666.56	-20	5 7	1.70 B	20

End Of Boring @ -20.0'. Boring backfilled with cuttings.

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	-25			
	-30			
	-35			
	-40			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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SOIL BORING LOG

GSI Job No. 10195

Page 1 **of** 1

Date 10/26/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. P-07
Station 394+56
Offset 33.70ft Right
Ground Surface Elev. 686.20 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 684.7 ft ▼
Upon Completion 678.2 ft ▽
After **Hrs.** ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12.0" CONCRETE			
685.20			
CLAY LOAM-brown & gray spotted black-stiff to very stiff (Fill) ▼	15		
	11 6	2.40 B	16
	2		
-5	2 3	1.20 B	26
680.70			
CLAYEY GRAVEL & SAND-gray-medium dense (Fill)	4		
	8 5		8
678.20 ▽			
ORGANIC SILTY CLAY-brown & gray-soft	1		
-10	2 1	0.40 B	38
675.70			
SANDY SILT with Gravel-brown & gray-very loose to loose	2		
	4 4		13
becoming gray @ -13.0'	1		
-15	2 2		17
670.70			
CLAY LOAM-gray-very stiff	3		
	5 6	2.40 B	18
668.20			
CLAY-gray-soft	2		
666.20 -20	2 2	0.30 B	25

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
End Of Boring @ -20.0'. Boring backfilled with cuttings.			
-25			
-30			
-35			
-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 10195

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Date 10/26/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. P-08
Station 394+06
Offset 33.70ft Right
Ground Surface Elev. 685.50 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 677.5 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12.0" CONCRETE				
684.50				
CRUSHED STONE-medium dense		12		
		7 20		13
682.50				
CLAY LOAM-brown & gray-very stiff (Fill)		3		
		6 6	3.10 B	16
680.00	-5			
SANDY SILT-dark brown & gray-loose to medium dense		6		
		5 5		15
	▽			
		4		
		4 3		16
675.00	-10			
CLAY LOAM-gray-stiff to very stiff		2		
		4 5	1.80 B	20
		4		
		4 5	2.10 B	21
670.50	-15			
End Of Boring @ -15.0'. Boring backfilled with cuttings.				
	-20			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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Date 10/26/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SW1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. P-09
Station 393+56
Offset 33.70ft Right
Ground Surface Elev. 685.70 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 683.7 ft ▼
Upon Completion 677.7 ft ▽
After **Hrs.** ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
11.0" CONCRETE				
684.78				
CRUSHED STONE-dense		16		
	▼	22 9		13
682.70				
CLAY LOAM-brown & gray-very stiff (Fill)		4		
		6 8	1.30 B	17
680.20	-5			
SANDY SILT-dark brown & gray-medium dense		4		
		6 5		12
677.70 ▽				
SANDY CLAY LOAM-brown & gray-loose		4		
		3 3		17
675.20	-10			
CLAY LOAM-gray-stiff		2		
		2 2	1.10 B	22
		1		
		4 5	1.20 B	21
670.70	-15			
End Of Boring @ -15.0'. Boring backfilled with cuttings.				
	-20			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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Date 10/12/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-43
Station 396+20
Offset 35.10ft Right
Ground Surface Elev. 687.80 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				10.0" CONCRETE
				686.97
	8			CRUSHED STONE-medium dense
	8 4		7	
				684.80
	2			CLAY LOAM-dark brown & black-very stiff (Fill)
	4 6	2.90 B	20	
-5				
				682.30
	2			PEAT-black-very loose
	1 1	0.18 B	153	
				679.80
	1			SILTY CLAY-dark gray-soft to medium stiff
	2 2	0.30 B	27	
-10				
	1			
	3 3	0.60 B	20	
				674.80
	2			CLAY LOAM-gray-stiff
	3 4	1.10 B	16	
-15				
	1			
	2 5	1.20 B	24	
	1			
	2 4	1.30 B	21	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAY LOAM-gray-stiff *(continued)*
	2			
	3 5	1.30 B	24	
				664.80
	6			SILTY SAND & GRAVEL-gray-medium dense
	5 7		18	
-25				
				662.30
	6			SILT-gray-medium dense
	7 8		14	
	5			
	6 6		18	
-30				
				655.80
	3			SILT-gray-very loose to loose
	3 2		19	
-35				
	2			
	1 3		26	
-40				

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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SOIL BORING LOG

GSI Job No. 10195

Date 10/12/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** AW

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-43
Station 396+20
Offset 35.10ft Right
Ground Surface Elev. 687.80 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILT-gray-very loose to loose *(continued)*
645.80				
				SILTY SAND & GRAVEL-gray-medium dense
	5			
	5		19	
-45	5			
	6			
	6		9	
-50	6			
635.80				
				SAND & GRAVEL-gray-loose
	1			
	3		9	
-55	4			
630.80				
				SILTY SAND & GRAVEL-gray-medium dense
	10			
	7		11	
-60	6			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY SAND & GRAVEL-gray-medium dense *(continued)*
625.80				
				SAND & GRAVEL-gray-very dense
	19			
	50/3"		14	
-65				
620.80				
				SILT-gray-dense
	18			
	19		17	
-70	14			
615.80				
				SILTY CLAY LOAM-gray-loose
	10			
	14		12	
612.80 -75	18			
				End Of Boring @ -75.0'. Boring backfilled with cuttings.
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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SOIL BORING LOG

GSI Job No. 10195

Date 10/11/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** DD

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-44
Station 397+00
Offset 36.40ft Right
Ground Surface Elev. 686.18 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				10.0" CONCRETE
685.35				
				CRUSHED STONE-dense
	14			
	18		6	
	12			
683.18				
				CLAY LOAM-brown & gray-very stiff (Fill)
	4			
	5	2.50	19	
-5	6	B		
	5			
	8	2.10	20	
	10	B		
678.18				
				SILTY SAND & GRAVEL-gray-very loose (Fill)
	2			
	1		16	
-10	2			
675.68				
				PEAT-black-very loose
	1			
	1		393	
	1			
	1		324	
-15	1			
	0			
	0		251	
	0			
668.18				
				ORGANIC SILTY CLAY-dark gray-medium stiff
	1			
	1	0.60	52	
-20	1	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				ORGANIC SILTY CLAY-dark gray-medium stiff *(continued)*
	0			
	0	0.50	38	
	0	B		
663.18				
				SILTY CLAY-gray-soft
	1			
	1	0.40	33	
-25	1	B		
660.68				
				SILTY CLAY LOAM-gray-medium stiff
	2			
	2	0.60	17	
	2	B		
658.18				
				SILTY SAND & GRAVEL-gray-loose
	2			
	3		15	
-30	3			
654.18				
				CLAY LOAM-gray-very stiff to hard
	5			
	6	2.30	21	
-35	17	B		
	7			
	9	4.20	19	
-40	15	B		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 10195

Date 10/11/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** DD

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-44
Station 397+00
Offset 36.40ft Right
Ground Surface Elev. 686.18 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				CLAY LOAM-gray-very stiff to hard *(continued)*
644.18				
				SILTY LOAM-gray-medium dense
	5			
-45	7 8		27	
639.18				
				CLAY-gray-very stiff
	4			
-50	6 9	2.10 B	20	
	6			
-55	8 14	2.90 B	21	
629.18				
				SILTY LOAM-gray-medium dense
	8			
-60	9 11		14	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				SILTY LOAM-gray-medium dense *(continued)*
624.18				
				SANDY LOAM-gray-medium dense
	7			
-65	11 9		16	
619.18				
				CLAY LOAM-gray-very stiff
	7			
-70	8 23	2.40 B	18	
614.18				
				GRAVEL-gray-medium dense
	5			
-75	12 12		6	
611.18				
				End Of Boring @ -75.0'. Boring backfilled with cuttings.
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** DD

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-45
Station 398+01
Offset 36.50ft Right
Ground Surface Elev. 685.70 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				9.0" CONCRETE
				684.95
	5			CRUSHED STONE-loose
	4 3		5	
				682.70
	2			CLAY LOAM-brown & gray-stiff (Fill)
-5	2 2	1.30 B	18	
	3			
	2 2	1.10 B	31	
				677.70
	2			ORGANIC SILTY CLAY-black-very loose
-10	3 0	1.30 B	23	
				675.20
	0			PEAT-black-very loose
	0 0		50	
	0			
-15	0 0		139	
	0			
	0 0		149	
	0			
-20	0 4		247	
				665.20
				PEAT-black-very loose *(continued)*
	3			SILTY LOAM-gray-very loose
	1 1		35	
				662.70
	0			ORGANIC SILTY CLAY-dark gray-medium stiff
-25	0 0	0.20 B	61	
	0			
	0 0	0.40 B	50	
	0			
-30	0 0	0.30 B	52	
				653.70
	2			SILTY CLAY-dark gray-stiff
-35	3 6	1.60 B	30	
				648.70
	8			CLAY LOAM-gray-very stiff
-40	11 16	2.30 B	21	

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
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SOIL BORING LOG

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Date 10/12/21

ROUTE IL Route 7/U.S. Route 6 (159th St.) **DESCRIPTION** IL Rte. 7 from Will Cook Rd. to Ravinia Av. **LOGGED BY** DD

SECTION 2010-081-R **LOCATION** SE1/4, **SEC.** 17, **TWP.** T36N, **RNG.** R12E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** HSA/ROTARY **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. SB-45
Station 398+01
Offset 36.50ft Right
Ground Surface Elev. 685.70 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10' ft
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAY LOAM-gray-very stiff *(continued)*
	6			
-45	8 12	2.20 B	16	
	4			
-50	6 10	2.10 B	16	
	6			
-55	7 10	2.30 B	5	
628.70				
				SILTY SAND & GRAVEL-gray-medium dense
	7			
-60	11 15		13	
				SILTY SAND & GRAVEL-gray-medium dense *(continued)*
623.70				
				CLAY LOAM-gray-very stiff
	8			
-65	12 19	2.30 B	16	
618.70				
				CLAY-gray-very stiff
	8			
-70	10 18	3.20 B	34	
613.70				
				SILTY LOAM-gray-medium dense
	10			
-75	11 14		12	
610.70				
				End Of Boring @ -75.0'. Boring backfilled with cuttings.
-80				

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
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APPENDIX E

PILE DESIGN TABLES

Bents: Boring SB-43 (Elevation 687.8 Begin Friction, 682.8 for Pile Cutoff)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12"		Metal Shell 14"	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0											-22	24
3											-24	27
5											-20	34
8											-13	47
10											-7	59
13											0	72
15											7	84
18											50	162
20											55	170
23											52	166
25											38	139
30											39	141
35											68	194
40											85	226
45											79	214
50											108	268
55											258	541

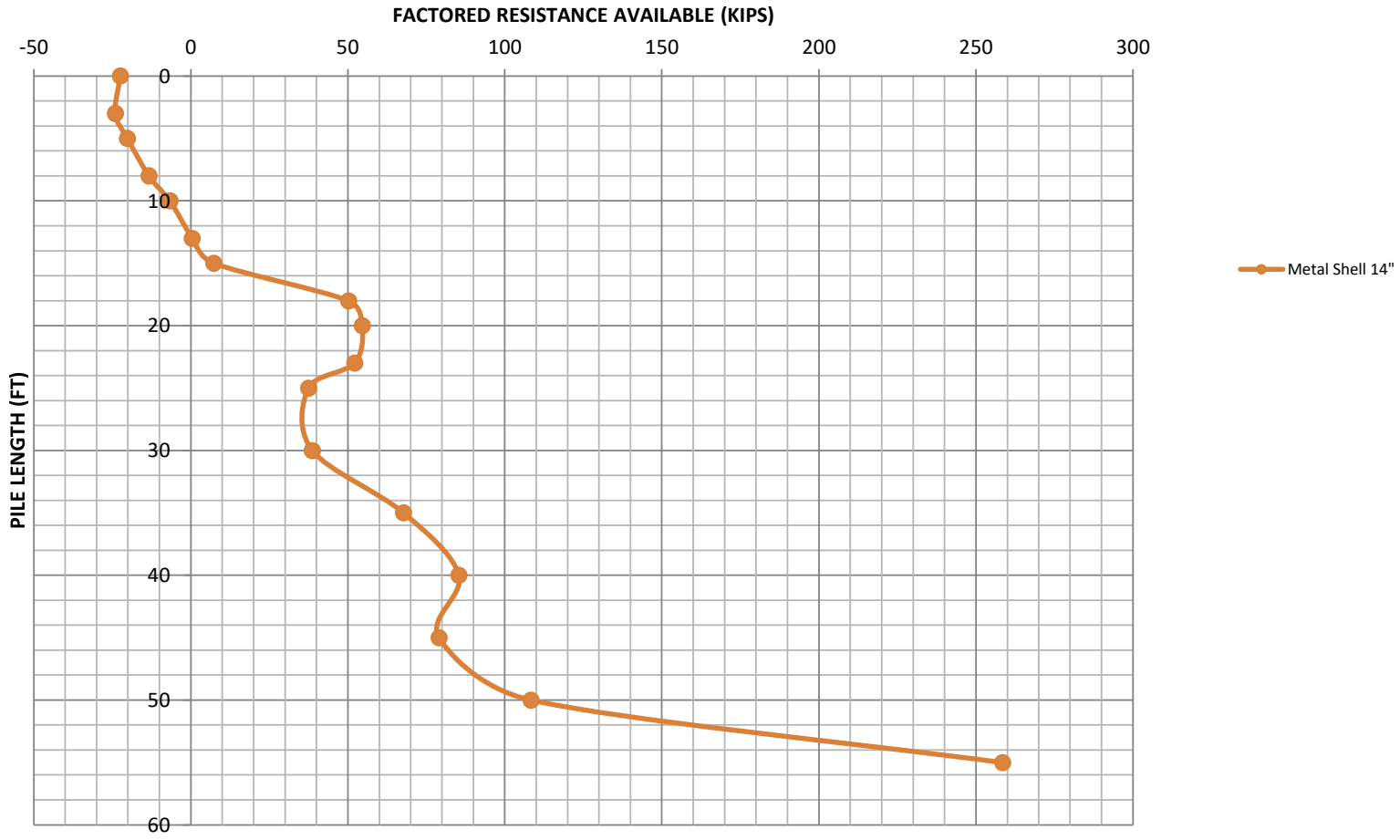
1) Downdrag to EL 679.8-ft assumed.

2) Shell Piles have a 0.25 inch wall thickness

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-43

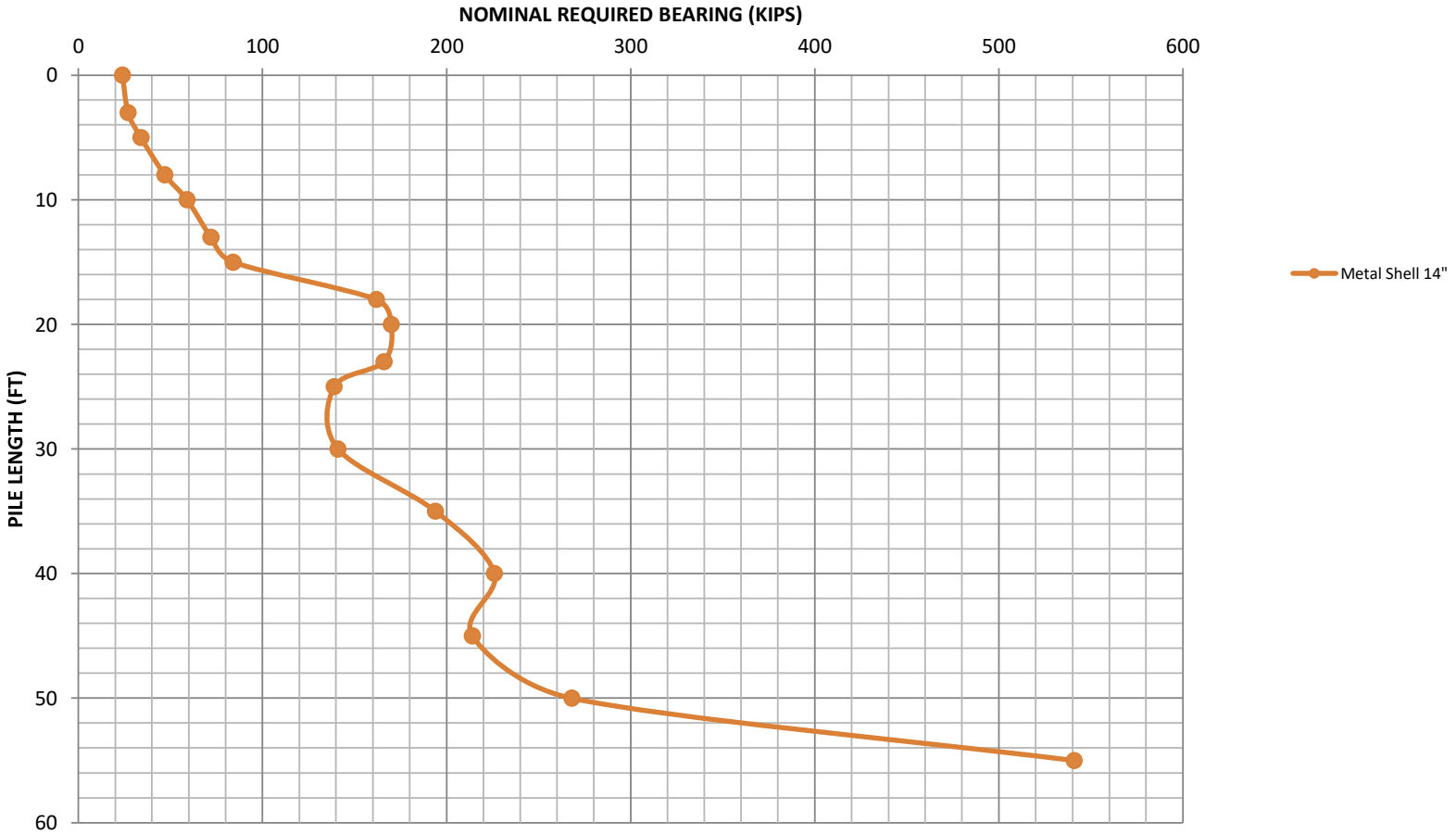
Elevation 687.8 Begin Friction, 682.8 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL. 679.80



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-43

Elevation 687.8 Begin Friction, 682.8 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL 679.80



Bents: Boring SB-44 (Elevation 686.18 Begin Friction, 681.18 for Pile Cutoff)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12"		Metal Shell 14"	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0											-8	44
3											-32	52
5											-41	42
8											-44	45
10											-47	47
13											-49	53
15											-55	59
18											-62	63
20											-58	70
23											-42	100
28											-39	105
33											-7	164
38											39	247
43											23	218
48											47	262
53											107	371
58											142	434
63											101	359
68											195	530

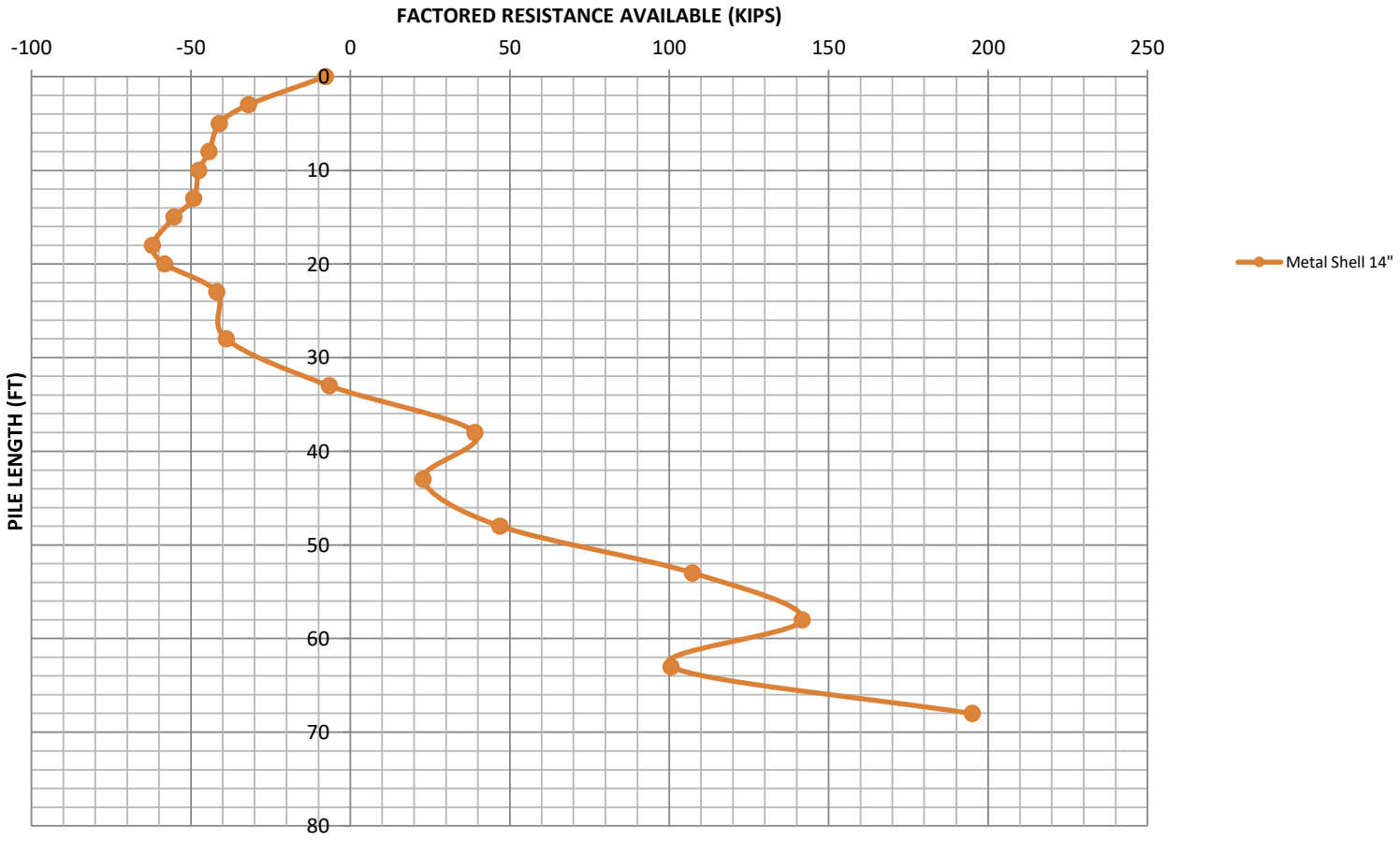
1)Downdrag to EL 663.18-ft assumed

2) Shell Piles have a 0.25 inch wall thickness

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-44

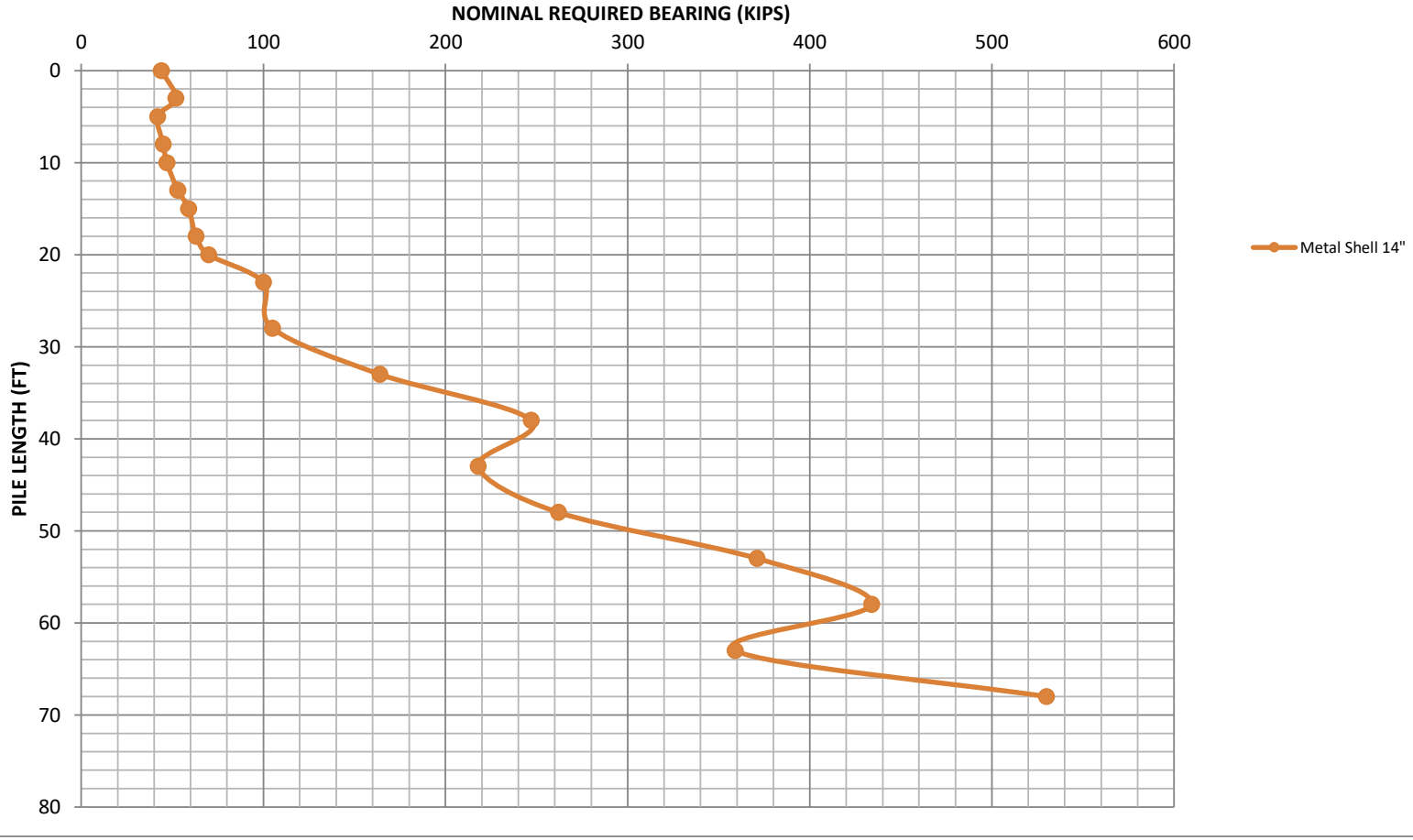
Elevation 686.18 Begin Friction, 681.18 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL. 663.18



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-44

Elevation 686.18 Begin Friction, 681.18 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL 663.18



Bents: Boring SB-45 (Elevation 685.7 Begin Friction, 680.7 for Pile Cutoff)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12"		Metal Shell 14"	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0											7	13
3											-4	26
5											-24	26
8											-27	29
10											-31	32
13											-34	35
15											-33	45
18											-39	40
20											-41	44
23											-47	48
25											-42	66
30											-22	103
35											-2	139
40											17	173
45											37	210
50											138	394
55											89	305
60											115	352
65											173	457

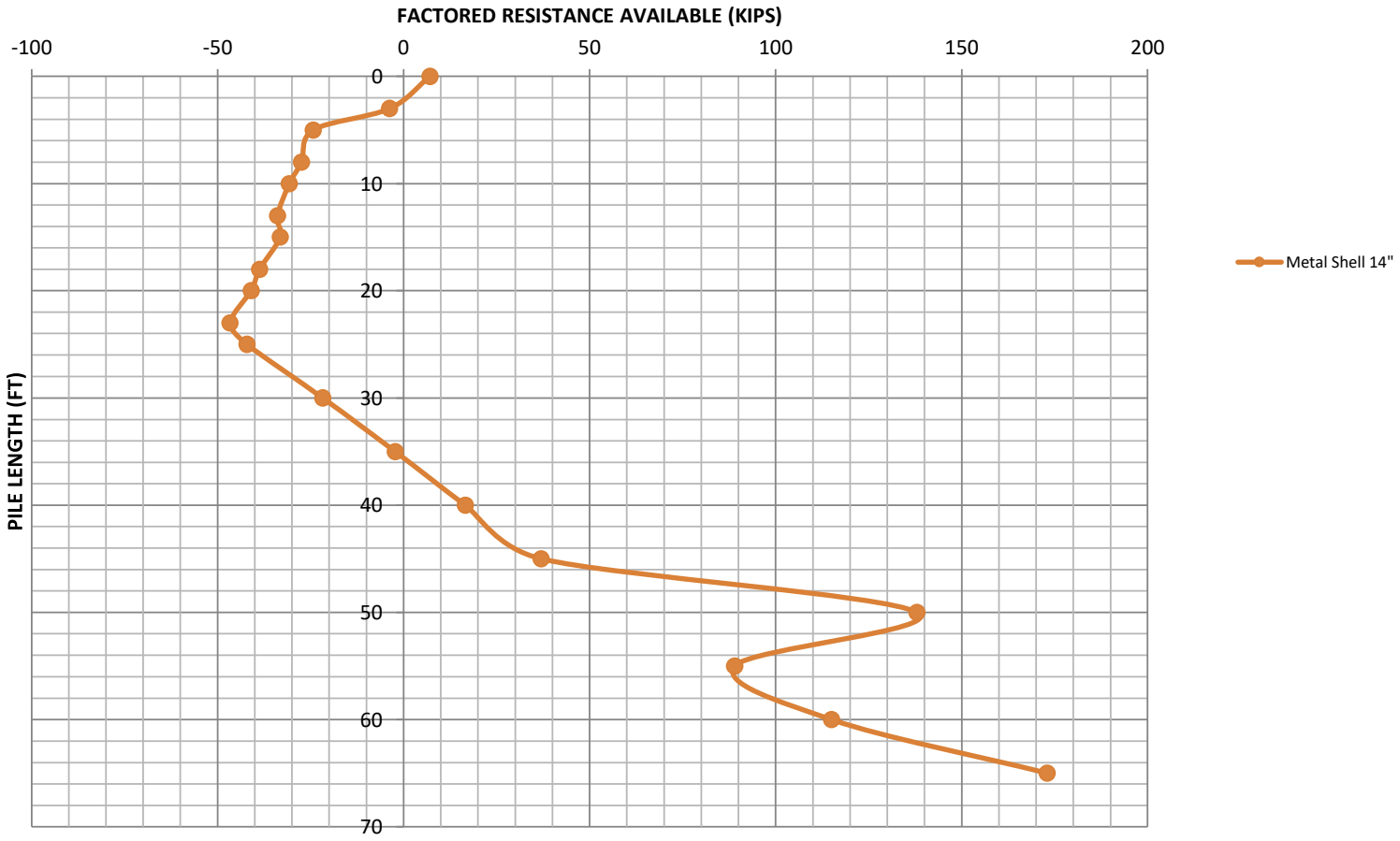
1) Downdrag to EL 653.70-ft assumed

2) Shell Piles have a 0.25 inch wall thickness

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-45

Elevation 685.7 Begin Friction, 680.7 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL 653.70



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH

Bents: BORING SB-45

Elevation 685.7 Begin Friction, 680.7 for Pile Cutoff (pile length = 0.0 feet)
Precore to EL. 653.70