Structure Geotechnical Report for IL 53 (FAP 342) over Salt Creek Bridge Replacement

IDOT Contract Number	62N91
IDOT Job Number	D-91-144-21
Section	2018-100-BR
County	Cook
Existing Bridge SN	016-0377
Route	IL 53 (FAP 342)
Feature Crossed	Salt Creek

Illinois Department of Transportation
District 1
Region 1

Gonzalez Project Number 23-1003

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Prepared for:

Strand Associates, Inc.
1170 South Houbolt Road
Joliet, IL 60431

Prepared by:

Gonzalez Companies, LLC
525 West Main Street, Suite 125
Belleville, IL 62220
www.gonzalezcos.com

Eric J. Glazier, P.E.
eglazier@gonzalezcos.com
618-222-2221

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Tables

Separate Files Submitted with Structure Geotechnical Report

Axial Pile Capacity Spreadsheets (.xls) – SC-01 through SC-06

Integral Abutment Feasibility Analysis Spreadsheet (.xls) – SC-03 and SC-04

1. PROJECT DESCRIPTION AND SCOPE

1.1 Project Description

Gonzalez Companies, LLC (Gonzalez) performed a geotechnical investigation for the IL 53 over Salt Creek bridge replacement. The project site is within Cook County, Illinois, and lies within the limits of the Third Principal Meridian (SE ¼, Section 35, T42N, R10E). The project location is shown on the Project Location Map in **Appendix A**. This report presents the depth and characteristics of the soils along the proposed improvement and geotechnical recommendations for the proposed project.

1.2 Existing Conditions

The structure carrying IL 53 over Salt Creek was originally built in 1962 and consists of a single-span bridge with 63'-3" back-to-back abutment span and 210' out-to-out deck width. Selected sheets from the 1962 plans are included in **Appendix B**. The 1962 plans show the existing abutments are supported on untreated timber piles with A design capacity of 20 tons, and design length of 25 feet. The existing bridge carries 10 lanes across Salt Creek. A boring log from 2017 Plans for Wingwall Repair are also included in **Appendix B**.

1.3 Proposed Improvements

The proposed bridge will have integral abutments supported on piles. The existing abutment along with its timber piles will remain in place and will be utilized to retain the soil for the proposed abutment. The proposed piles will be located approximately 3.75 feet away from the existing outside piles. The slope in front of the proposed abutment will be 1:2 until it reaches the existing abutment. The proposed cross-section from the *General Plan and Elevation* (HMG, 2023) is included as **Appendix C**.

2. GENERAL GEOLOGY

The project area is located in northeastern Illinois about 8 miles northwest of Chicago O'Hare International Airport within the Wheaton Morainal Country within the Great Lake section of the Central Lowland Province. Based on historical borings and publications, the subsurface profile includes interbedded glacial deposits (medium stiff to stiff), and bedrock. In the area of IL 53 over Salt Creek, bedrock is expected around El. 560 (Stumpf, 2006), which is over 150 feet below the existing ground surface.

3. FIELD EXPLORATION

3.1 Subsurface Exploration and Testing

3.1.1 Field Investigation

Between July 30 and August 2, 2023, Gonzalez drilled and logged six conventional soil borings near the bridge. The boring locations are shown on the Boring Plan in **Appendix D** and coordinates are provided in **Table 1**. Ground surface elevations at the boring locations were determined in the field by GPS survey equipment (Virtual Reference Station (VRS) utilizing a Trimble R8 receiver). Gonzalez subcontracted the conventional soil borings to Rubino Engineering, Inc. A Gonzalez geotechnical specialist observed and coordinated the field investigation.

Table 1. Boring Locations and Elevations

Boring ID	Date Drilled	Boring Depth (ft)	Surface Elevation[1] (ft)	Latitude	Longitude
SC-01	July 30, 2023	80	717.7	42.0689359	-88.0280945
SC-02	July 31, 2023	80	717.5	42.0686273	-88.0281250
SC-03	August 3, 2023	80	717.0	42.0686034	-88.0273918
SC-04	August 6, 2023	80	717.9	42.0688810	-88.0273740
SC-05	August 2, 2023	80	717.8	42.0689268	-88.0277776
SC-06	August 1, 2023	80	717.6	42.0686048	-88.0277841

1. **North American Vertical Datum 1983; vertical precision is within 0.1 feet.**

The borings were advanced with a Geoprobe 7822DT drill rig using hollow stem augers to a completion depth of 80 feet below existing ground surface. Soil samples were obtained under the direction of a Gonzalez geotechnical field specialist using a 2-inch outer diameter split spoon sampler driven with an automatic hammer in accordance with the standard penetration test (AASHTO T 206). The samples were logged for soil type and the unconfined compressive strength was determined with a Rimac or pocket penetrometer, as appropriate. Upon completion, each boring was backfilled with auger cuttings and capped with pavement patch. The Subsurface Data Profile Plot is included as **Appendix E** as a graphical record of the subsurface explorations, and the Soil Boring Logs are included as **Appendix F**.

3.1.2 Laboratory Testing

Soil samples were taken to the laboratory of Gonzalez subcontractor Rubino to determine the moisture content (AASTHO T265), grain size (T88), and Atterberg Limits (T89 / T90) in general accordance with the referenced AASHTO Standards. The results of the laboratory testing are summarized on the boring logs at the corresponding sample depths and in **Appendix G**.

3.2 Subsurface Conditions

The near-surface materials in the project area generally consist of glacial materials overlain by fill placed for the IL 53 embankments. Some variations in subsurface materials between individual borings was observed, and caution should be taken with extrapolating soil properties beyond limits of the investigation. Fill material will vary in depth across the project site as a result of previous construction activities.

Bedrock was not encountered during the field investigation. The deepest boring was advanced to 80 feet below existing ground surface (bottom of boring at EL 637).
A summary of fill and naturally-deposited soils encountered during the field exploration are described in the following subsections. The summary results of their associated field and laboratory testing are also included in **Table 2**.

Table 2. Summary of Field and Laboratory Tests

Field/Lab Test	Fill Material			Natural Deposits		
Index/General Properties:	***# tests***	**Range**	**Average**	***# tests***	**Range**	**Average**
Moisture Content (%)	*46*	8 – 30	16	*85*	11 – 44	19
Atterberg Limits (%)				*5*		
Liquid Limit					23 – 33	28
Plastic Limit					16 – 18	17
Plasticity Index					7 – 15	11
Rimac Unconfined Compressive Strength (tsf)	*35*	0.37 – 5.4	2.6	*80*	0.1 – 5.4	1.8

3.2.1 Fill Material

Observed fill material consists predominately of clay that was brown, dry to moist, low plastic. Fill material was encountered in all borings to an average elevation of 698, but varies in depth across the project site as a result of previous construction activities. SPT N-values in the fill materials ranged between 4 and 16 blows per foot (bpf) with an average near 10 bpf, indicating medium stiff to stiff cohesive deposits.

3.2.2 Natural Deposits (Glacial)

Observed natural deposits generally consist of cohesive soil (loams) that were generally brown, dry to wet, low plastic, with varying amounts of sand and gravel. Occasional layers of sand and silt were encountered as well. SPT N-values in the natural deposits ranged between 0 and 36 bpf with an average near 16 bpf, indicating a soft to stiff deposit.

3.2.3 Groundwater

Groundwater was encountered in the borings at the time of field exploration at depths/elevations shown in **Table 3**.

Table 3. Groundwater Observations

Boring ID	During Drilling		After Drilling	
	Groundwater Depth (ft)	Groundwater Elevation (ft)	Groundwater Depth (ft)	Groundwater Elevation (ft)
SC-01	55	662.7	25	692.7
SC-02	44	673.5	40	677.5
SC-03	38.5	678.5	20	697.0
SC-04	53.5	664.4	28	689.9
SC-05	43.5	674.3	34	683.8
SC-06	46	671.6	Cave at 14	-

Delayed groundwater levels were not measured, because the borings were backfilled upon completion due to safety reasons. The values in **Table 3** may not represent the long-term groundwater levels. Groundwater is not expected to be present within the embankment fill, but may be present in the natural soils. Since the

historical topographic maps indicate the project area was in a marsh, groundwater may be present near the natural ground surface elevation.

4. GEOTECHNICAL EVALUATIONS

4.1 Settlement

Gonzalez is not aware of any settlement issues at the structure. It is our understanding that this project will not include additional fill heights, so overall embankment settlement is not expected. Downdrag on pile foundations was therefore not analyzed.

4.2 Global Slope Stability Analysis

Since changes to the abutment slopes are assumed to be minimal, the abutments were not analyzed for global slope stability.

4.3 Seismic Considerations

Seismic Site Class was determined based on IDOT Design Guide: AGMU Memo 09.1-LRFD Seismic Site Class Definition (2009) and the IDOT spreadsheet BBS 149 “Seismic Site Class Determination” (November 01, 2016). Based on a weighted average N-value of 17 bpf and weighted average undrained shear strength (su) of 1.99 kips per square foot (ksf), the global site soil class is defined as Seismic Site Class D. The results of the seismic site class determination are included in **Appendix H**.

Seismic analysis based IDOT Geotechnical Manual (IDOT, 2020) and the AASHTO Seismic Acceleration Coefficient Map provided by USGS Hazard Design Tool (USGS, 2022) for AASHTO-2009 indicated the Peak Ground Acceleration (PGA) is 0.043g during the earthquake based on the hazard of 7% probability of exceedance in 75 years (an approximate 1000-year return period event). Based on the site coordinates, the mapped MCE (Maximum Considered Earthquake) spectral response accelerations were obtained at 0.2 second (S_{DS}) and 1 second (S_{D1}). The site Seismic Performance Zone (SPZ) was assigned to the site to establish a level of seismic risk which is used for structure design criteria based on Table 3.10.6-1 of the “AASHTO LRFD Bridge Design Specifications” (AASHTO, 2020). The design criteria in **Table 4** were developed using the USGS Hazard Design Tool for AASHTO-2009 for reference coordinates 42.068605, -88.027784.

Table 4. Seismic Soil Site Class and Parameters

Seismic Soil Site Class	Seismic Performance Zone (SPZ)	Site-Specific Design Spectral Acceleration Parameters	
		S_{DS}	S_{D1}
D	1	0.144g	0.083g

Note: SPZ 1: $S_{D1} = F_V S_1 \leq 0.15g$

Based on site’s seismic performance zone, seismic slope stability and liquefaction analysis are not required.

5. DRIVEN PILE FOUNDATION RECOMMENDATIONS

Untreated timber piles with design capacities of 20 tons and design lengths of 25 feet are shown for support of the existing abutments on the 1962 plans. The maximum factored axial force per pile for both abutments is 408 kips. Multiple pile types are suitable for use at the proposed abutments including, but not limited to, metal shell piles and H-piles.

The nominal required bearing (R_N) and the geotechnical factored resistance available (R_F) for several pile types of various lengths were estimated according to the IDOT Design Guide “Axial Geotechnical Resistance of Driven Piles (2009) and using the IDOT BBS 147 “Static Method of Estimating Pile Length” spreadsheet (January 2010). Select results are displayed in **Tables 5 through 10**. Pile cut off elevation (accounting for the embedment depths inside the substructure) was assumed. For the abutments, the bottom of substructure elevations and ground surface elevations (where the soil beings contact with the pile) during driving were also assumed. In order to isolate the proposed integral abutments from the existing retaining walls, the piles at both the North and South Abutment should be advanced through precored holes utilizing pile sleeves. The sleeves should extend 10 feet below the bottom of the abutment caps. The annulus between the piles and sleeves should remain empty.

Liquefaction and downdrag were not considered to be significant, as discussed in **Sections 4.1 and 4.3**, and were not included in the analysis. Computations for the IDOT Static Method are included in **Appendix I** and the Axial Pile Capacity Spreadsheets (.xls file format) are included as part of this SGR package.

Since the piles for this project will be predominately supported by side resistance and we do not anticipate very hard layers, boulders, or other obstructions will cause damage to the piles; metal shell piles are appropriate and economical for use.

Deep foundation elements (e.g., driven piles) should be spaced a minimum of 3 diameters center-to-center. Closer spacing may require a reduction in axial load capacity and could result in physical damage to the pile due to drift during pile installation. Axial capacity reduction can be calculated by comparing the allowable axial capacity determined from the sum of individual elements in a group versus the capacity calculated using the perimeter and base of the group acting as a unit. The lesser of the two capacities should be used in design.

The capacity of each pile should be estimated during driving based on the Washington State Department of Transportation (WSDOT) pile driving formula as specified in the IDOT Geotechnical Manual (IDOT, 2020).

Table 5. Pile Design Table for North Abutment, West End – Boring SC-01

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	225	123	66
	358	197	69
	374	206	71
	390	215	74
Metal Shell 14"Ø w/.312" walls	263	145	66
	444	244	69
	463	255	71
	481	265	74
Metal Shell 16"Ø w/.375" walls	279	153	59
	292	161	61
	295	162	64
	301	166	66
	537	296	69
	559	307	71
	580	319	74

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

Table 6. Pile Design Table for South Abutment, West End – Boring SC-02

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	273	150	67
	286	157	69
	306	169	72
	323	178	74
Metal Shell 14"Ø w/.312" walls	261	144	58
	321	177	67
	336	185	69
	362	199	72
	382	210	74
Metal Shell 16"Ø w/.375" walls	282	155	51
	295	162	56
	299	165	58
	370	204	67
	388	213	69
	419	230	72
	441	243	74

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

Table 7. Pile Design Table for North Abutment, Center – Boring SC-03

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	279	153	58
	291	160	60
	303	167	63
	323	178	65
	340	187	68
	357	196	70
	373	205	73
	386	213	75
Metal Shell 14"Ø w/.312" walls	285	156	50
	299	164	53
	313	172	55
	328	180	58
	342	188	60
	357	196	63
	382	210	65
	401	221	68
	420	231	70
	440	242	73
	455	250	75
Metal Shell 16"Ø w/.375" walls	262	144	40
	291	160	43
	297	163	45
	317	174	48
	328	181	50
	345	190	53
	361	199	55
	378	208	58
	394	217	60
	411	226	63
	441	242	65
	463	255	68
	485	267	70
	507	279	73
	525	289	75

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

Table 8. Pile Design Table for South Abutment, Center – Boring SC-04

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	214	118	57
	307	169	71
	326	179	74
Metal Shell 14"Ø w/.312" walls	250	138	57
	363	200	71
	385	212	74
Metal Shell 16"Ø w/.375" walls	281	154	55
	287	158	57
	421	231	71
	445	245	74

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

Table 9. Pile Design Table for North Abutment, East End – Boring SC-05

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	284	156	60
	309	170	62
	323	178	65
	344	189	67
	352	194	70
	366	202	72
	375	206	74
Metal Shell 14"Ø w/.312" walls	280	154	52
	318	175	55
	343	189	57
	397	218	60
	431	237	62
	444	244	65
	472	260	67
	477	262	70
	496	273	72
	508	279	74
Metal Shell 16"Ø w/.375" walls	280	154	52
	318	175	55
	343	189	57
	397	218	60
	431	237	62
	444	244	65
	472	260	67
	477	262	70
	496	273	72
	508	279	74

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

Table 10. Pile Design Table for South Abutment, East End – Boring SC-06

	R_N Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length[1] (ft)
Metal Shell 12"Ø w/.25" walls	272	150	64
	289	159	67
	302	166	69
	317	174	72
	329	181	74
Metal Shell 14"Ø w/.312" walls	284	156	59
	305	168	62
	322	177	64
	341	188	67
	356	196	69
	373	205	72
	387	213	74
Metal Shell 16"Ø w/.375" walls	277	152	54
	290	160	57
	330	181	59
	354	195	62
	373	205	64
	395	217	67
	411	226	69
	430	237	72
	446	245	74

Note: Estimated pile length is based on an assume pile cut off elevation of 712 feet (accounting for the embedment depth of 2 feet inside the substructure), a bottom of substructure elevation of 710 feet, 10 feet of pre-coring, and a ground surface elevation (where the soil begins contact with the pile) during driving of 710 feet.

5.1 Test Piles

Test piles for the bridge reconstruction are recommended for each abutment to verify estimated pile length.

5.2 Lateral Loads

Resistance to lateral loads can be provided by deep foundation elements such as vertical piles or battered piles. The lateral capacity of the deep foundation elements is controlled by the response of the upper 15 to 20 feet of soil. In addition, the location of the pile head can greatly affect the lateral capacity and should be modelled correctly. Lateral load capacity analysis of piles can be performed using computer programs such as L-Pile for the deep foundation element selected for the foundation. Recommended soil parameters for lateral load capacity analysis are provided in **Table 11**. Group action should be considered when calculating the lateral resistance of a group of piles. Group effects (or shadowing) will reduce pile capacities if the piles are spaced closer than 6 pile diameters (center-to-center). The lateral pile capacity reduction is an average of the pile group efficiency for all piles within a typical group.

Table 11. Soil Parameters for Lateral Load Capacity

Boring ID	Elev. At Bottom of Layer	Total Unit Weight (pcf)	Undrained Shear Strength, s_u (psf)	Average N-value (bpf)	Assumed % Fines (< #200 sieve)	Strain ε_{50}	Lateral Subgrade Modulus (pci)
SC-01	697	120	1,800	9	73	0.007	200
	685	120	1,100	11	89	0.007	200
	637	120	1,600	21	89	0.007	200
SC-02	702	120	2,000	11	73	0.005	400
	694	120	1,100	9	67	0.007	200
	671	120	1,800	13	89	0.007	200
	645	120	1,600	17	89	0.007	200
	637	120	2,100	24	73	0.005	400
SC-03	697	120	2,000	11	73	0.005	200
	694	120	700	5	67	0.007	400
	677	120	2,300	14	89	0.005	200
	637	120	2,000	19	89	0.005	200
SC-04	699	120	2,000	11	73	0.005	200
	689	120	650	7	67	0.007	400
	640	120	2,300	19	89	0.005	200
	637	120	2,900	28	89	0.005	200
SC-05	714	120	1,000	10	77	0.007	200
	694	120	2,300	9	73	0.005	400
	692	120	1,200	7	67	0.007	200
	637	120	2,200	15	83	0.005	400
SC-06	699	120	2,000	8	73	0.005	200
	684	120	1,300	8	67	0.007	400
	657	120	1,800	13	89	0.007	400
	637	120	1,800	23	89	0.007	400

Note: Elevations have been generalized based on observed conditions. Exact elevations and material properties may vary across the site.

6. CONSTRUCTION CONSIDERATIONS

6.1 Temporary Soil Retention Systems

Temporary excavations will be required to reconstruct the bridge using staged construction, as shown on the General Plan and Elevation (HBM, 2023). We understand sheet piling for is not feasible due to proximity to existing foundation elements, so a Temporary Soil Retention System (TSRS) is recommended. The TSRS should be designed in accordance with Section 522.07 of the IDOT Standard Specifications and to withstand surcharges of traffic and/or structural loads, as appropriate by the contractor. In addition, the contractor should design the TSRS based on encountered soils, anticipated groundwater, and anticipated surcharge loading. **Table 12** below provides basic soil parameters to assist the contractor with the design of the TSRS. The contractor shall review the boring logs associated with each structure and verify soil parameters during the design of the TSRS.

Table 12 TSRS Design Soil Parameters

Boring ID	Elev. At Bottom of Layer	Average N-value (bpf)	Total Unit Weight (pcf)	Drained Peak Friction Angle, ø	Undrained Shear Strength, s_u (psf)
SC-01	697	9	120	26	1,800
	685	11	120	27	1,100
	637	21	120	30	1,600
SC-02	702	11	120	27	2,000
	694	9	120	26	1,100
	671	13	120	28	1,800
	645	17	120	28	1,600
	637	24	120	32	2,100
SC-03	697	11	120	27	2,000
	694	5	120	24	700
	677	14	120	28	2,300
	637	19	120	30	2,000
SC-04	699	11	120	27	2,000
	689	7	120	24	650
	640	19	120	30	2,300
	637	28	120	32	2,900
SC-05	714	10	120	26	1,000
	694	9	120	26	2,300
	692	7	120	24	1,200
	637	15	120	28	2,200
SC-06	699	8	120	26	2,000
	684	8	120	26	1,300
	657	13	120	28	1,800
	637	23	120	30	1,800

Note: Elevations have been generalized based on observed conditions. Exact elevations and material properties may vary across the site.

6.2 Retaining Walls

The stems of three retaining walls (northeast, northwest, and southwest) will be reconstructed on the existing foundations with a stem added behind each existing stem, as shown on the General Plan and Elevation (HBM, 2024). Retaining wall heights of less than 25 feet are expected. The retaining walls should be drained, and the granular backfill immediately behind the wall should be free-draining such as CA-7, CA-8, or CA-11. The embankment backfill greater than four feet behind the back of the wall could consist of granular fill such as CA-6, CA-7, CA-8, CA-9 or CA-10. For compacted granular backfill (new gravel), an angle of internal friction of 34 degrees could be assumed for design purposes. For compacted structural backfill (new clay), an angle of internal friction of 28 degrees could be assumed for design purposes.

As shown on the plans (HBM, 2024), the Estimated Water Surface Elevation (EWSE) is 700.66; therefore, Type 1 Cofferdams will be utilized along the three wingwalls.

6.3 Construction Monitoring

We do not anticipate the need for other special construction monitoring for the earthwork except as normally required by the IDOT Standard Specifications, Special Provisions and Contract Plans. During construction, an experienced geotechnical engineer or soil technician should be retained to perform the following tasks:

- Monitor earthwork operations
- Observe excavation
- Check soil materials, compaction, moisture content, and stability for compliance with project specifications
- Monitor locations and depths of undercuts
- Advise the IDOT Resident Engineer of any conditions not apparent during the subsurface exploration

6.4 Temporary Excavations

All excavations must comply with applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. Temporary excavations should have a slope as required to provide a stable side slope and the potential effect of ground movements upon open roadway and utilities should also be taken into consideration. All temporary cut excavation should be analyzed on an individual basis. Based on the EWSE, Type 1 Cofferdams will be utilized along the three wingwalls during construction. In general for other cut areas, we recommend that temporary construction slopes be no steeper than 1 Horizontal to 1 Vertical (1H:1V) and comply with OSHA requirements for Soil Type B.

7. LIMITATIONS

This report is based on Gonzalez Companies' understanding of the project as described and was prepared to provide recommendations for bridge reconstruction. The boring logs depict subsurface conditions for the specific locations and dates. Depth to groundwater levels recorded on our boring logs are subject to many variables and may not be indicative of long-term equilibrium conditions. These variables include puncture of perched horizons and inadequate time for equilibration of groundwater pressure.

The analyses and recommendations submitted in this report are based in part upon the subsurface data collected and our experience with similar projects. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent that could affect the proposed project, it may be necessary to re-evaluate some of the recommendations of this report. The recommendations and observations presented in the report assume that significant variations do not occur. Non-uniform conditions, however, often cannot be determined by the procedures described. Such conditions may necessitate additional expenditures to obtain a properly constructed project. We recommend that a contingency fund be budgeted to accommodate such possible expenditures.

8. REFERENCES

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APPENDIX A Project Location Map

LEGEND KEY:

PROJECT LOCATION

gonzalez COMPANIES, LLC

ILLINOIS DEPARTMENT OF TRANSPORTATION
IL 53 BRIDGES, 62N91, PTB 203-021
COOK COUNTY, IL

PROJECT NO. 23-1003

IL 53 OVER SALT CREEK
PROJECT LOCATION MAP

APPENDIX A

APPENDIX B Selected Pages from 1962 and 2017 Plans

FEDERAL-AID ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 61	531-I-B-7	COOK	26	1
B. P. R. REG. NO. 4	ILLINOIS	PROJECT	U-184(26)	

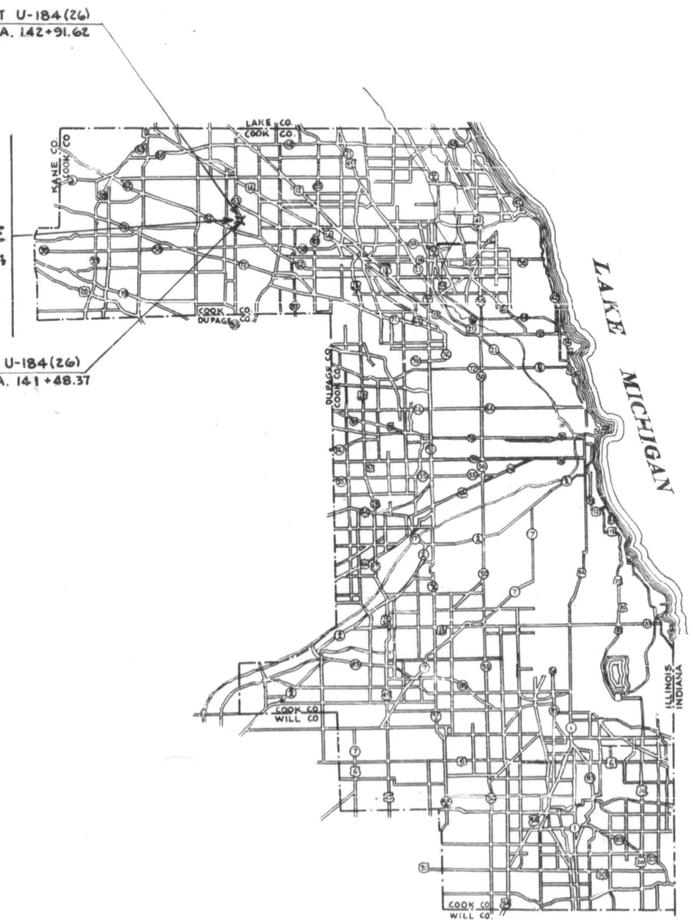
INDEX OF SHEETS ON SHEET NO. 2

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
PLANS FOR PROPOSED FEDERAL AID HIGHWAY

DISTRICT 10
RELOCATED S.B.I. ROUTE 53 (F.A. ROUTE 61) SECTION 531-I-B-7
STRUCTURES OVER SALT CREEK
PROJECT U-184(26)
COOK COUNTY

PROJECT LENGTH 143.25 FT. (0.027 MILES)

PROJECT U-184(26)
SECTION 531-I-B-7 INCLUDES THE CONSTRUCTION OF THREE 1-SPAN PRESTRESSED PRECAST CONCRETE BEAM STRUCTURES (TO CARRY RELOCATED ROUTE 53 OVER SALT CREEK), WITH SPANS AS FOLLOWS: (a) STRUCTURE FOR THRU LANES AND COLLECTOR — DISTRIBUTOR ROADS — 63'-3"; (b) STRUCTURE FOR WEST FRONTAGE ROAD — 83'-8"; (c) STRUCTURE FOR EAST FRONTAGE ROAD - 63'-3⅛"; EACH STRUCTURE HAVING CLOSED R.C. ABUTMENTS CONNECTED BY R.C. RETAINING WALLS, AT STATION 142+20.00 IN THE CITY OF ROLLING MEADOWS AND PALATINE TOWNSHIP.



LOCATION OF SECTION INDICATED THUS:— ▬

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

SUBMITTED September 26, 19 62
Marshall O. Dubway
DISTRICT ENGINEER

EXAMINED September 28, 19 62
A. W. Vandervoort
ENGINEER OF ROAD PLANS AND CONTRACTS

PASSED September 28, 19 62
ENGINEER OF DESIGN

APPROVED September 28, 19 62
CHIEF HIGHWAY ENGINEER

APPROVED September 28, 19 62
DIRECTOR

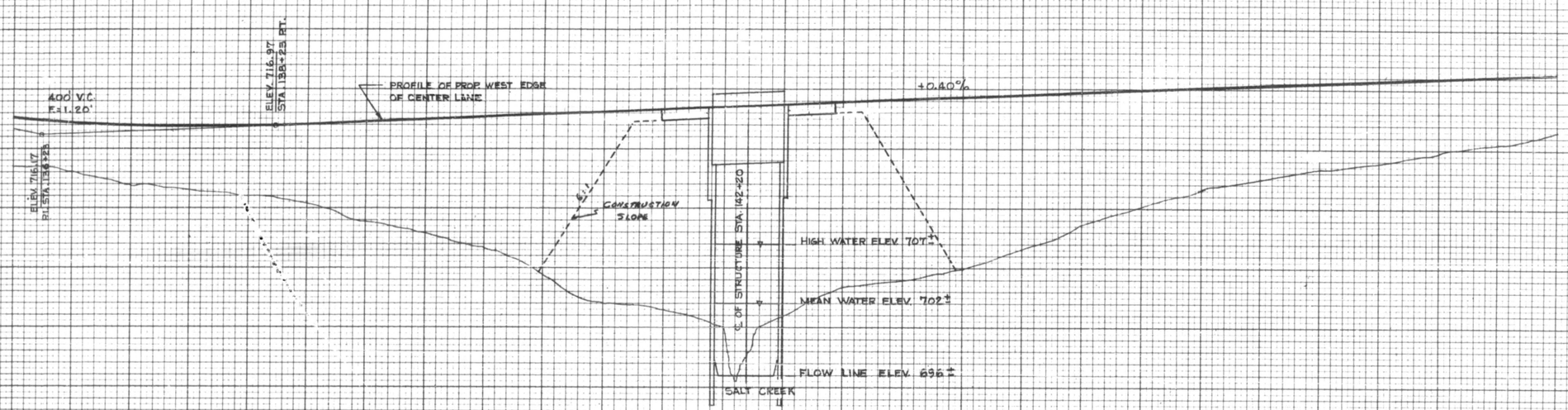
DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED

DIVISION ENGINEER — DATE

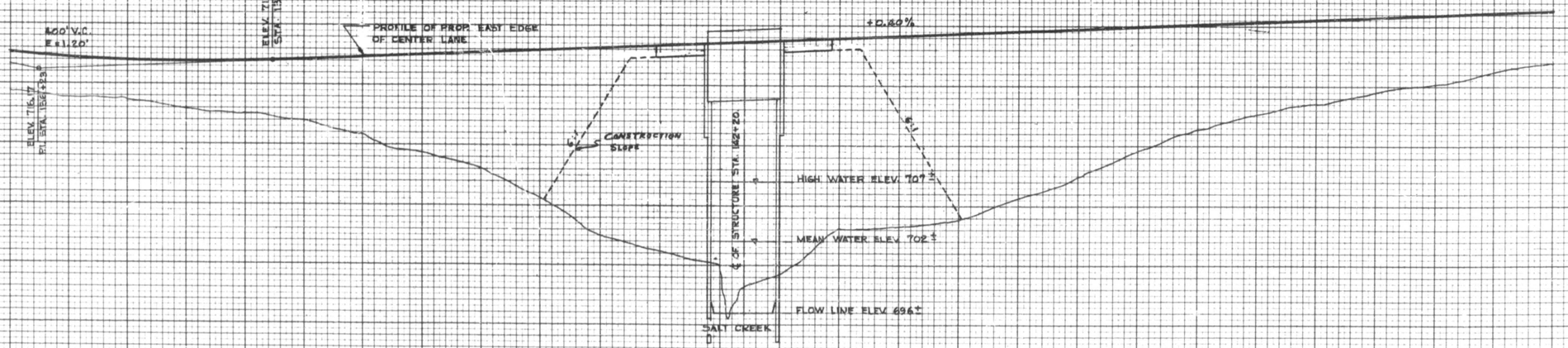
JOB NO. 22690

BOND ISSUE ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 6	531-1-B-7	COOK	26	6
STA. 136+00		TO STA. 149+00		
U.S. SUB. PUB. ROADS, DIV. 4	ILLINOIS	F.A. PROJECT		



SOUTHBOUND

136	137	138	139	140	141	142	143	144	145	146	147	148	149
717.56 / 713.5	717.19	716.91 / 711.8	716.86	716.87 / 711.0	717.28 / 708.9	717.68 / 706.7	718.08 / 702.0	716.48 / 700.0	718.88 / 703.4	719.28 / 704.8	719.68 / 708.6	720.08 / 711.5	720.48 / 713.2	720.88 / 714.7	721.28 / 716.5



NORTHBOUND

136	137	138	139	140	141	142	143	144	145	146	147	148	149
717.56 / 714.4	717.19	716.91 / 713.6	716.86	716.87 / 712.5	717.28 / 710.8	717.68 / 708.0	718.08 / 702.5	716.48 / 700.0	718.88 / 703.1	719.28 / 703.8	719.68 / 707.3	720.08 / 711.5	720.48 / 713.5	720.88 / 715.1	721.28 / 717.0

PROFILE OF MAIN LINE
ROUTE 53
SECTION 531-1-B-7
SCALE: VERT. 1" = 5'
HORIZ. 1" = 50'

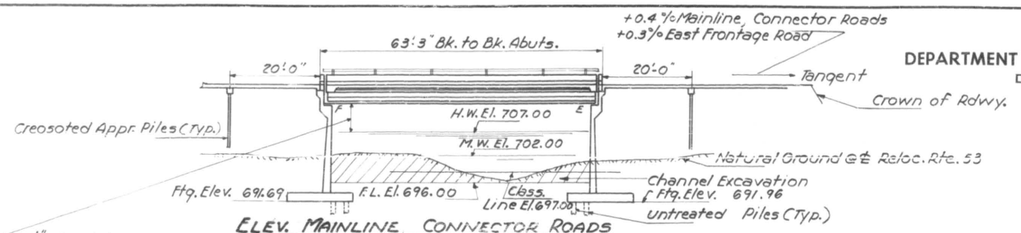
NOTE BOOK
NO.
TEMPLATE
AREAS
AREAS CHECKED

PLATE 3—CROSS SECTION O. P. R. & R. E. STANDARD
THE FREDERICK POST CO., CHICAGO

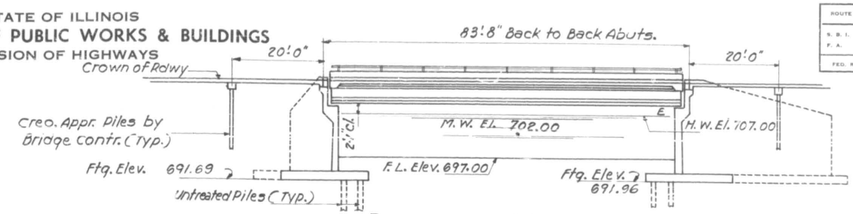
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
S. B. I. 53 / F. A.	531-1-B.7	COOK	26	11
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT: U-184(26)		

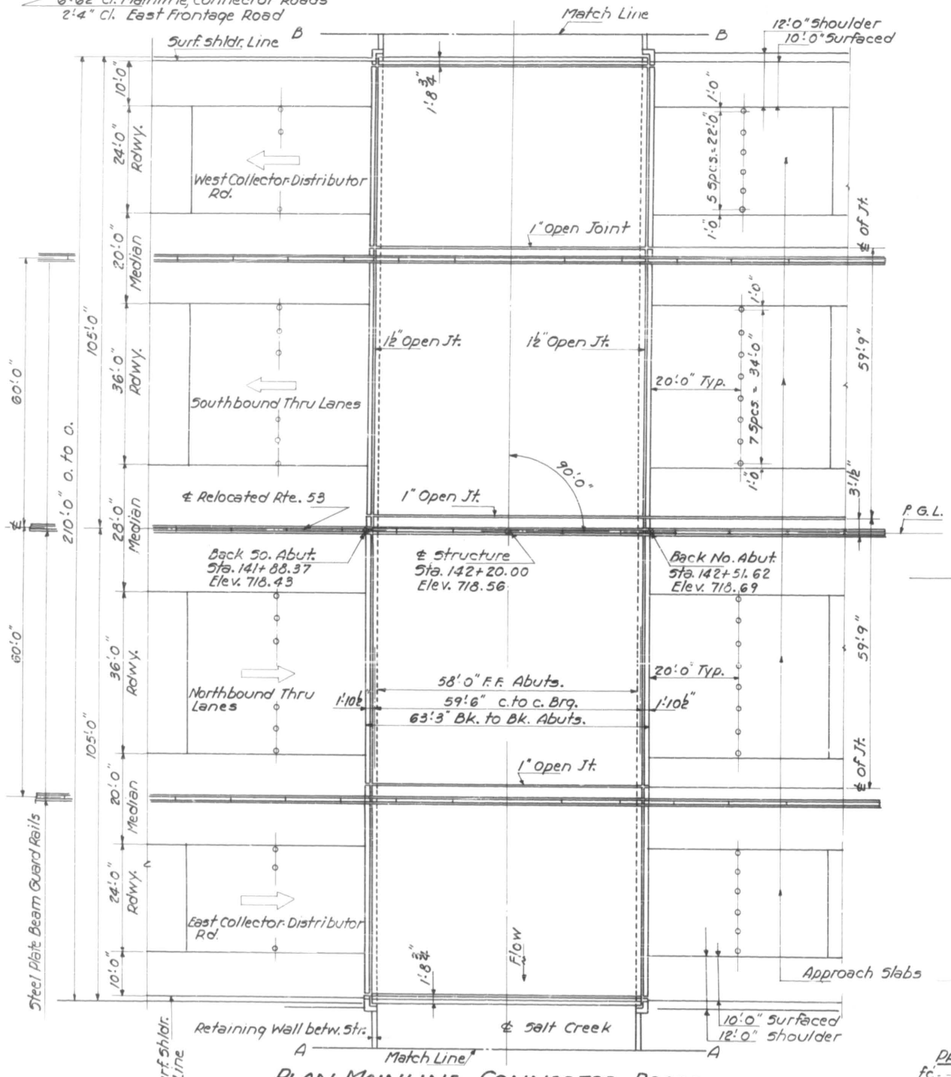
SHEET NO. 1
12 SHEETS



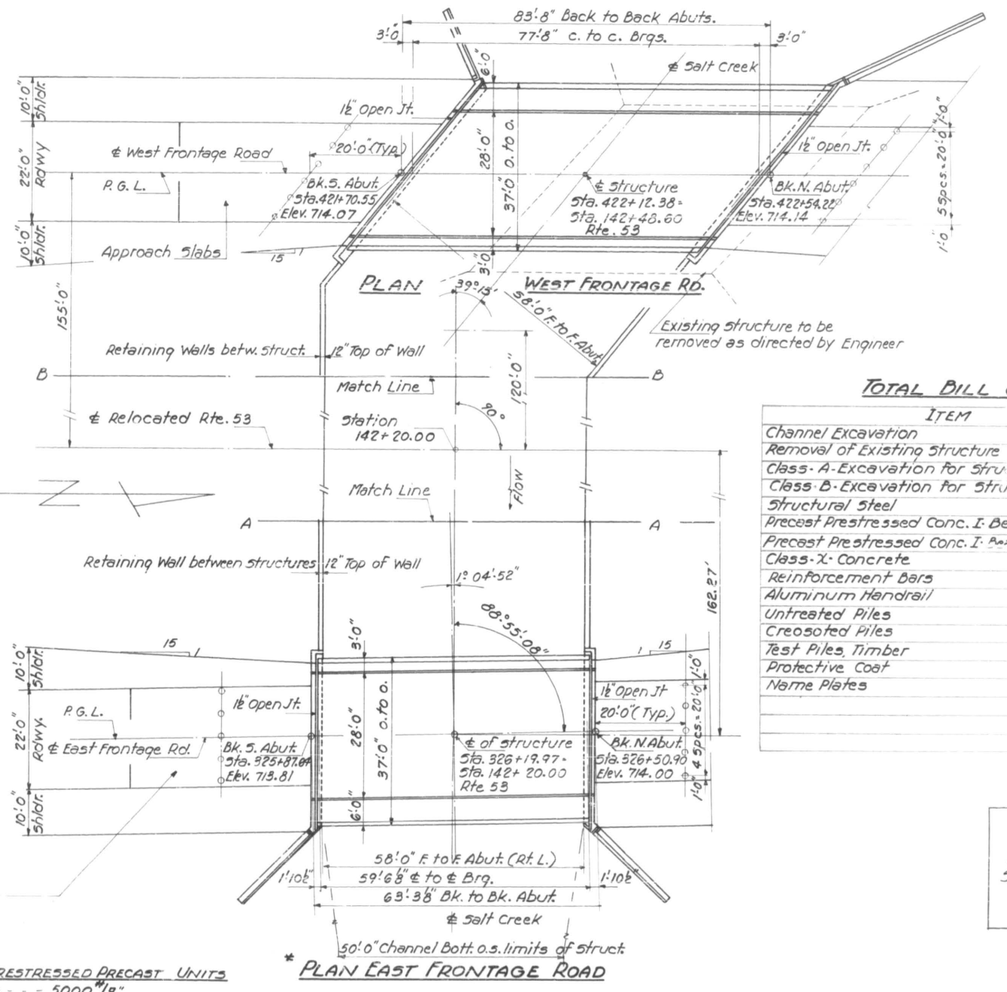
ELEV. MAINLINE, CONNECTOR ROADS



ELEVATION WEST FRONTAGE ROAD



PLAN MAINLINE, CONNECTOR ROADS



* PLAN EAST FRONTAGE ROAD

* for Elevation, East Frontage Road (See Elev. Mainline, Connector Roads)

PILE DATA - APPROACH SLAB PILES

Type	Creosoted
Capacity	15 Tons
Est. Length	15 Ft.
No. Req'd.	78

TOTAL BILL OF MATERIAL

ITEM	UNIT	SUPER.	SUBSTR.	TOTAL
Channel Excavation	Cu. Yds.		1770	1770
Removal of Existing Structure	Each			1
Class-A-Excavation for Structures	Cu. Yds.		1320	1320
Class-B-Excavation for Structures	Cu. Yds.		2040	2040
Structural Steel	Lbs.	30050		30050
Precast Prestressed Conc. I-Beams 42"	Lin. Ft.	2491		2491
Precast Prestressed Conc. I-Beams 48"	Lin. Ft.	552		552
Class-X-Concrete	Cu. Yds.	571.8	1968.6	2540.4
Reinforcement Bars	Lbs.	102430	236370	338800
Aluminum Handrail	Lin. Ft.	420		420
Untreated Piles	Lin. Ft.		14850	14850
Creosoted Piles	Lin. Ft.		1170	1170
Test Piles, Timber	Each		6	6
Protective Coat	Sq. Yds.	2100		2100
Name Plates	Each	2		2

PRESTRESSED PRECAST UNITS

fc	5000 #/a"
fci	4000 #/a"
fs	248000 #/a" (Cables)
fsi	173600 #/a"
fs	20000 #/a" Struct.

DESIGN STRESSES

fc	1400 Super, fc = 1000 #/a" Sub.
Vc	75 #/a" f'tgs.
fs	20000 #/a" Reinf.
fs	20000 #/a" Struct.
n	10

STATION 142+20.00
BUILT 196 BY
STATE OF ILLINOIS
S.B.I. RT. 53-SEC. 531-1-B.7
PROJECT F-184 (26)
LOADING H20-S16 & ALT.

NAME PLATE
See Standard 2113

DESIGNED	Mario L. Ciavella	Sept. 26 1962
CHECKED	Walter Perry	EXAMINED W. E. Saurman, ENGINEER OF BRIDGES AND TRAFFIC STRUCTURES
DRAWN	M. Miller	PASSED ENGINEER OF DESIGN
CHECKED	P. Kowert	APPROVED CHIEF HIGHWAY ENGINEER

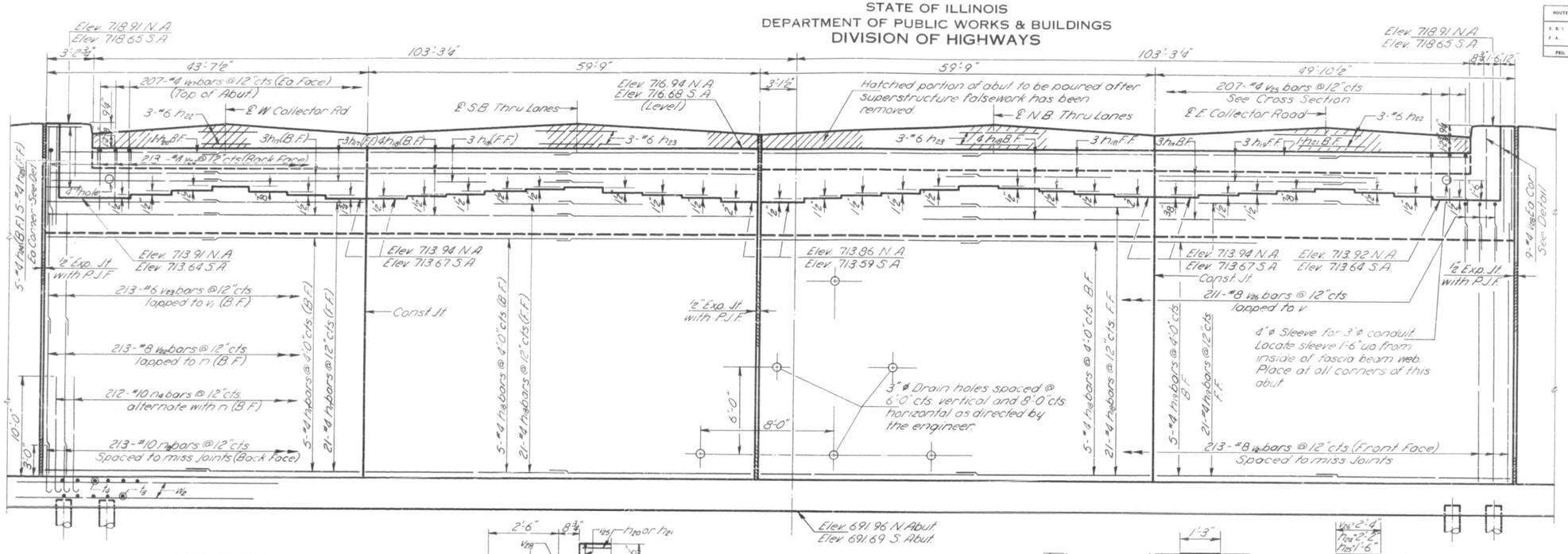
PROJECT F-184 (26)
GENERAL PLAN & ELEVATION
RELOCATED ROUTE 53 MAINLINE CONNECTOR ROADS AND FRONTAGE ROADS OVER SALT CREEK
S.B.I. ROUTE 53 — SEC. 531-1-B.7
COOK COUNTY
STATION 142+20.00

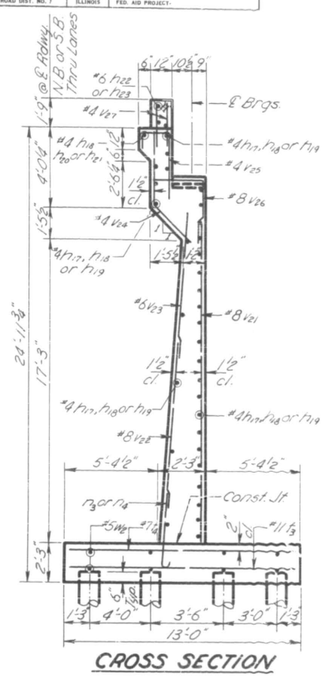
Loading H20-S16 & Alt.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
S.B.I. 53	531-			
F.A.	1-B-7	COOK	26	18
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT-		

SHEET NO. 9
12 SHEETS

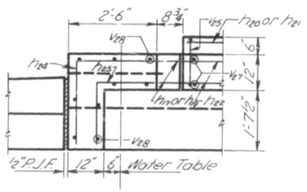




CROSS SECTION

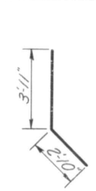
PILE DATA

Type ---------- Untreated
Capacity ---------- 20 Tons
Est Length ---------- 25 Ft
No. Req'd ---------- 213
(Includes 2 test piles)

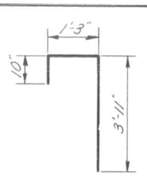


CORNER DETAIL

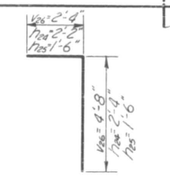
FRONT ELEVATION - N. ABUT.
S. ABUT. OPPOSITE HAND



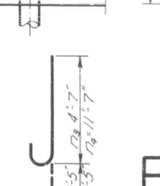
BAR V24



BAR V25



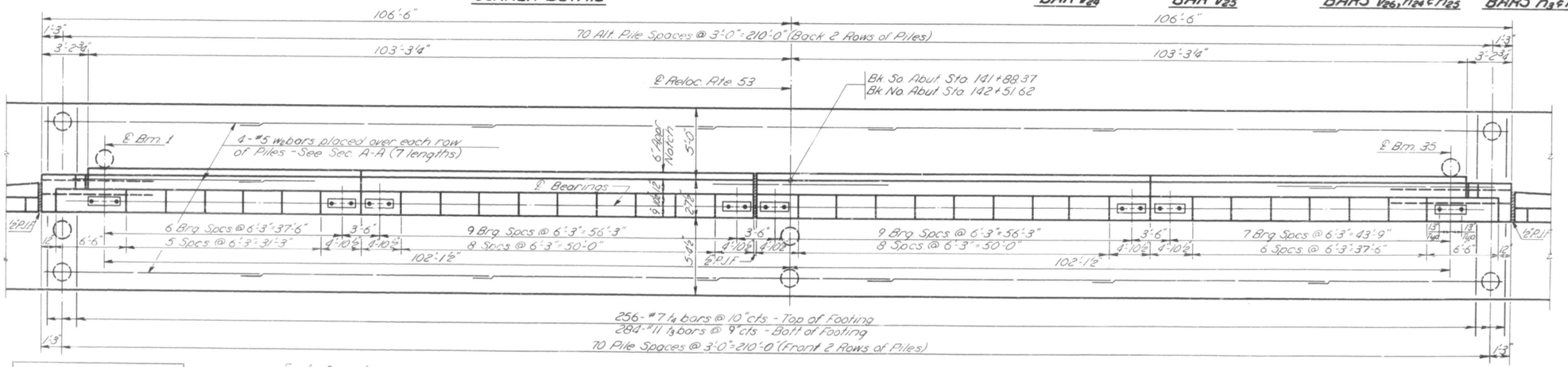
BARS V26, h24 & h25



BARS n3 & n4

BILL OF MATERIAL
2 ABUTS. - MAIN BRIDGE

Bar	No.	Size	Length	Shape
n3	426	#10	6'-0"	
n4	424	#10	13'-0"	
h17	128	#4	22'-3"	
h18	264	#4	30'-3"	
h19	128	#4	25'-3"	
h20	4	#4	20'-6"	
h21	4	#4	24'-0"	
h22	24	#6	24'-0"	
h23	24	#6	30'-3"	
h24	20	#4	4'-6"	
h25	20	#4	3'-0"	
V21	426	#8	19'-0"	
V22	426	#8	14'-0"	
V23	426	#6	7'-0"	
V24	426	#4	6'-9"	
V25	414	#4	6'-0"	
V26	422	#8	7'-0"	
V27	828	#4	2'-6"	
V28	36	#4	6'-0"	
f3	568	#11	12'-9"	
f4	512	#7	12'-9"	
W2	56	#5	31'-9"	
Class X Concrete			Cu Yds	1073.6
Reinforcement Bars			Lbs	154,970
Untreated Piles			Lin Ft	5275
Test Piles (Timber)			Each	2



PLAN - N. ABUTMENT
S. ABUT. OPPOSITE HAND

DESIGNED	M. L. Revels
CHECKED	Walter Perry
DRAWN	M. L. Wanless
CHECKED	WP

Sept. 26 1962

EXAMINED W. E. Baumann — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES

PASSED E. E. Hamm — ENGINEER OF DESIGN

APPROVED C. H. Bierbaum — CHIEF HIGHWAY ENGINEER

MAIN BRIDGE ABUTMENTS
S.B.I. RT. 53 - SEC. 531-1-B7
COOK COUNTY
STA. 142 + 20.00

04-28-2017 LETTING ITEM 179

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2016-055I	COOK	21	1
	ILLINOIS	CONTRACT NO. 62D37		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED
HIGHWAY PLANS

FAP ROUTE 342: IL 53
OVER SALT CREEK
SECTION 2016-055I
WINGWALL REPAIR
COOK COUNTY

C-91-010-17

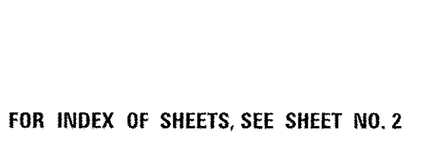
FOR INDEX OF SHEETS, SEE SHEET NO. 2

THIS IMPROVEMENT IS LOCATED IN
THE CITY OF ROLLING MEADOWS

TRAFFIC DATA

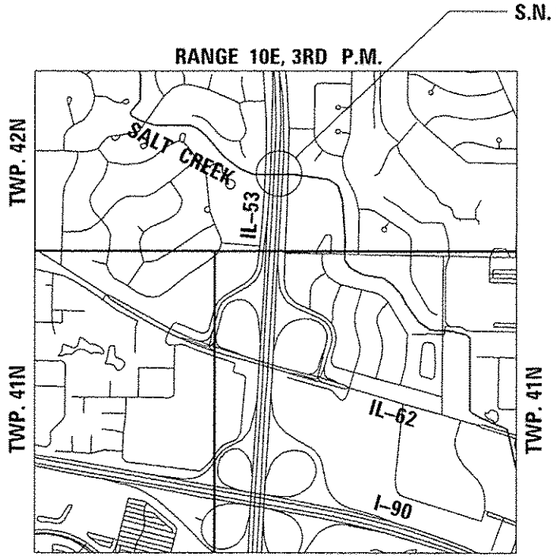
IL 53
ADT(2015) = 80,100
POSTED SPEED = 55 MPH
FUNCTIONAL CLASSIFICATION: FREEWAY

IL 53 E FRONTAGE RD
ADT(2014) = 2850
POSTED SPEED = 35 MPH
FUNCTIONAL CLASSIFICATION: MAJOR COLLECTOR



FULL SIZE PLANS HAVE BEEN PREPARED USING STANDARD ENGINEERING SCALES. REDUCED SIZED PLANS WILL NOT CONFORM TO STANDARD SCALES. IN MAKING MEASUREMENTS ON REDUCED PLANS, THE ABOVE SCALES MAY BE USED.

J.U.L.I.E.
JOINT UTILITY LOCATION INFORMATION FOR EXCAVATION
1-800-892-0123
OR 811



PALATINE TOWNSHIP

LOCATION MAP
NOT TO SCALE

NET AND GROSS LENGTH = 100 FT. = 0.02 MILE

D-91-010-17

LOCATION OF SECTION INDICATED THUS: —

Signed Joseph M. Glennon
Joseph M. Glennon, P.E.
Il. Lic. No. 062-046610
Expires 11-30-2017
Date 02/16/2017
For Sheets 1 thru 5

Signed Moussa A. Issa
Dr. Moussa A. Issa, S.E.
Il. Lic. No. 081-005738
Expires 11-30-2018
Date 02/16/2017
For Sheets 12 thru 17

PREPARED BY
HBM
ENGINEERING GROUP, LLC

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUBMITTED February 16 20 17
REGIONAL ENGINEER
May 24 20 17
ENGINEER OF DESIGN AND ENVIRONMENT
May 24 20 17
DIRECTOR OF PROGRAM DEVELOPMENT

PROJECT ENGINEER: ISSAM RAYYAN, P.E. (847) 705-4178
PROJECT MANAGER: RAGHAD ADEIS-DAHHAN, P.E., S.E. (847) 705-5183

CONTRACT NO. 62D37

PRINTED BY THE AUTHORITY
OF THE STATE OF ILLINOIS

IL 53 SOUTHBOUND COLLECTOR-DISTRIBUTOR ROAD

IL 53 SOUTHBOUND

IL 53 NORTHBOUND

IL 53 NORTHBOUND COLLECTOR-DISTRIBUTOR ROAD

138+00 139+00 140+00 141+00 142+00 143+00

℄ IL ROUTE 53

STA. 142+20.00

SHOULDER CLOSURE
PER DISTRICT STANDARD TC-17

1600′ 1000′ 185.00′ 100.00′ 50.39′ 50.61′ 29.00′

STA. 138+04.94 STA. 139+89.94 STA. 140+89.94 STA. 141+40.33 STA. 141+91.00

8′ 12′ 12′ 10′

5.00′ 12:1 TAPER 1.00′ 1

IMPACT ATTENUATORS, TEMPORARY
(NON- REDIRECTIVE), TEST LEVEL 3

TEMPORARY CONCRETE BARRIER

37.83′

ROAD CONSTRUCTION AHEAD
W20-1103(0)-48
STA. 112+04.94

SHOULDER CLOSED AHEAD
W21-5aR
STA. 128+04.94

1

LANE CLOSURE
PER HIGHWAY STANDARD 701501

11′ 5′ 11′ 8′

322+00 323+00 324+00 325+00 326+00 327+00

℄ EAST FRONTAGE RD.

DRIVEWAY DRIVEWAY DRIVEWAY DRIVEWAY DRIVEWAY

STA. 326+19.97 EAST FRONTAGE RD.
STA. 142+20.00 IL ROUTE 53

℄ SALT CREEK

LEGEND

- TRAFFIC DIRECTION
- WORK AREA
- IMPACT ATTENUATORS, TEMPORARY (NON- REDIRECTIVE), TEST LEVEL 3
- TEMPORARY CONCRETE BARRIER
- SIGN
- DRUMS AT 50′ CTS
- EXIST. STORM SEWER
- EXIST. FENCE
- CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED
- EXIST. GUARDRAIL

PLAN

NOTE:
STATIONING MEASURED ALONG ℄ IL ROUTE 53

HBM ENGINEERING GROUP, LLC

USER NAME : Kendrabent	DESIGNED - KJD, RTB	REVISED - 1 4/13/2017	
	DRAWN - KJD	REVISED -	
PLOT SCALE = 40.0000 '/ in.	CHECKED - RTB, JMG	REVISED -	
PLOT DATE = 4/13/2017	DATE - 03/20/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC
IL 53 OVER SALT CREEK

SCALE: | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2016-055I	COOK	21	5
		CONTRACT NO. 62D37		
	ILLINOIS FED. AID PROJECT			

1 Revised Sheet 4-18-17

FOUNDATION ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING
BOX 3607 RFD LONG GROVE, ILLINOIS 60047
Tel. (708) 882-2450
LABORATORY AT 650 MORSE AVE. SCHAUMBURG
ILLINOIS 60193

LOCATION: SEC 35 T42 N, R10 E | OWNER: Illinois Department of Transportation | FEI JOB No. 6960 | BORING No. B-1 | SHEET No. 1 of 4

PROJECT: Scour Study For Bridge S.N. 016-1123 | CITY,STATE: , Illinois

SITE: IL-53 E. Frontage Rd., over Salt Creek | COUNTY: Cook

Water Level Observations (ft): ▽ ▼ ▼

STA: 325+79.04 OFFSET (ft): 13 LT

Surface Elevation 713.5

STARTING DATE: 2/9/96 ENDING DATE: 2/9/96

DRILL CO. FEI DRILL RIG: D-50

DRILLER: BP ASS'T DRILLER: NK

ENG/GEOL. CHC APPROVED: CHC

Boring Defin.	Depth (Feet)	Lith-ology	Number	Type	Moisture (%)	Qu, tsf	SPT - N Blows/ft.
	0						
		4" Asphalt and 8" Gravel 712.5 (1.0)					
		Very stiff to soft mixed brown & black gray CLAY FILL	1	SS	20.0		18 20 20 N=40
	5		2	SS	11.0	2.1 B	3 4 6 N=10
			3	SS	15.0	3.0 B	3 6 6 N=12
			4	SS	14.0	2.0 B	4 5 4 N=9
	10		5	SS	15.0	2.8 B	4 8 8 N=16
			6	SS	19.0	1.5 B	5 5 5 N=10
	15		7	SS	16.0	1.6 B	3 4 4 N=8
			8	SS	17.0	1.0 B	3 4 3 N=7
	20		9	SS	24.0	0.5 B	2 3 3 N=6
		23.0 690.5					
		Stiff to very stiff gray, SILTY CLAY with occasional silt seams	10	SS	18.0	1.5 B	4 4 4 N=8
	25						

☆ Water Contant %
▫ Qu, tsf
● SPT (Blows/Foot)

0 25 50 75 100

FOUNDATION ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING
BOX 3607 RFD LONG GROVE, ILLINOIS 60047
Tel. (708) 882-2450
LABORATORY AT 650 MORSE AVE. SCHAUMBURG
ILLINOIS 60193

LOCATION: SEC 35 T42 N, R10 E | OWNER: Illinois Department of Transportation | FEI JOB No. 6960 | BORING No. B-1 | SHEET No. 2 of 4

PROJECT: Scour Study For Bridge S.N. 016-1123 | CITY,STATE: , Illinois

SITE: IL-53 E. Frontage Rd., over Salt Creek | COUNTY: Cook

Water Level Observations (ft): ▽ ▼ ▼

STA: 325+79.04 OFFSET (ft): 13 LT

Surface Elevation 713.5

STARTING DATE: 2/9/96 ENDING DATE: 2/9/96

DRILL CO. FEI DRILL RIG: D-50

DRILLER: BP ASS'T DRILLER: NK

ENG/GEOL. CHC APPROVED: CHC

Boring Defin.	Depth (Feet)	Lith-ology	Number	Type	Moisture (%)	Qu, tsf	SPT - N Blows/ft.
	30	Stiff to very stiff gray, SILTY CLAY with occasional silt seams at 26.0 to 27.5 feet LL= 23.2 PL= 14.5 PI= 8.7 A-4 (8)	11	SS	16.0	1.8 B	4 4 4 N=8
			12	SS	16.0	1.7 B	5 5 7 N=12
			13	SS	20.0	3.5 B	6 7 11 N=18
	35		14	SS	18.0	3.1 B	6 9 12 N=21
			15	SS	20.0	2.3 B	5 7 9 N=16
	40		16	SS	21.0	2.5 B	6 8 10 N=18
			17	SS	23.0	2.1 B	6 7 11 N=18
	45		18	SS	22.0	2.3 B	6 7 8 N=15
			19	SS	22.0	2.2 B	6 8 10 N=18
	50		20	SS	22.0	2.3 B	8 8 12 N=20

☆ Water Contant %
▫ Qu, tsf
● SPT (Blows/Foot)

0 25 50 75 100

FILE PATH = P:\1603-668.IDOT PTB 177 Item 4 (Various-various) with AES\WDP6 IL 53 at Salt Cr\Sheet Files\Structural\S-5 Boring Log (Sheet 1 of 2).dgn

HBM ENGINEERING GROUP, LLC

S-5 Boring Log (Sheet 1 of 2).dgn	DESIGNED - KJD	REVISED -	
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PLOT DATE = 2/16/2017	DATE - 02/01/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING LOG (SHEET 1 OF 2)
IL 53 OVER SALT CREEK (SN 016-0377)
SHEET S-5 OF 6 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2016-055I	COOK	21	16
		CONTRACT NO. 62D37		
	ILLINOIS FED. AID PROJECT			

FOUNDATION ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING

BOX 3607 RFD LONG GROVE, ILLINOIS 60047
Tel. (708) 882-2450
LABORATORY AT 650 MORSE AVE. SCHAUMBURG
ILLINOIS 60193

LOCATION: SEC 35 T42 N, R10 E | OWNER: Illinois Department of Transportation | FEI JOB No. 6960
PROJECT: Scour Study For Bridge S.N. 016-1123 | CITY,STATE: , Illinois | BORING No. B-1
SITE: IL-53 E. Frontage Rd., over Salt Creek | COUNTY: Cook | SHEET No. 3 of 4

Water Level Observations (ft): ▽ ▼ ▼

STA: 325+79.04 OFFSET (ft): 13 LT
Surface Elevation 713.5

STARTING DATE: 2/9/96 ENDING DATE: 2/9/96
DRILL CO. FEI DRILL RIG: D-50
DRILLER: BP ASS'T DRILLER: NK
ENG/GEOL. CHC APPROVED: CHC

Boring Defin.	Depth (Feet)	Lithology	Number	Type	Moisture (%)	Qu, tsf	SPT - N Blows/ft.
		Stiff to very stiff gray, SILTY CLAY with occasional silt seams	21	SS	26.0	2.3 B	5 5 10 N=15
	55		22	SS	22.0	2.0 B	5 6 8 N=14
			23	SS	22.0	4.1 S	10 12 16 N=28
	60		24	SS	22.0	2.3 S	5 7 9 N=16
		62.0 651.5					
		Hard to very hard gray SILTY LOAM, tr. gravel, silt seams	25	SS	11.0	4.4 S	11 13 21 N=34
	65						
			26	SS	12.0	9.5 S	16 25 36 N=61
	70						
		72.0 641.5					
		Hard gray SILTY CLAY LOAM, tr. gravel	27	SS	15.0	5.5 S	15 18 46 N=
	75						

☆ Water Contant %
▫ Qu, tsf
● SPT (Blows/Foot)

0 25 50 75 100

FILE PATH = P:\1603-668-IDOT PTB 177 Item 4 (Various-various) with AES\WO#6 IL 53 at Salt Cr\Sheet Files\Structural\S-6 Boring Log (Sheet 2 of 2).dgn

HBM ENGINEERING GROUP, LLC

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PLOT DATE = 2/16/2017	DATE - 02/01/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING LOG (SHEET 2 OF 2)
IL 53 OVER SALT CREEK (SN 016-0377)
SHEET S-6 OF 6 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2016-055I	COOK	21	17
		CONTRACT NO. 62D37		
	ILLINOIS	FED. AID PROJECT		

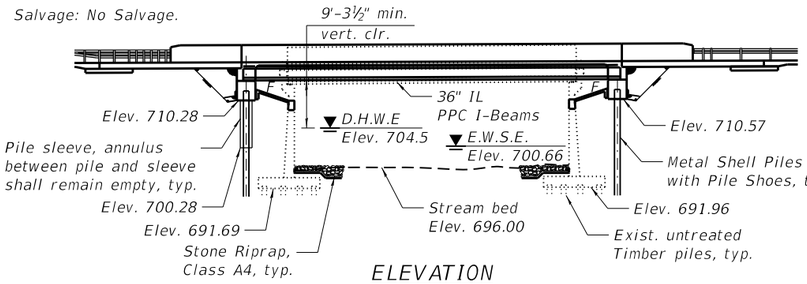
APPENDIX C General Plan and Elevation (HBM, 2024)

Benchmark: TBM 37 cut cross on the southeast corner of the westerly concrete foundation of an overhead sign that is approximately 380 feet north of salt creek and over the southbound lanes. elevation 718.951

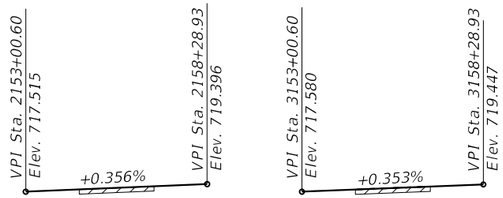
Existing Structure: The structure carrying IL–53 (SN 016–0377) over Salt Creek was originally built in 1962 as Relocated SBI Route 53 (F.A. Route 61) under Project U–184(26), Section 531–I–B–7. In 1990, as part of Contract 80797, the asphalt overlay was removed, the top of the deck was scarified ½", and 2½"Microsilicia Concrete was overlaid. In 2010, as part of Contract 60138, the deck had some partial and full depth concrete repairs, the abutments had several epoxy crack injections, and partial depth concrete repairs. The expansion joints at the abutments were removed and Silicon Joint Sealers were installed. Eighteen floor drain extensions were added to existing floor drains to extend the drains below the bottom web of the beams. Superstructure has an overall length of 63'–3" back to back of abutments and a width of 210'–0" out to out of deck. The northeast retaining wall has a length of 36'–7", the northwest retainng wall has a length of 37'–9½", the southeast retaining wall has a length of 37'–10", and the southwest retaining wall has a length of 28'–3¼". The southeast retaining wall between the mainline bridge and East Frontage Road bridge was leaning for several years, finally failing in 2017. The stem of the wall was replaced with a modified section in 2017 under contract 62D37, Section 2016–0551. The contractor will remove the deck, superstructure and partial height of existing abutment, leaving the rest of the abutment stem in–place, construct new bridge and remove and reconstruct the stems of the northeast, northwest, and southwest retaining walls.

Traffic Control: Traffic is to be maintained utilizing Stage Construction.

Salvage: No Salvage.



ELEVATION
(Looking West)



IL–53 NB PROFILE GRADE

IL–53 SB PROFILE GRADE

(The Profile Grade shows the final grade after grinding)

LEGEND

- Exist. Storm Sewer
- Prop. Storm Sewer
- Exist. Fence
- Wetland
- Exist. Guardrails
- Prop. Guardrails
- Prop. Lighting Conduit
- Exist. Gaslines
- Temporary Soil Retention System
- Prop. Light Pole
- Junction Box

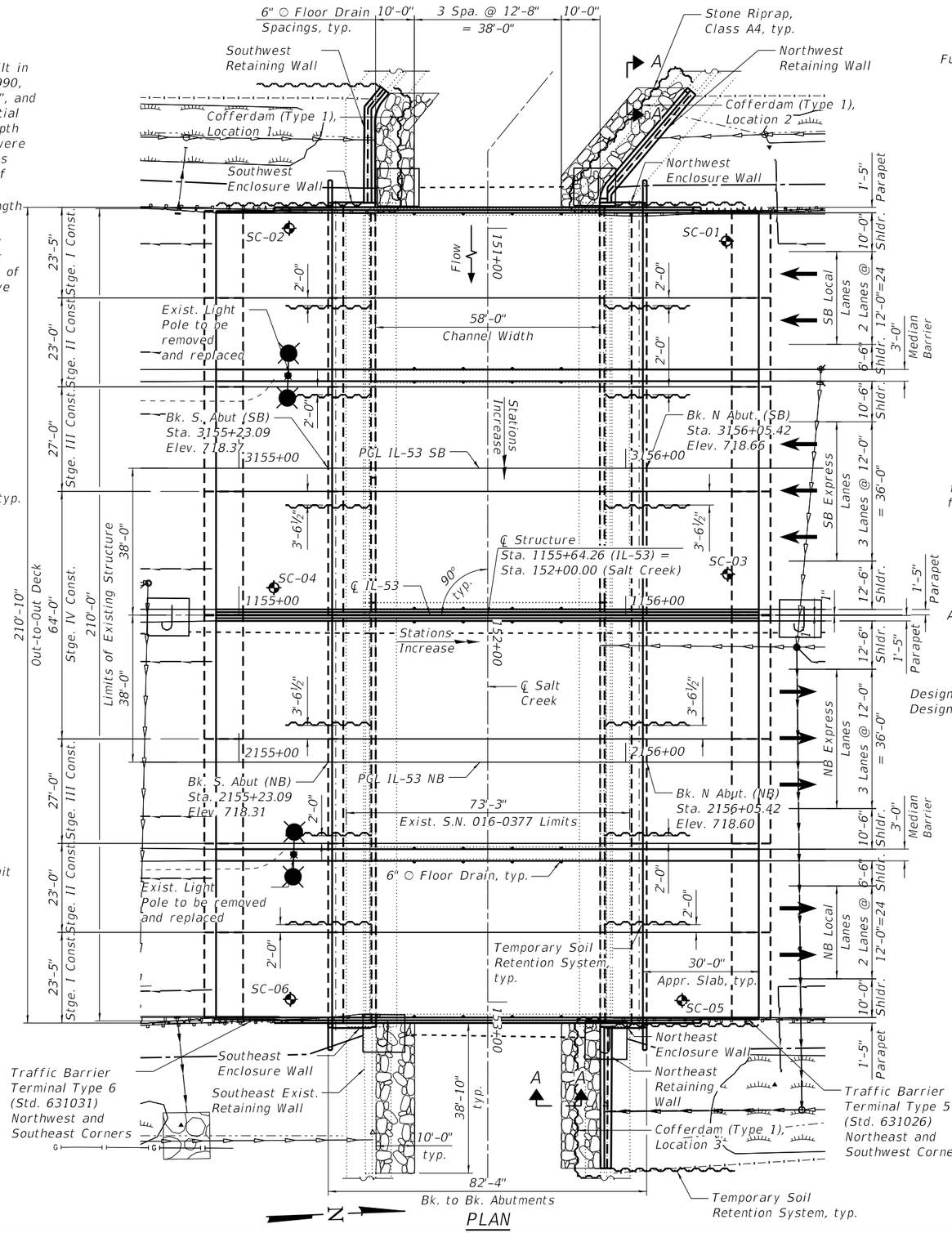
DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.) N. Abut.	S. Abut.	Item 113
Q100	691.60	691.60	5
Q200	690.60	690.60	
Design	691.60	691.60	
Check	690.60	690.60	

WATERWAY INFORMATION

Drainage Area = 17.0 square miles
Existing Overtopping Elev. = 717.9 at Sta. 1155+44.91
Proposed Overtopping Elev. = 717.9 at Sta. 1155+44.91

Flood Event	Freq. Yr.	Discharge C.F.S.	Opening Sq. Ft. Exist.	Prop.	Nat. H.W.E.	Head – Ft. Exist.	Prop.	Headwater El. – Ft. Exist.	Prop.
Ten–Year	10	577	385	385	703.3	0.3	0.3	703.6	703.6
Design	50	947	454	454	704.5	0.3	0.3	704.8	704.8
Base	100	1129	485	485	705.0	0.2	0.2	705.2	705.2
Scour Check	200	1308	509	509	705.4	0.2	0.2	705.6	705.6
Max. Calc.	500	1547	541	541	706.0	0.2	0.2	706.2	706.2



PLAN

HIGHWAY CLASSIFICATION

F.A.P. Rte. 342 (IL–53)
Functional Class: Freeway and Expressway
ADT: 123,500 (2022); 114,061 (2046)
ADTT: 13,585 (2022); 12,547 (2046)
DHV: 6,985 (2016)
Design Speed: 60 mph
Posted Speed: 55 mph
Two–Way Traffic
Directional Distribution (SB:NB): 51:49

DESIGN SPECIFICATIONS

BRIDGE
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition
RETAINING WALLS
AASHTO Standard Specifications for Highway Bridges, 17th Edition, 2002

DESIGN STRESSES

FIELD UNITS

f'c = 4,000 psi (Superstructure)
f'c = 3,500 psi (Substructure)
fy = 60,000 psi (Reinforcement)

PRECAST PRESTRESSED UNITS

f'c = 8,500 psi
f'ci = 6,500 psi
fpu = 270,000 psi (0.6"○ low lax strands)
fpbt = 202,300 psi (0.6"○ low lax strands)

FIELD UNITS (EXISTING CONSTRUCTION)

f'c = 1,400 psi (Substructure)
fy = 20,000 psi (Reinforcement)

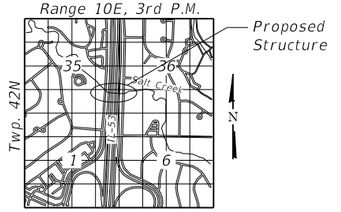
LOADING HL–93

Allow 50#/sq. ft. for future wearing surface.

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.083g
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.144g
Soil Site Class = D

Note:
Up to ¼" to be ground off the bridge deck and bridge approach slabs.



LOCATION SKETCH

GENERAL PLAN AND ELEVATION
F.A.P. RTE. 342 (IL–53)
OVER SALT CREEK
SECTION 2018–100–BR
COOK COUNTY
STA. 1155+64.35
STRUCTURE NO. 016–1195

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	CHECKED - MI	REVISED -	
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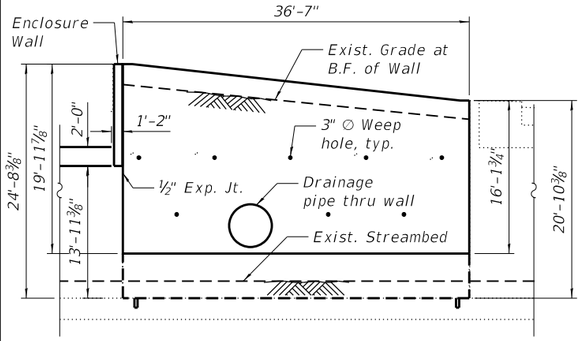
PLOT DATE =	CHECKED - MI	REVISED -	

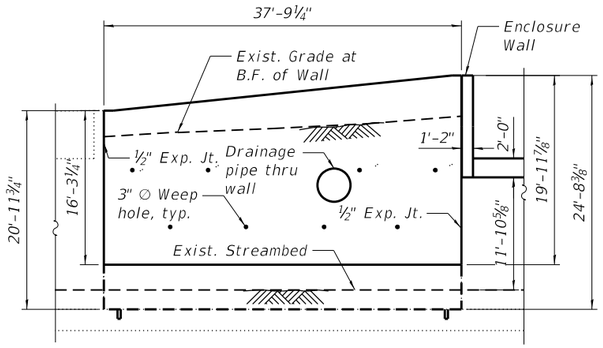
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1195
SHEET 1 OF 5 SHEETS

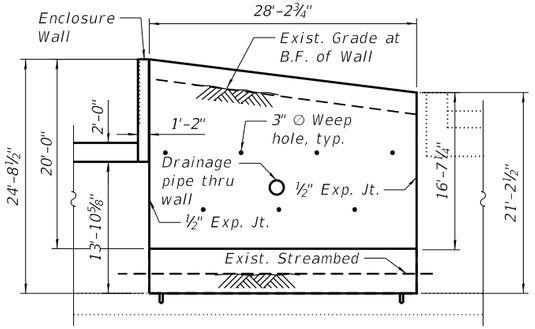
F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2018-100-BR	COOK	5	1
		CONTRACT NO. 62N91		
	ILLINOIS FED. AID PROJECT			



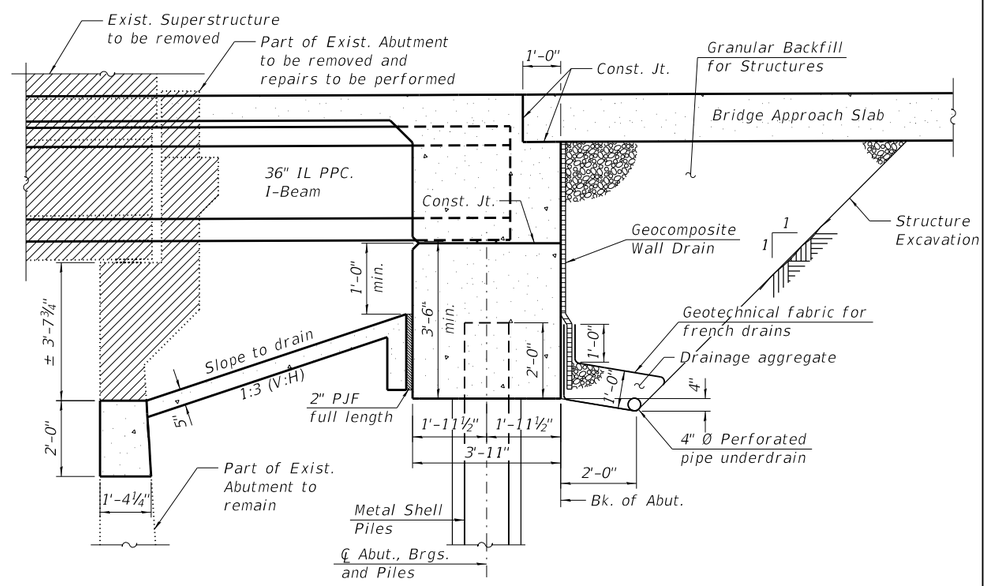
ELEVATION – NORTH-EAST RETAINING WALL



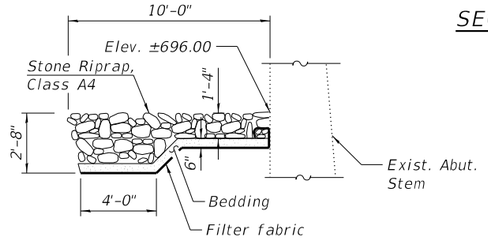
ELEVATION – NORTH-WEST RETAINING WALL



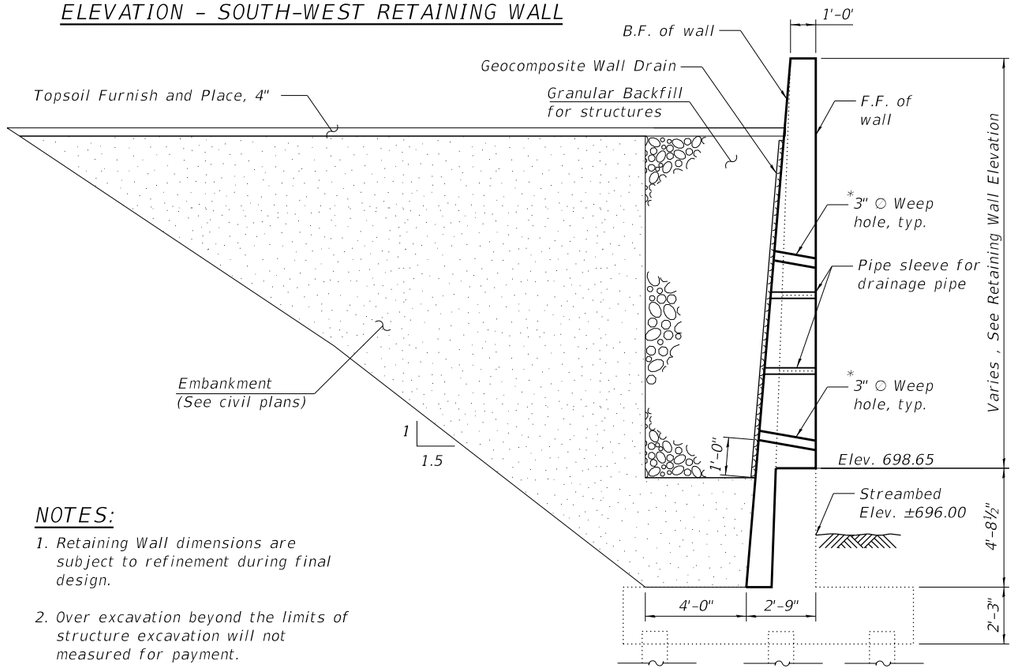
ELEVATION – SOUTH-WEST RETAINING WALL



SECTION THRU INTEGRAL ABUTMENT



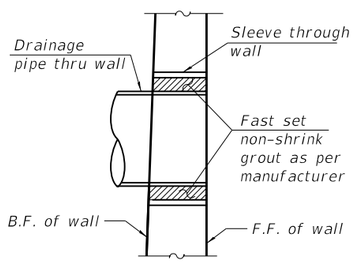
SECTION A-A



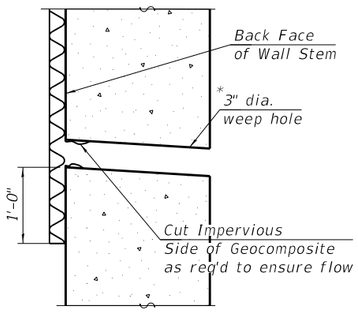
SECTION THRU RETAINING WALLS

NOTES:

1. Retaining Wall dimensions are subject to refinement during final design.
2. Over excavation beyond the limits of structure excavation will not measured for payment.

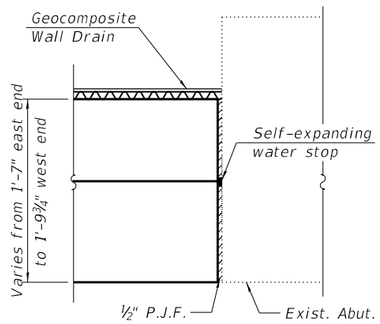


SLEEVE THRU WALL DETAIL



WEEP HOLE DRAIN DETAIL

*Weep hole spacing shall be at ℄ 8'-0" horizontally.



EXPANSION JOIT DETAIL

ELEVATIONS, SECTIONS AND DETAILS
F.A.P. RTE. 342 (IL-53)
OVER SALT CREEK
SECTION 2018-100-BR
COOK COUNTY
STA. 1155+64.35
STRUCTURE NO. 016-1195

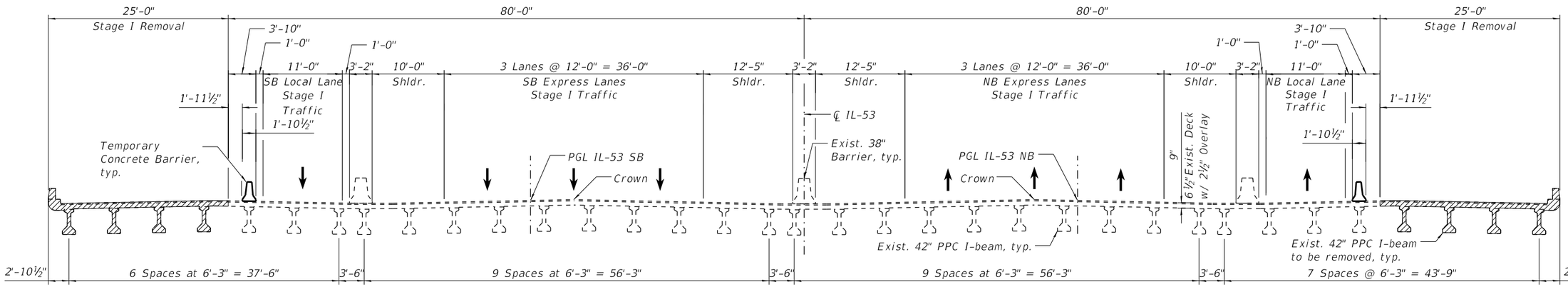
HBM ENGINEERING GROUP, LLC

USER NAME =		DESIGNED - PG	REVISED -	
		CHECKED - MI	REVISED -	
PLOT SCALE =		DRAWN - PG	REVISED -	
PLOT DATE =		CHECKED - MI	REVISED -	

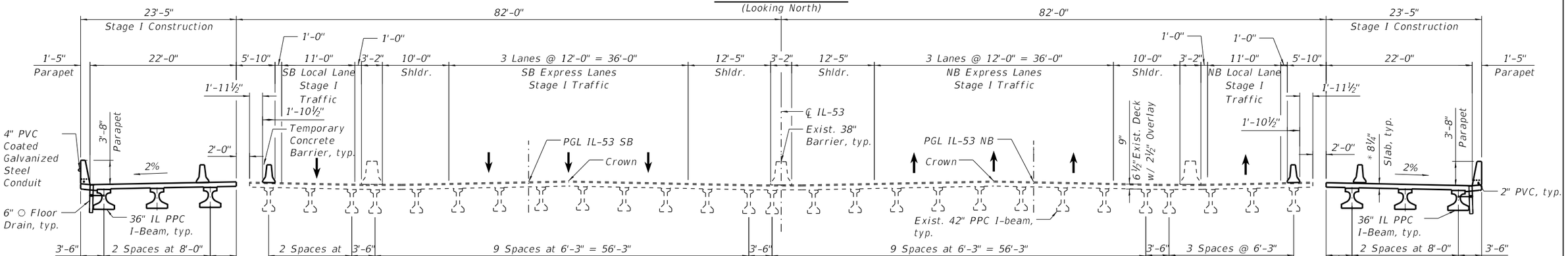
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1195
SHEET 2 OF 5 SHEETS

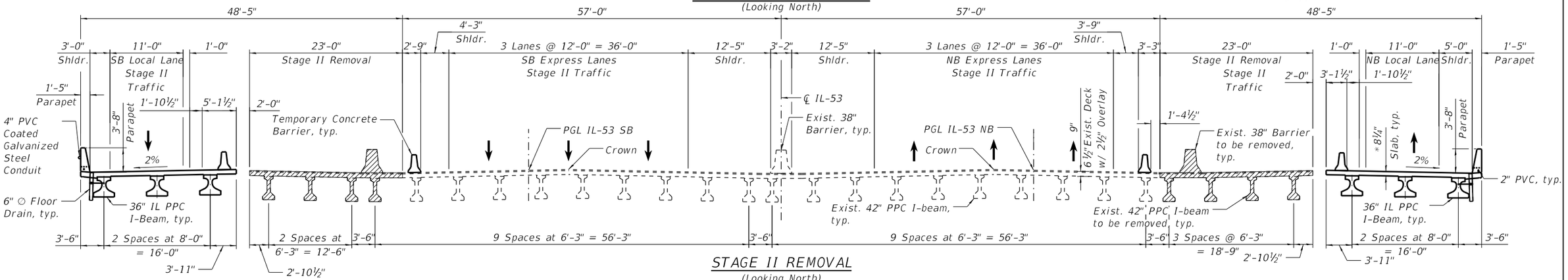
F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2018-100-BR	COOK	5	2
		CONTRACT NO. 62N91		
	ILLINOIS	FED. AID PROJECT		



STAGE I REMOVAL
(Looking North)



STAGE I CONSTRUCTION
(Looking North)



STAGE II REMOVAL
(Looking North)

Note:
Up to ¼" to be ground off the bridge deck and bridge approach slabs.

* Prior to Grinding

LEGEND

Removal of Existing Deck/Superstructure

STAGE CONSTRUCTION (SHEET 1 OF 3)
F.A.P. RTE. 342 (IL-53)
OVER SALT CREEK
SECTION 2018-100-BR
COOK COUNTY
STA. 1155+64.35
STRUCTURE NO. 016-1195

HBM ENGINEERING GROUP, LLC	USER NAME =	DESIGNED - KJD	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
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	PLOT SCALE =	DRAWN - KJD, PG	REVISED -	
	PLOT DATE =	CHECKED - MI	REVISED -	

STRUCTURE NO. 016-1195

SHEET 3 OF 5 SHEETS

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2018-100-BR	COOK	5	3
		CONTRACT NO. 62N91		
		ILLINOIS	FED. AID PROJECT	

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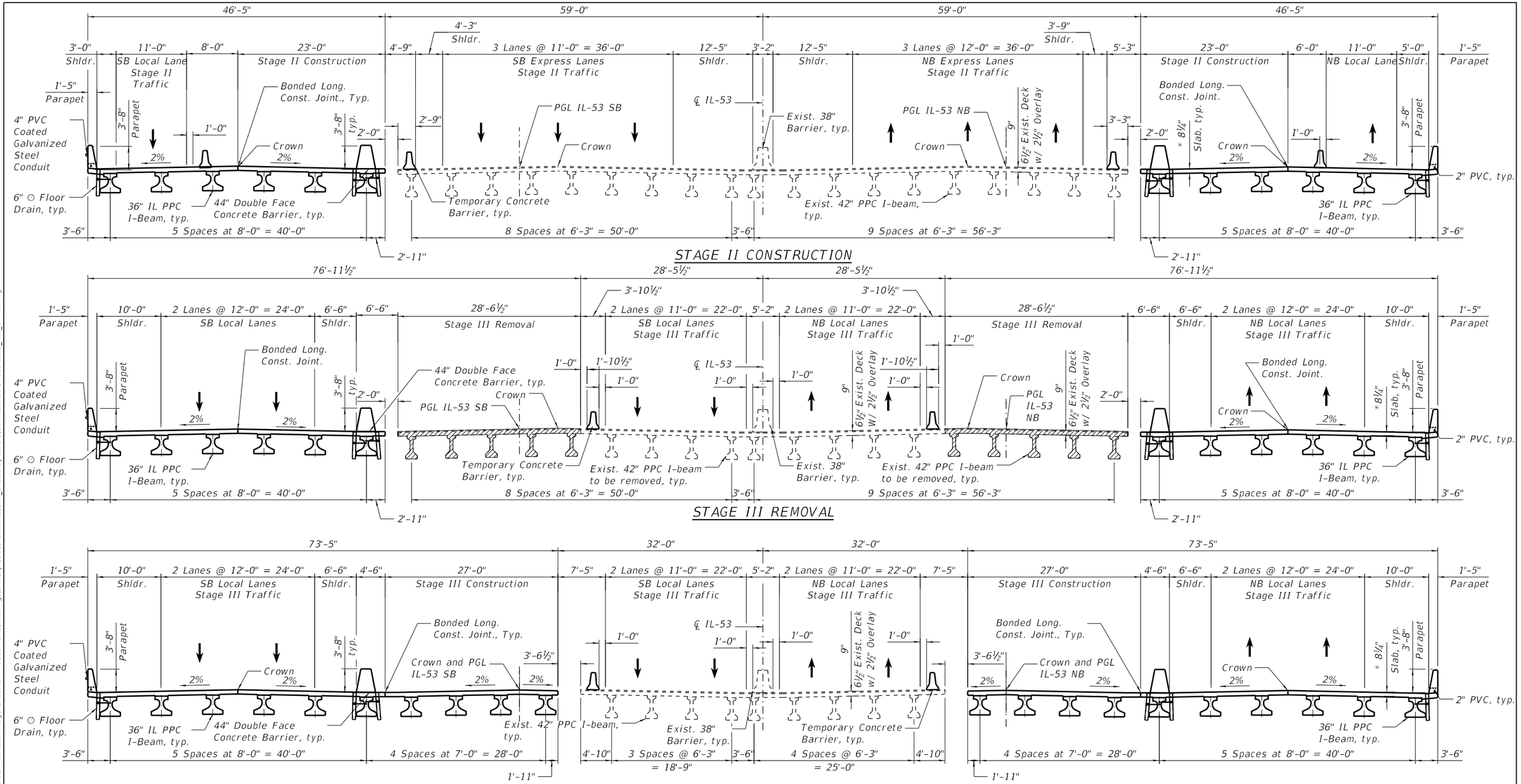

STAGE II CONSTRUCTION

STAGE III REMOVAL

STAGE III CONSTRUCTION

Note:
Up to ¼" to be ground off the bridge deck and bridge approach slabs.

* Prior to Grinding

LEGEND

Removal of Existing Deck/Superstructure

STAGE CONSTRUCTION (SHEET 2 OF 3)
F.A.P. RTE. 342 (IL-53)
OVER SALT CREEK
SECTION 2018-100-BR
COOK COUNTY
STA. 1155+64.35
STRUCTURE NO. 016-1195

HBM ENGINEERING GROUP, LLC	USER NAME =	DESIGNED - KJD	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
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	PLOT DATE =	CHECKED - MI	REVISED -	

STRUCTURE NO. 016-1195
SHEET 4 OF 5 SHEETS

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2018-100-BR	COOK	5	4
			CONTRACT NO. 62N91	
		ILLINOIS	FED. AID PROJECT	

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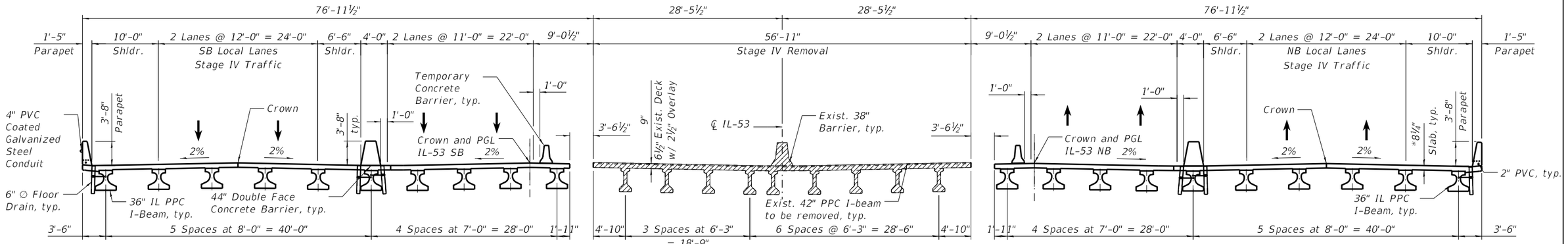
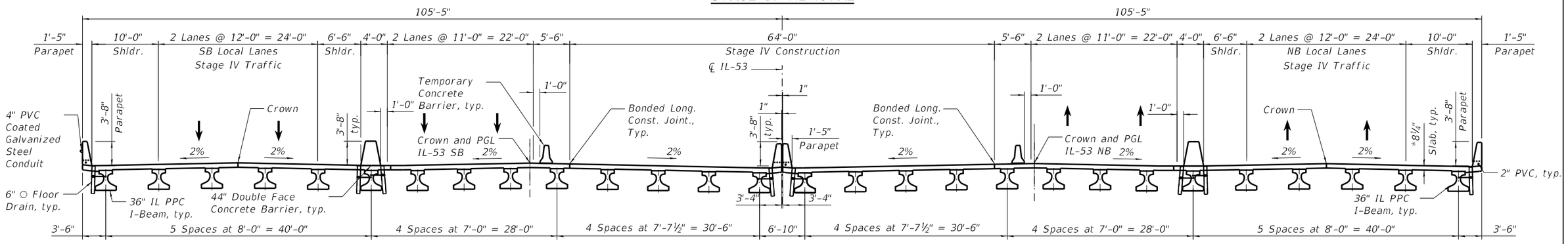
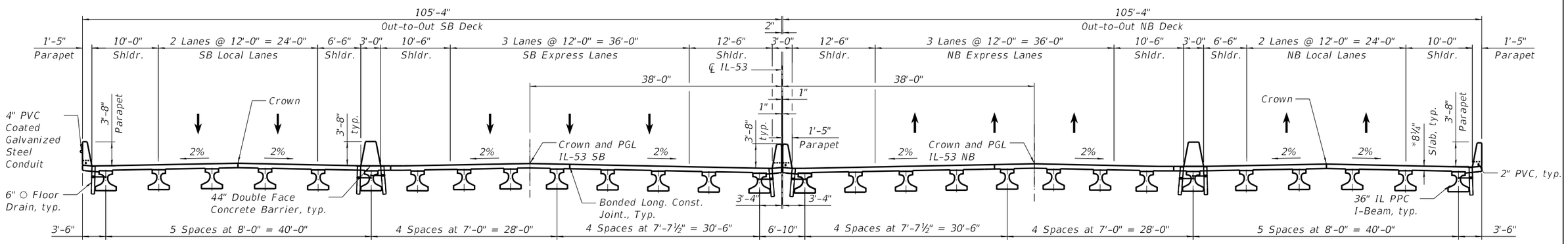


STAGE IV REMOVAL



STAGE IV CONSTRUCTION



FINAL CROSS SECTION

Note:
Up to ¼" to be ground off the bridge deck and bridge approach slabs.

* Prior to Grinding

LEGEND

Removal of Existing Deck/Superstructure

STAGE CONSTRUCTION (SHEET 3 OF 3)
F.A.P. RTE. 342 (IL-53)
OVER SALK CREEK
SECTION 2018-100-BR
COOK COUNTY
STA. 1155+64.35
STRUCTURE NO. 016-1195

HBM ENGINEERING GROUP, LLC	USER NAME =	DESIGNED - KJD	REVISED -
		CHECKED - MI	REVISED -
	PLOT SCALE =	DRAWN - KJD, PG	REVISED -
	PLOT DATE =	CHECKED - MI	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1195

SHEET 5 OF 5 SHEETS

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	2018-100-BR	COOK	5	5
			CONTRACT NO. 62N91	
		ILLINOIS	FED. AID PROJECT	

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APPENDIX D Boring Location Map

LEGEND KEY:

APPROXIMATE BORING LOCATION

gonzalez COMPANIES, LLC

ILLINOIS DEPARTMENT OF TRANSPORTATION
IL 53 BRIDGES, 62N91, PTB 203-021
COOK COUNTY, IL

PROJECT NO.
23-1003

IL 53 OVER SALT CREEK
RETAINING WALL
BORING LOCATION MAP

APPENDIX D

APPENDIX E Subsurface Data Profile Plot

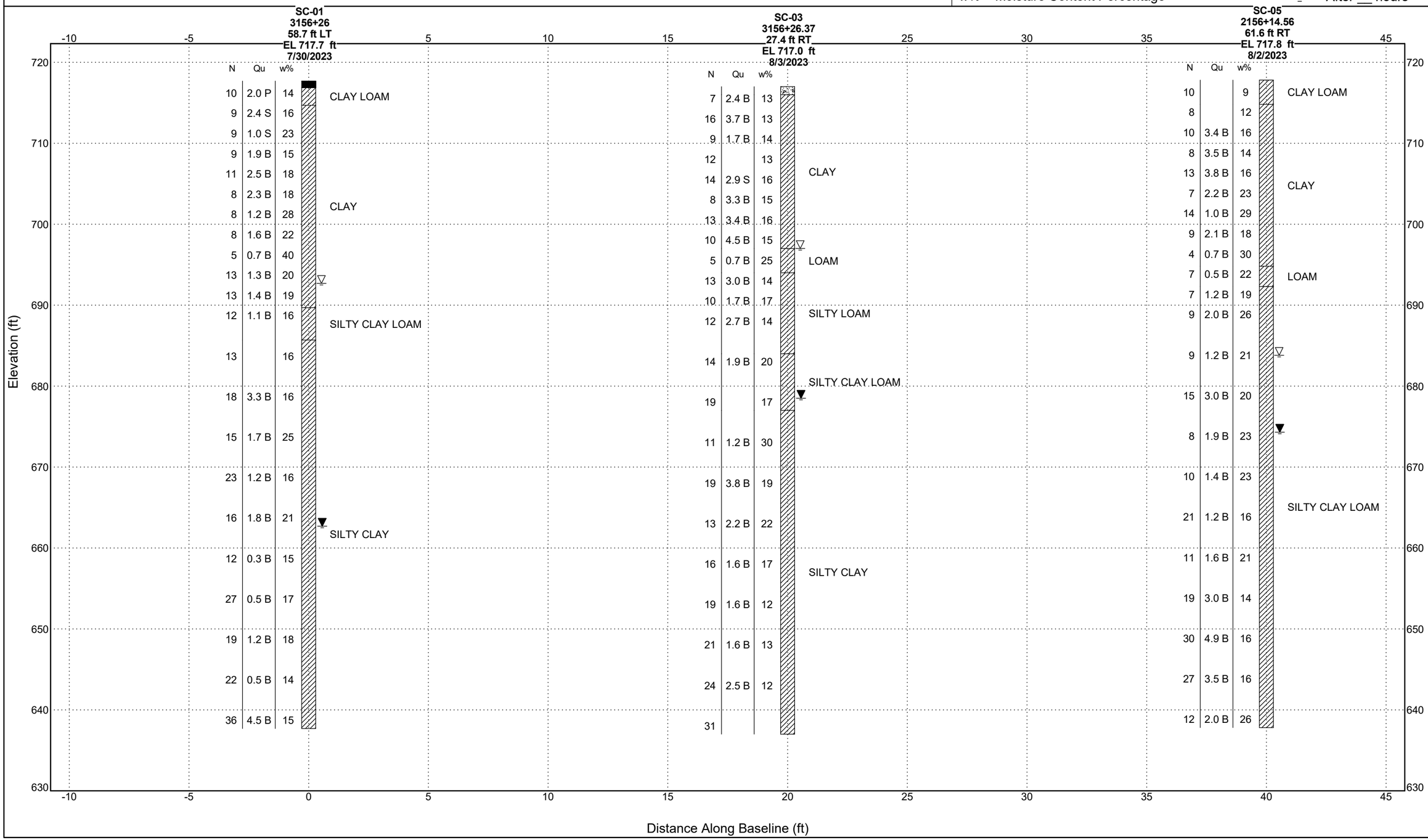
gonzalez COMPANIES, LLC

ROUTE FAP 342
SECTION 2018-100-BR
COUNTY Cook
PROJECT LOCATION IL 53 from IL 62 (Algonquin Rd) to US 12 (Rand Rd)

SUBSURFACE PROFILE
IL 53 OVER SALT CREEK
NORTH ABUTMENT
APPENDIX E.1

LEGEND
EL = Elevation (ft)
D = Depth Below Existing Ground Surface (ft)
N = SPT N-Value (AASHTO T206)
Qu = Unconfined compressive Strength (tsf)
Failure Mode (B= Bulge, S= shear, P= penetrometer)
w% = Moisture Content Percentage

WATER TABLE LEGEND
▼ = First Encountered
▽ = Upon Completion
▼ = After __ hours



ROADWAY PROFILE - BETA 23-1003 IL 53 CHICAGO.GPJ GINT STD US.GDT 08/23/23

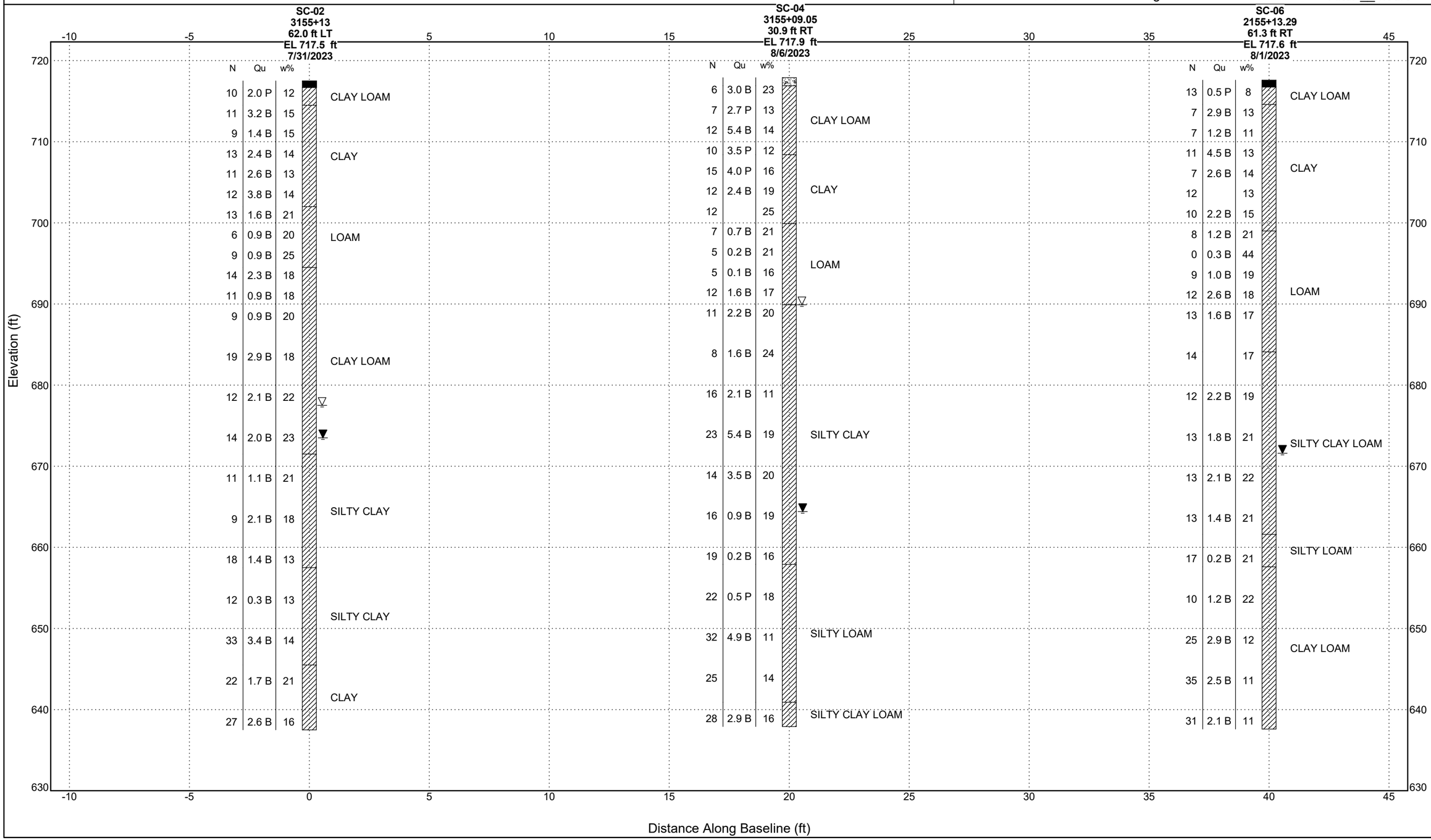
gonzalez COMPANIES, LLC

ROUTE FAP 342
SECTION 2018-100-BR
COUNTY Cook
PROJECT LOCATION IL 53 from IL 62 (Algonquin Rd) to US 12 (Rand Rd)

SUBSURFACE PROFILE
IL 53 OVER SALT CREEK
SOUTH ABUTMENT
APPENDIX E.2

LEGEND
EL = Elevation (ft)
D = Depth Below Existing Ground Surface (ft)
N = SPT N-Value (AASHTO T206)
Qu = Unconfined compressive Strength (tsf)
Failure Mode (B= Bulge, S= shear, P= penetrometer)
w% = Moisture Content Percentage

WATER TABLE LEGEND
▼ = First Encountered
▽ = Upon Completion
▼ = After __ hours



ROADWAY PROFILE - BETA 23-1003 IL 53 CHICAGO.GPJ GINT STD US.GDT 08/23/23

APPENDIX F Soil Boring Logs

SOIL BORING LOG

Date 07/30/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0689359, **Longitude** -88.0280945

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-01
Station 3156+26
Offset 58.7 ft LT
Ground Surface Elev. 717.7 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 662.7 ft ▼
Upon Completion 692.7 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Asphalt - 10"
				716.9
	6			Stiff, Brown, Dry, CLAY LOAM
	6 4	2.0 P	14	
				714.7
	3			Stiff, Brown, Moist to Wet, CLAY
-5	4 5	2.4 S	16	
	3			
	3 6	1.0 S	23	
	3			
-10	4 5	1.9 B	15	
	4			A-6(9)
	5 6	2.5 B	18	LL=33, PL=18, PI=15
	3			6%Gravel, 21%Sand,
-15	4 4	2.3 B	18	43%Silt, 30%Clay
	3			
	4 4	1.2 B	28	
	3			
-20	4 4	1.6 B	22	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Stiff, Brown, Moist to Wet, CLAY *(continued)*
	0			
	2 3	0.7 B	40	
	4			
▽ -25	5 8	1.3 B	20	
	4			
	5 8	1.4 B	19	
				689.7
	4			Stiff, Brown, Wet, SILTY CLAY LOAM
-30	4 8	1.1 B	16	
				685.7
	6			Stiff to Very Stiff, Brown, Wet, SILTY CLAY
-35	6 7		16	
	4			
-40	7 11	3.3 B	16	

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

SOIL BORING LOG

Date 07/30/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0689359, **Longitude** -88.0280945

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-01
Station 3156+26
Offset 58.7 ft LT
Ground Surface Elev. 717.7 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 662.7 ft
Upon Completion 692.7 ft
After Hrs. Filled ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff to Very Stiff, Brown, Wet, SILTY CLAY *(continued)*				
		6		
	-45	7 8	1.7 B	25
		6		
	-50	10 13	1.2 B	16
		4		
	▼-55	6 10	1.8 B	21
		4		
	-60	5 7	0.3 B	15
Stiff to Very Stiff, Brown, Wet, SILTY CLAY *(continued)*				
		6		
	-65	12 15	0.5 B	17
		5		
	-70	9 10	1.2 B	18
		9		
	-75	14 8	0.5 B	14
		9		
637.7	-80	18 18	4.5 B	15

Boring terminated at 80 feet.

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

SOIL BORING LOG

Date 07/31/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0686273, **Longitude** -88.028125

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-02
Station 3155+13
Offset 62.0 ft LT
Ground Surface Elev. 717.5 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 673.5 ft ▼
Upon Completion 677.5 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Asphalt - 10"
				716.7
	12			Stiff, Brown, Dry, CLAY LOAM, Some Gravel
	5 5	2.0 P	12	
				714.5
	3			Stiff, Brown, Dry, CLAY
-5	4 7	3.2 B	15	
	4			
	4 5	1.4 B	15	
	2			
-10	6 7	2.4 B	14	
	4			
	5 6	2.6 B	13	
	4			
-15	5 7	3.8 B	14	
				702.0
	4			Medium Stiff to Stiff, Dark Brown, Moist, LOAM
	6 7	1.6 B	21	
	0			
-20	3 3	0.9 B	20	
	0			Medium Stiff to Stiff, Dark Brown, Moist, LOAM *(continued)*
	3 6	0.9 B	25	
				694.5
	5			Medium Stiff to Stiff, Brown, Moist to Wet, CLAY LOAM
-25	7 7	2.3 B	18	
	4			
	5 6	0.9 B	18	
	3			Silt Seam
-30	3 6	0.9 B	20	
	4			
-35	8 11	2.9 B	18	
	4			
▽ -40	5 7	2.1 B	22	

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

SOIL BORING LOG

Date 07/31/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**, **Latitude** 42.0686273, **Longitude** -88.028125

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-02
Station 3155+13
Offset 62.0 ft LT
Ground Surface Elev. 717.5 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 673.5 ft ▼
Upon Completion 677.5 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Stiff to Stiff, Brown, Moist to Wet, CLAY LOAM *(continued)*			
▼	4		
-45	6 8	2.0 B	23
671.5			
Stiff, Brown, Wet, SILTY CLAY, A-4(7) LL=26, PL=16, PI=10 3%Gravel, 8%Sand, 59%Silt, 30%Clay			
	4		
-50	4 7	1.1 B	21
	3		
-55	4 5	2.1 B	18
	5		
657.5 -60	8 10	1.4 B	13
Stiff to Very Stiff, Dark Brown, Wet, SILTY CLAY, Some Gravel			
	4		
-65	6 6	0.3 B	13
	10		
-70	15 18	3.4 B	14
645.5			
Very Stiff, Brown, Wet, CLAY			
	4		
-75	6 16	1.7 B	21
	6		
637.5 -80	11 16	2.6 B	16

Boring terminated at 80 feet.

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

SOIL BORING LOG

Date 08/03/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0689268, **Longitude** -88.0277776

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-03
Station 3156+26.37
Offset 27.4 ft RT
Ground Surface Elev. 717.0 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 678.5 ft ▼
Upon Completion 697.0 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Concrete - 12"
				716.0
				Stiff, Brown, Dry, CLAY
	3			
	3 4	2.4 B	13	
	5			
-5	9 7	3.7 B	13	
	4			
	4 5	1.7 B	14	
	4			
-10	5 7		13	
	5			
	6 8	2.9 S	16	
	3			
-15	4 4	3.3 B	15	
	5			
	6 7	3.4 B	16	
	8			
697.0 ▽ -20	5 5	4.5 B	15	
				Medium Stiff, Brown, Moist, LOAM
	2			
	2 3	0.7 B	25	
				694.0
				Medium Stiff, Dark Brown, Moist, SILTY LOAM
	3			
-25	6 7	3.0 B	14	
	3			
	5 5	1.7 B	17	
	4			
-30	5 7	2.7 B	14	
				684.0
				SILTY CLAY LOAM, A-4(6) LL=26, PL=18, PI=8 6%Gravel, 6%Sand 62%Silt, 27%Clay
	5			
-35	6 8	1.9 B	20	
▼	6			
677.0 -40	8 11		17	

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

SOIL BORING LOG

Date 08/03/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0689268, **Longitude** -88.0277776

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-03
Station 3156+26.37
Offset 27.4 ft RT
Ground Surface Elev. 717.0 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 678.5 ft ▼
Upon Completion 697.0 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	Stiff, Dark Brown, Wet, SILTY CLAY		
	3		
-45	3 8	1.2 B	30
	5		
-50	8 11	3.8 B	19
	4		
-55	5 8	2.2 B	22
	5		
-60	7 9	1.6 B	17
	Stiff, Dark Brown, Wet, SILTY CLAY *(continued)*		
	6		
-65	8 11	1.6 B	12
	5		
-70	9 12	1.6 B	13
	7		
-75	11 13	2.5 B	12
	7		
637.0 -80	12 19		

Boring terminated at 80 feet.

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

SOIL BORING LOG

Date 08/06/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0686048, **Longitude** -88.0277841

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-04
Station 3155+09.05
Offset 30.9 ft RT
Ground Surface Elev. 717.9 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 664.4 ft ▼
Upon Completion 689.9 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Concrete - 12"			
716.9			
Medium Stiff to Stiff, Brown, Dry, CLAY LOAM	4		
	3 3	3.0 B	23
	4		
	3 4	2.7 P	13
-5	4		
A-6(9) LL=31, PL=17, PI=14 4%Gravel, 19%Sand 49%Silt, 28%Clay	5 7	5.4 B	14
	2		
708.4	4 6	3.5 P	12
Stiff, Dark Brown, Dry, CLAY -10	5		
	8 7	4.0 P	16
	5		
	6 6	2.4 B	19
-15	4		
	5 7		25
699.9			
Medium Stiff, Dark Brown, Moist, LOAM	2		
	3 4	0.7 B	21
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Stiff, Dark Brown, Moist, LOAM *(continued)*			
	0		
Silt Seam	3 2	0.2 B	21
	2		
-25	2 3	0.1 B	16
	4		
	6 6	1.6 B	17
689.9 ▽			
Stiff to Very Stiff, Dark Brown, Moist, SILTY CLAY	4		
	5 6	2.2 B	20
-30			
	2		
	3 5	1.6 B	24
-35			
	4		
	6 10	2.1 B	11
-40			

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

SOIL BORING LOG

Date 08/06/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0686048, **Longitude** -88.0277841

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-04
Station 3155+09.05
Offset 30.9 ft RT
Ground Surface Elev. 717.9 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 664.4 ft ▼
Upon Completion 689.9 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff to Very Stiff, Dark Brown, Moist, SILTY CLAY *(continued)*			
	5		
-45	8 15	5.4 B	19
	3		
-50	5 9	3.5 B	20
▼	5		
-55	8 8	0.9 B	19
	6		
657.9 -60	9 10	0.2 B	16
Very Stiff, Brown, Wet, SILTY LOAM			
	6		
-65	12 10	0.5 P	18
	8		
-70	12 20	4.9 B	11
	12		
-75	14 11		14
640.9			
Very Stiff, Dark Brown, Wet, SILTY CLAY LOAM			
	6		
637.9 -80	10 18	2.9 B	16

Boring terminated at 80 feet.

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

SOIL BORING LOG

Date 08/02/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**, **Latitude** 42.068881, **Longitude** -88.027374

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-05
Station 2156+14.56
Offset 61.6 ft RT
Ground Surface Elev. 717.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 674.3 ft ▼
Upon Completion 683.8 ft ▽
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Dry, CLAY LOAM			
	7		
	5 5		9
714.8			
Medium Stiff to Stiff, Brown, Dry to Moist, CLAY			
	4		
-5	4 4		12
	4		
	4 6	3.4 B	16
	3		
-10	4 4	3.5 B	14
	3		
	6 7	3.8 B	16
	2		
-15	3 4	2.2 B	23
	3		
	6 8	1.0 B	29
	4		
-20	4 5	2.1 B	18
Medium Stiff to Stiff, Brown, Dry to Moist, CLAY *(continued)*			
	2		
	2 2	0.7 B	30
694.8			
Medium Stiff, Brown, Moist, LOAM A-4(2) LL=23, PL=16, PI=7 16%Gravel, 17%Sand, 47%Silt, 20%Clay	3		
-25	3 4	0.5 B	22
692.3			
Medium Stiff to Stiff, Brown, Moist to Wet, SILTY CLAY LOAM	2		
	3 4	1.2 B	19
	6		
-30	3 6	2.0 B	26
▽	2		
-35	4 5	1.2 B	21
	3		
	6 9	3.0 B	20

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

SOIL BORING LOG

Date 08/02/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.068881, **Longitude** -88.027374

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-05
Station 2156+14.56
Offset 61.6 ft RT
Ground Surface Elev. 717.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 674.3 ft
Upon Completion 683.8 ft
After Hrs. Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Stiff to Stiff, Brown, Moist to Wet, SILTY CLAY LOAM *(continued)*			
	3		
-45	3 5	1.9 B	23
	3		
-50	4 6	1.4 B	23
	6		
-55	10 11	1.2 B	16
	4		
-60	4 7	1.6 B	21
Medium Stiff to Stiff, Brown, Moist to Wet, SILTY CLAY LOAM *(continued)*			
	5		
-65	9 10	3.0 B	14
	8		
-70	14 16	4.9 B	16
	6		
-75	10 17	3.5 B	16
	4		
637.8 -80	5 7	2.0 B	26

Boring terminated at 80 feet.

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

SOIL BORING LOG

Date 08/01/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**, **Latitude** 42.0686034, **Longitude** -88.0273918

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-06
Station 2155+13.29
Offset 61.3 ft RT
Ground Surface Elev. 717.6 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Asphalt - 10"
716.8				
	7			Stiff, Brown, Dry, CLAY LOAM
	7 6	0.5 P	8	
714.6				
	3			Medium Stiff to Stiff, Brown, Dry, CLAY
-5	4 3	2.9 B	13	
	4			
	2 5	1.2 B	11	
	3			
-10	4 7	4.5 B	13	
	3			
	3 4	2.6 B	14	
	3			
-15	5 7		13	Some Organics
	6			
	5 5	2.2 B	15	
699.0				
	3			Very Soft to Stiff, Dark Brown, Moist, LOAM
-20	3 5	1.2 B	21	
				Very Soft to Stiff, Dark Brown, Moist, LOAM *(continued)*
	0			
	0 0	0.3 B	44	Silt Seam
	3			
-25	4 5	1.0 B	19	
	4			
	4 8	2.6 B	18	
	3			
-30	6 7	1.6 B	17	
684.1				
	4			Stiff, Brown, Moist to Wet, SILTY CLAY LOAM, Some Gravel
-35	6 8		17	
	5			
-40	5 7	2.2 B	19	

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

SOIL BORING LOG

Date 08/01/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over Salt Creek **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** SE 1/4, **SEC.** 35, **TWP.** 42N, **RNG.** 10E, 3rd **PM**,
Latitude 42.0686034, **Longitude** -88.0273918

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0377 (Ex)
Station

BORING NO. SC-06
Station 2155+13.29
Offset 61.3 ft RT
Ground Surface Elev. 717.6 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 671.6 ft
Upon Completion Dry ft
After Hrs. Filled ft

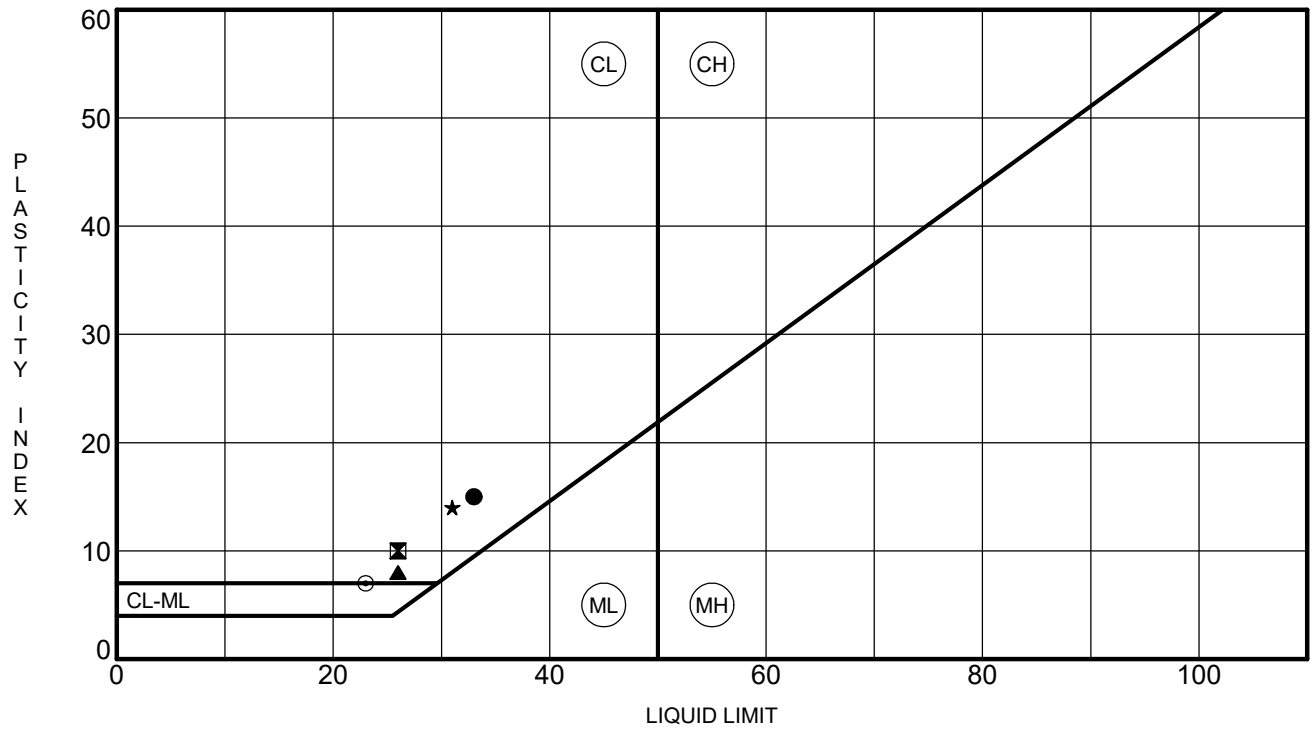
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist to Wet, SILTY CLAY LOAM, Some Gravel *(continued)*			
	3		
-45	5 8	1.8 B	21
	3		
-50	5 8	2.1 B	22
	5		
-55	5 8	1.4 B	21
661.6			
Soft to Stiff, Brown, Wet, SILTY LOAM NP 4%Gravel, 13%Sand 68%Silt, 15%Clay			
	7		
657.6 -60	9 8	0.2 B	21

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Wet, CLAY LOAM			
	4		
-65	5 5	1.2 B	22
	6		
-70	11 14	2.9 B	12
	8		
-75	13 22	2.5 B	11
	8		
637.6 -80	12 19	2.1 B	11

Boring terminated at 80 feet.

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

APPENDIX G Laboratory Test Results



Sample Identification		Depth	LL	PL	PI	Fines	AASHTO and IDH Textural Classification
●	**SC-01**	**11.0**	**33**	**18**	**15**	**73**	**A-6 (9) CLAY**
⊠	**SC-02**	**48.5**	**26**	**16**	**10**	**89**	**A-4 (7) SILTY CLAY**
▲	**SC-03**	**33.5**	**26**	**18**	**8**	**89**	**A-4 (6) SILTY CLAY LOAM**
★	**SC-04**	**6.0**	**31**	**17**	**14**	**78**	**A-6 (9) CLAY LOAM**
⊙	**SC-05**	**23.5**	**23**	**16**	**7**	**66**	**A-4 (2) LOAM**

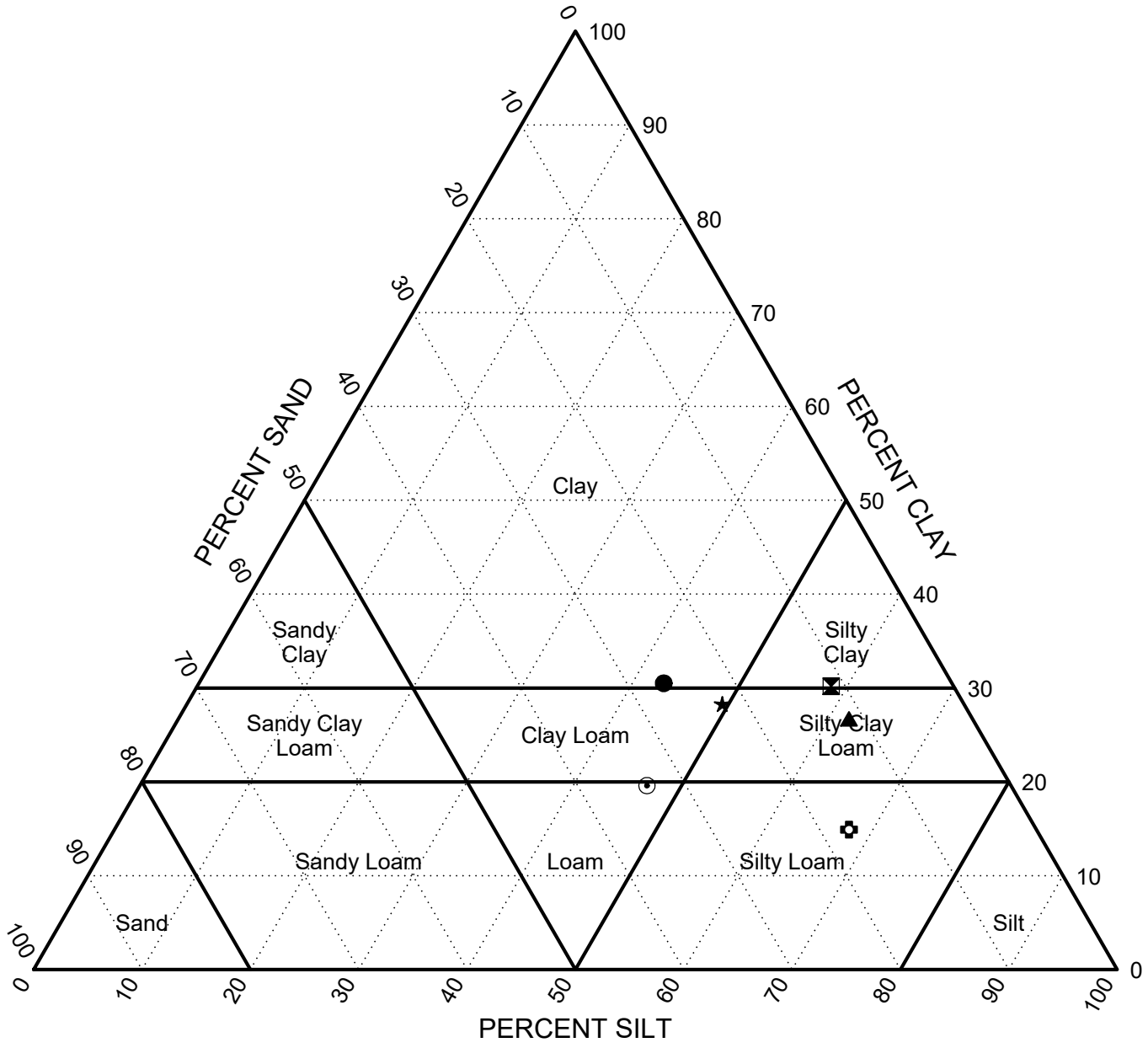
gonzalez COMPANIES, LLC

ATTERBERG LIMITS' RESULTS

Route: FAP 342

Section: 2018-100-BR

County: Cook



	Borehole	Station	Offset	Depth (ft)	IDH Textural Classification
●	**SC-01**			**11.0**	**A-6 (9) CLAY**
⊠	**SC-02**			**48.5**	**A-4 (7) SILTY CLAY**
▲	**SC-03**			**33.5**	**A-4 (6) SILTY CLAY LOAM**
★	**SC-04**			**6.0**	**A-6 (9) CLAY LOAM**
⊙	**SC-05**			**23.5**	**A-4 (2) LOAM**
✿	**SC-06**			**58.5**	**SILTY LOAM**

gonzalez COMPANIES, LLC

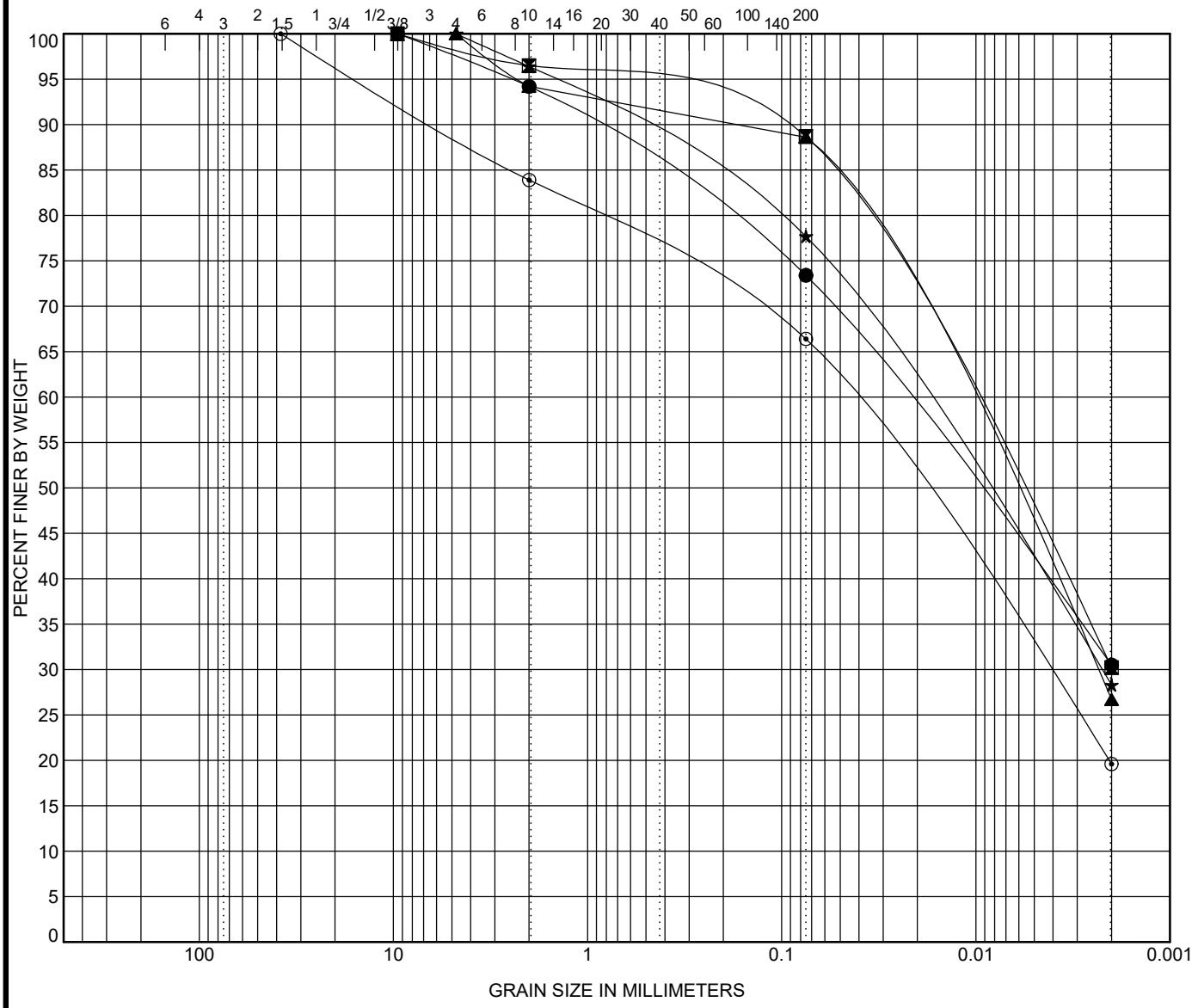
IDH Textural Classification Chart

Route: FAP 342

Section: 2018-100-BR

County: Cook

TEXTURAL CLASSIFICATION 23-1003 IL 53 CHICAGO.GPJ IL_DOT.GDT 08/15/23



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Sample ID		Depth	Classification	LL	PL	PI	Cc	Cu
●	**SC-01**	**11.0**	**A-6 (9) CLAY**	**33**	**18**	**15**		
⊠	**SC-02**	**48.5**	**A-4 (7) SILTY CLAY**	**26**	**16**	**10**		
▲	**SC-03**	**33.5**	**A-4 (6) SILTY CLAY LOAM**	**26**	**18**	**8**		
★	**SC-04**	**6.0**	**A-6 (9) CLAY LOAM**	**31**	**17**	**14**		
⊙	**SC-05**	**23.5**	**A-4 (2) LOAM**	**23**	**16**	**7**		

Sample ID		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SC-01**	**11.0**	**9.53**	**0.024**			**5.8**	**20.8**	**42.9**	**30.5**
⊠	**SC-02**	**48.5**	**9.53**	**0.013**			**3.5**	**7.8**	**58.5**	**30.2**
▲	**SC-03**	**33.5**	**4.75**	**0.014**	**0.002**		**5.8**	**5.6**	**61.9**	**26.7**
★	**SC-04**	**6.0**	**4.75**	**0.02**	**0.002**		**3.6**	**18.7**	**49.4**	**28.3**
⊙	**SC-05**	**23.5**	**38.1**	**0.046**	**0.004**		**16.1**	**17.5**	**46.8**	**19.6**

gonzalez COMPANIES, LLC

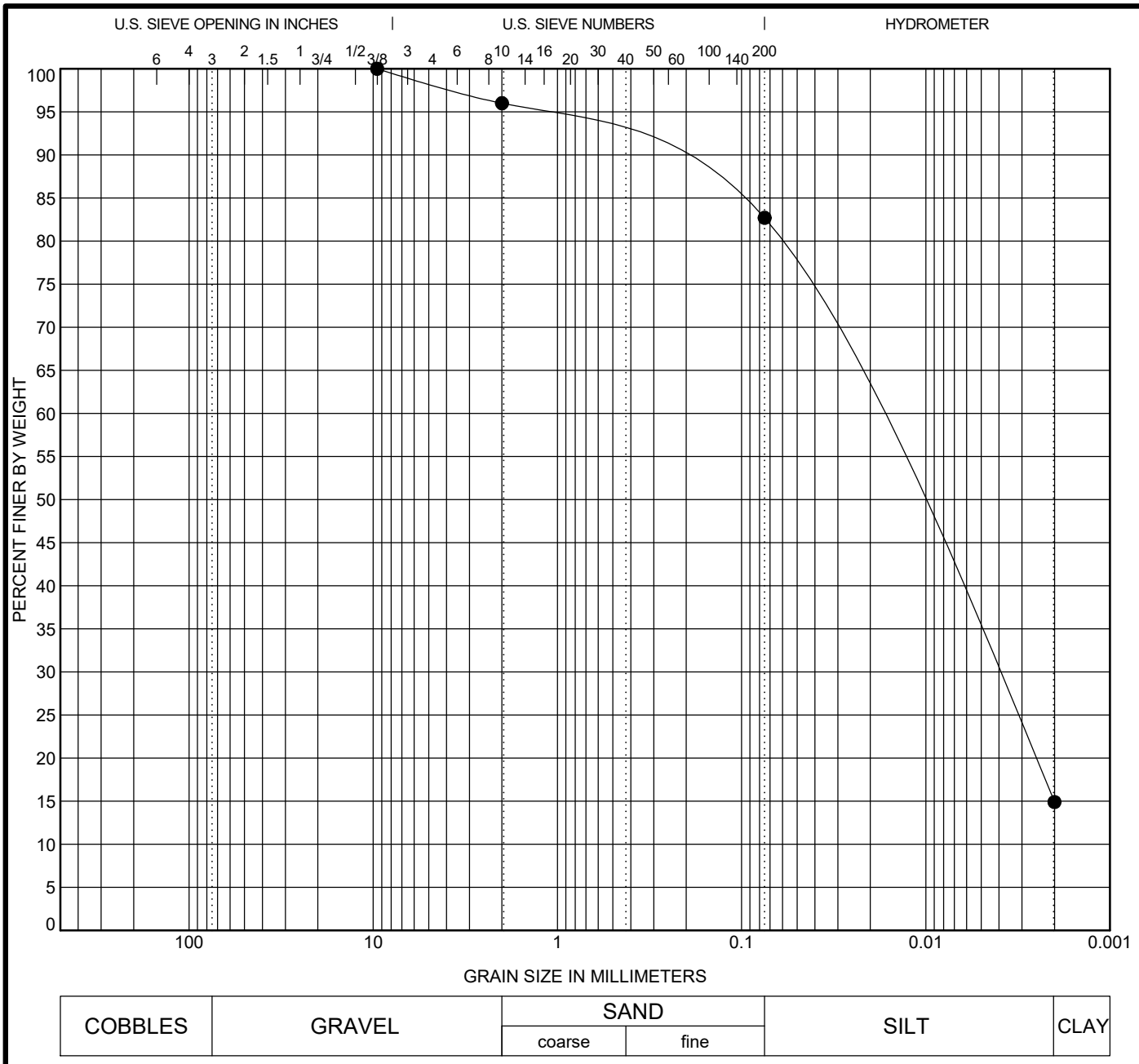
IDH GRAIN SIZE DISTRIBUTION

Route: FAP 342

Section: 2018-100-BR

County: Cook

GRAIN_SIZE_IDH_3-18-11 23-1003 IL 53 CHICAGO.GPJ IL_DOT.GDT 08/15/23



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Sample ID	Depth	Classification	LL	PL	PI	Cc	Cu
● **SC-06**	**58.5**	**SILTY LOAM**					

Sample ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **SC-06**	**58.5**	**9.53**	**0.022**	**0.004**		**4.0**	**13.3**	**67.8**	**14.9**

gonzalez COMPANIES, LLC

IDH GRAIN SIZE DISTRIBUTION

Route: FAP 342

Section: 2018-100-BR

County: Cook

GRAIN_SIZE_IDH_3-18-11 23-1003 IL 53 CHICAGO.GPJ IL_DOT.GDT 08/15/23

APPENDIX H Seismic Analysis

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====IL 53 OVER SALT CREEK

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-01	
Top of Boring Elev.	717.7	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 21 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 2.35 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	714.7	3.00	10	2.00	B
	712.2	2.50	9	2.40	
	709.7	2.50	9	1.00	
	707.2	2.50	9	1.90	
	704.7	2.50	11	2.50	
0.8	702.2	2.50	8	2.30	
3.3	699.7	2.50	8	1.20	
5.8	697.2	2.50	8	1.60	
8.3	694.7	2.50	5	0.70	
10.8	692.2	2.50	13	1.30	
13.3	689.7	2.50	13	1.40	B
17.3	685.7	4.00	12	1.10	B
22.3	680.7	5.00	13	1.10	
27.3	675.7	5.00	18	3.30	
32.3	670.7	5.00	15	1.70	
37.3	665.7	5.00	23	1.20	
42.3	660.7	5.00	16	1.80	
47.3	655.7	5.00	12	0.30	
52.3	650.7	5.00	27	0.50	
57.3	645.7	5.00	19	1.20	
62.3	640.7	5.00	22	0.50	
67.3	635.7	5.00	36	4.50	
72.3	630.7	5.00	36	4.50	
77.3	625.7	5.00	36	4.50	
82.3	620.7	5.00	36	4.50	
87.3	615.7	5.00	36	4.50	
92.3	610.7	5.00	36	4.50	
97.3	605.7	5.00	36	4.50	
100.0	603.0	2.70	36	4.50	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-02	
Top of Boring Elev.	717.5	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 17 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.93 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	714.5	3.00	10	2.00	B
	712.0	2.50	11	3.20	
	709.5	2.50	9	1.40	
	707.0	2.50	13	2.40	
	704.5	2.50	11	2.60	
1.0	702.0	2.50	12	3.80	B
3.5	699.5	2.50	13	1.60	
6.0	697.0	2.50	6	0.90	
8.5	694.5	2.50	9	0.90	B
11.0	692.0	2.50	14	2.30	
13.5	689.5	2.50	11	0.90	
16.0	687.0	2.50	9	0.90	
21.0	682.0	5.00	19	2.90	
26.0	677.0	5.00	12	2.10	
31.5	671.5	5.50	14	2.00	B
36.5	666.5	5.00	11	1.10	
41.5	661.5	5.00	9	2.10	
45.5	657.5	4.00	18	1.40	B
50.5	652.5	5.00	12	0.30	
57.5	645.5	7.00	33	3.40	B
62.5	640.5	5.00	22	1.70	
67.5	635.5	5.00	27	2.60	
72.5	630.5	5.00	27	2.60	
77.5	625.5	5.00	27	2.60	
82.5	620.5	5.00	27	2.60	
87.5	615.5	5.00	27	2.60	
92.5	610.5	5.00	27	2.60	
97.5	605.5	5.00	27	2.60	
100.0	603.0	2.50	27	2.60	B

Substructure 3

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-03	
Top of Boring Elev.	717	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 19 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 2.33 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	714.0	3.00	7	2.40	
	711.5	2.50	16	3.70	
	709.0	2.50	9	1.70	
	706.5	2.50	12	1.70	
	704.0	2.50	14	2.90	
1.5	701.5	2.50	8	3.30	
4.0	699.0	2.50	13	3.40	
6.5	696.5	2.50	10	4.50	
9.0	694.0	2.50	5	0.70	B
11.5	691.5	2.50	13	3.00	
14.0	689.0	2.50	10	1.70	
19.0	684.0	5.00	12	2.70	B
22.0	681.0	3.00	14	1.90	
26.0	677.0	4.00	19	1.90	B
31.0	672.0	5.00	11	1.20	
36.0	667.0	5.00	19	3.80	
41.0	662.0	5.00	13	2.20	
46.0	657.0	5.00	16	1.60	
51.0	652.0	5.00	19	1.60	
56.0	647.0	5.00	21	1.60	
61.0	642.0	5.00	24	2.50	
66.0	637.0	5.00	31	2.50	
71.0	632.0	5.00	31	2.50	
76.0	627.0	5.00	31	2.50	
81.0	622.0	5.00	31	2.50	
86.0	617.0	5.00	31	2.50	
91.0	612.0	5.00	31	2.50	
96.0	607.0	5.00	31	2.50	
100.0	603.0	4.00	31	2.50	B

Substructure 4

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-04	
Top of Boring Elev.	717.9	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 18 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.86 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	715.4	2.50	6	3.00	
	712.9	2.50	7	2.70	
	710.4	2.50	12	5.40	
	708.4	2.00	10	3.50	B
	705.9	2.50	15	4.00	
	703.4	2.50	12	2.40	
3.1	699.9	3.50	12	2.40	B
5.6	697.4	2.50	7	0.70	
8.1	694.9	2.50	5	0.20	
10.6	692.4	2.50	5	0.10	
13.1	689.9	2.50	12	1.60	B
18.1	684.9	5.00	11	2.20	
23.1	679.9	5.00	8	1.60	
28.1	674.9	5.00	16	2.10	
33.1	669.9	5.00	23	5.40	
38.1	664.9	5.00	14	3.50	
43.1	659.9	5.00	16	0.90	
48.1	654.9	5.00	19	0.20	
53.1	649.9	5.00	22	0.50	
58.1	644.9	5.00	32	4.90	
62.1	640.9	4.00	25	2.00	B
67.1	635.9	5.00	28	2.90	
72.1	630.9	5.00	28	2.90	
77.1	625.9	5.00	28	2.90	
82.1	620.9	5.00	28	2.90	
87.1	615.9	5.00	28	2.90	
92.1	610.9	5.00	28	2.90	
97.1	605.9	5.00	28	2.90	
100.0	603.0	2.90	28	2.90	B

Global Site Class Definition: Substructures 1 through 6

N (bar): 17 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.99 (ksf) Soil Site Class D <----Controls

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====IL 53 OVER SALT CREEK

Substructure 5

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-05	
Top of Boring Elev.	717.8	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 13 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.74 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	715.3	2.50	10		B
	712.8	2.50	8		
	710.3	2.50	10	3.40	
	707.8	2.50	8	3.50	
	705.3	2.50	13	3.80	
0.2	702.8	2.50	7	2.20	
2.7	700.3	2.50	14	1.00	
5.2	697.8	2.50	9	2.10	
8.2	694.8	3.00	4	0.70	B
10.7	692.3	2.50	7	0.50	B
13.2	689.8	2.50	7	1.20	
18.2	684.8	5.00	9	2.00	
23.2	679.8	5.00	9	1.20	
28.2	674.8	5.00	15	3.00	
33.2	669.8	5.00	8	1.90	
38.2	664.8	5.00	10	1.40	
43.2	659.8	5.00	21	1.20	
48.2	654.8	5.00	11	1.60	
53.2	649.8	5.00	19	3.00	
58.2	644.8	5.00	30	4.90	
63.2	639.8	5.00	27	3.50	
68.2	634.8	5.00	12	2.00	
73.2	629.8	5.00	12	2.00	
78.2	624.8	5.00	12	2.00	
83.2	619.8	5.00	12	2.00	
88.2	614.8	5.00	12	2.00	
93.2	609.8	5.00	12	2.00	
98.2	604.8	5.00	12	2.00	
100.0	603.0	1.80	12	2.00	B

Substructure 6

Base of Substruct. Elev. (or ground surf for bents	710	ft.
Pile or Shaft Dia.	14	inches
Boring Number	SC-06	
Top of Boring Elev.	717.6	ft.
Approximate Fixity Elev.	703	ft.

Individual Site Class Definition:

N (bar): 16 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.75 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	714.6	3.00	13	0.50	B
	712.1	2.50	7	2.90	
	709.6	2.50	7	1.20	
	707.1	2.50	11	4.50	
	704.6	2.50	7	2.60	
0.9	702.1	2.50	12	2.20	
2.8	700.2	1.90	4	2.20	B
5.3	697.7	2.50	8	1.20	
7.8	695.2	2.50	0	0.30	
10.3	692.7	2.50	9	1.00	
12.8	690.2	2.50	12	2.60	
18.9	684.1	6.10	13	1.60	B
23.9	679.1	5.00	14	2.20	
28.9	674.1	5.00	12	2.20	
33.9	669.1	5.00	13	1.80	
38.9	664.1	5.00	13	2.10	
41.4	661.6	2.50	13	1.40	B
46.4	656.6	5.00	17	0.20	
51.4	651.6	5.00	10	1.20	
56.4	646.6	5.00	25	2.90	
61.4	641.6	5.00	35	2.50	
66.4	636.6	5.00	26	2.10	
71.4	631.6	5.00	26	2.10	
76.4	626.6	5.00	26	2.10	
81.4	621.6	5.00	26	2.10	
86.4	616.6	5.00	26	2.10	
91.4	611.6	5.00	26	2.10	
96.4	606.6	5.00	26	2.10	
100.0	603.0	3.60	26	2.10	B

Substructure 7

Base of Substruct. Elev. (or ground surf for bents)		ft.
Pile or Shaft Dia.		inches
Boring Number		
Top of Boring Elev.		ft.
Approximate Fixity Elev.		ft.

Individual Site Class Definition:

N (bar): (Blows/ft.) NA
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary

Substructure 8

Base of Substruct. Elev. (or ground surf for bents)		ft.
Pile or Shaft Dia.		inches
Boring Number		
Top of Boring Elev.		ft.
Approximate Fixity Elev.		ft.

Individual Site Class Definition:

N (bar): (Blows/ft.) NA
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary

JSON Raw Data Headers

Save Copy Collapse All Expand All Filter JSON

request:
- date: "2023-08-18T14:18:46.446Z"
- referenceDocument: "AASHTO-2009"
- status: "success"
- url: "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=42.068605&longitude=-88.027784&siteClass=D&title=IL_53_over_Salt_Creek"
- parameters:
  - latitude: 42.068605
  - longitude: -88.027784
  - siteClass: "D"
  - title: "IL_53_over_Salt_Creek"

response:
- data:
  - pga: 0.043
  - fpga: 1.6
  - as: 0.068
  - ss: 0.09
  - fa: 1.6
  - sds: 0.144
  - s1: 0.035
  - fv: 2.4
  - sd1: 0.083
  - sdc: "A"
  - ts: 0.575
  - t0: 0.115
  - twoPeriodDesignSpectrum:
    - 0:
      - 0: 0
      - 1: 0.068
    - 1:
      - 0: 0.025
      - 1: 0.085
    - 2:
      - 0: 0.05
      - 1: 0.101
    - 3:
      - 0: 0.1
      - 1: 0.135
    - 4:
      - 0: 0.115
      - 1: 0.144
    - 5:
      - 0: 0.15
      - 1: 0.144
    - 6:
      - 0: 0.2

APPENDIX I Axial Pile Capacity Computation and Plots

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== N Abutment, West End, SB
REFERENCE BORING ========== SC-01
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

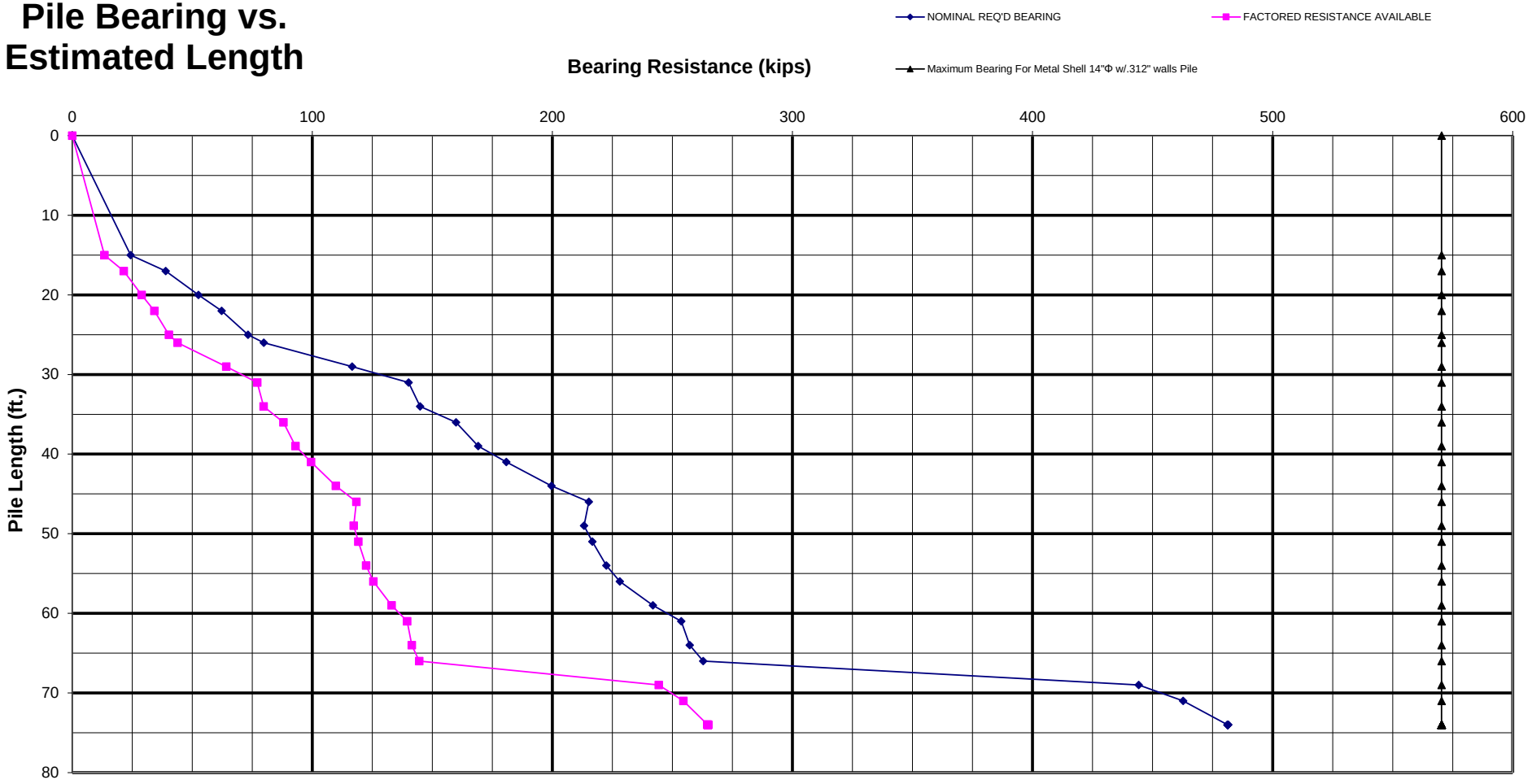
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**481** KIPS	**265** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
697.20	2.80	1.60			16.1		***24.4***				24	0	0	13	15
694.70	2.50	0.70			7.6	8.2	***38.9***				39	0	0	21	17
692.20	2.50	1.30			12.5	15.2	***52.6***				53	0	0	29	20
689.70	2.50	1.40			13.2	16.4	***62.2***				62	0	0	34	22
687.20	2.50	1.10			11.0	12.9	***73.2***				73	0	0	40	25
685.70	1.50	1.10			6.6	12.9	***79.8***				80	0	0	44	26
683.20	2.50	1.10			11.0	12.9	***116.6***				117	0	0	64	29
680.70	2.50	3.30	18		23.5	38.7	***140.1***				140	0	0	77	31
678.20	2.50	3.30	18		23.5	38.7	***144.9***				145	0	0	80	34
675.70	2.50	1.70			15.0	19.9	***159.9***				160	0	0	88	36
673.20	2.50	1.70			15.0	19.9	***169.1***				169	0	0	93	39
670.70	2.50	1.20			11.8	14.1	***180.8***				181	0	0	99	41
668.20	2.50	1.20			11.8	14.1	***199.6***				200	0	0	110	44
665.70	2.50	1.80			15.6	21.1	***215.2***				215	0	0	118	46
663.20	2.50	1.80			15.6	21.1	***213.2***				213	0	0	117	49
660.70	2.50	0.30			3.5	3.5	***216.7***				217	0	0	119	51
658.20	2.50	0.30			3.5	3.5	***222.5***				222	0	0	122	54
655.70	2.50	0.50			5.6	5.9	***228.1***				228	0	0	125	56
653.20	2.50	0.50			5.6	5.9	***241.9***				242	0	0	133	59
650.70	2.50	1.20			11.8	14.1	***253.6***				254	0	0	140	61
648.20	2.50	1.20			11.8	14.1	***257.2***				257	0	0	141	64
645.70	2.50	0.50			5.6	5.9	***262.8***				263	0	0	145	66
643.20	2.50	0.50			5.6	5.9	***444.2***				444	0	0	244	69
640.70	2.50		36	Hard Till	18.6	181.7	***462.7***				463	0	0	255	71
638.20	2.50		36	Hard Till	18.6	181.7	***481.3***				481	0	0	265	74
637.70	0.50		36	Hard Till		181.7									

Pile Bearing vs. Estimated Length



Pile Design Table for N Abutment, West End, SB utilizing Boring #SC-01

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
225	123	66
358	197	69
374	206	71
390	215	74
Metal Shell 14"Φ w/.25" walls		
263	145	66
444	244	69
Metal Shell 14"Φ w/.312" walls		
263	145	66
444	244	69
463	255	71
481	265	74
Metal Shell 16"Φ w/.312" walls		
279	153	59
292	161	61
295	162	64
301	166	66
537	296	69
559	307	71
580	319	74
Metal Shell 16"Φ w/.375" walls		
279	153	59
292	161	61
295	162	64
301	166	66
537	296	69
559	307	71
580	319	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
203	112	74
Steel HP 10 X 57		
208	115	74
Steel HP 12 X 53		
256	141	74
Steel HP 12 X 63		
258	142	74
Steel HP 12 X 74		
262	144	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
266	147	74
Steel HP 14 X 73		
220	121	66
308	169	69
313	172	71
317	174	74
Steel HP 14 X 89		
223	122	66
312	172	69
317	174	71
322	177	74
Steel HP 14 X 102		
225	124	66
316	174	69
321	177	71
326	179	74
Steel HP 14 X 117		
227	125	66
321	176	69
326	179	71
330	182	74
Precast 14"x 14"		
254	140	44

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== S Abutment, West End, SB
REFERENCE BORING ========== SC-02
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

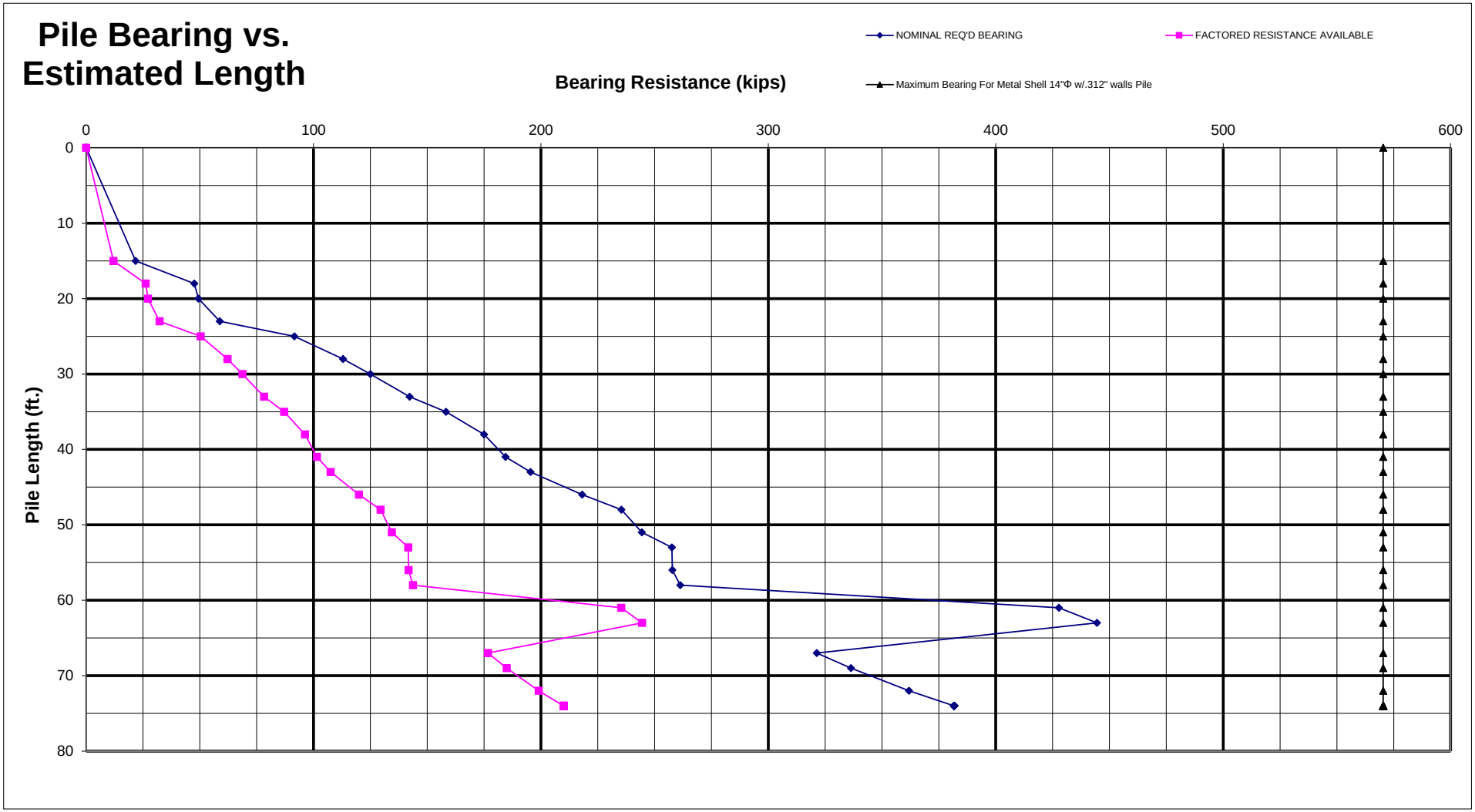
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**382** KIPS	**210** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
697.00	3.00	0.90			11.2		***21.8***				22	0	0	12	15
694.50	2.50	0.90			9.4	10.6	***47.5***				48	0	0	26	18
692.00	2.50	2.30			18.3	27.0	***49.4***				49	0	0	27	20
689.50	2.50	0.90			9.4	10.6	***58.7***				59	0	0	32	23
687.00	2.50	0.90			9.4	10.6	***91.5***				92	0	0	50	25
684.50	2.50	2.90			21.4	34.0	***113.0***				113	0	0	62	28
682.00	2.50	2.90			21.4	34.0	***125.0***				125	0	0	69	30
679.50	2.50	2.10			17.2	24.6	***142.2***				142	0	0	78	33
677.00	2.50	2.10			17.2	24.6	***158.3***				158	0	0	87	35
674.50	2.50	2.00			16.7	23.5	***175.0***				175	0	0	96	38
671.50	3.00	2.00			20.0	23.5	***184.4***				184	0	0	101	41
669.00	2.50	1.10			11.0	12.9	***195.4***				195	0	0	107	43
666.50	2.50	1.10			11.0	12.9	***218.2***				218	0	0	120	46
664.00	2.50	2.10			17.2	24.6	***235.4***				235	0	0	129	48
661.50	2.50	2.10			17.2	24.6	***244.4***				244	0	0	134	51
659.00	2.50	1.40			13.2	16.4	***257.5***				258	0	0	142	53
656.50	2.50	1.40			13.2	16.4	***257.8***				258	0	0	142	56
654.00	2.50	0.30			3.5	3.5	***261.3***				261	0	0	144	58
651.50	2.50	0.30			3.5	3.5	***427.8***				428	0	0	235	61
649.00	2.50		33	Hard Till	16.7	166.6	***444.5***				444	0	0	244	63
645.50	3.50		33	Hard Till	23.4	166.6	***321.3***				321	0	0	177	67
643.00	2.50	1.70			15.0	19.9	***336.3***				336	0	0	185	69
640.50	2.50	1.70			15.0	19.9	***361.9***				362	0	0	199	72
638.00	2.50	2.60			19.8	30.5	***381.7***				382	0	0	210	74
637.50	0.50	2.60				30.5									

Pile Bearing vs. Estimated Length



Pile Design Table for S Abutment, West End, SB utilizing Boring #SC-02

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
273	150	67
286	157	69
306	169	72
323	178	74
Metal Shell 14"Φ w/.25" walls		
261	144	58
321	177	67
336	185	69
362	199	72
382	210	74
Metal Shell 14"Φ w/.312" walls		
261	144	58
321	177	67
336	185	69
362	199	72
382	210	74
Metal Shell 16"Φ w/.312" walls		
282	155	51
295	162	56
299	165	58
370	204	67
388	213	69
419	230	72
441	243	74
Metal Shell 16"Φ w/.375" walls		
282	155	51
295	162	56
299	165	58

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
211	116	74
Steel HP 10 X 57		
216	119	74
Steel HP 12 X 53		
260	143	74
Steel HP 12 X 63		
262	144	74
Steel HP 12 X 74		
266	146	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
269	148	74
Steel HP 14 X 73		
269	148	69
299	164	72
315	173	74
Steel HP 14 X 89		
273	150	69
303	167	72
319	176	74
Steel HP 14 X 102		
276	152	69
307	169	72
323	178	74
Steel HP 14 X 117		
279	153	69
310	171	72
327	180	74
Precast 14"x 14"		
249	137	43

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== N Abutment, Center
REFERENCE BORING ========== SC-03
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

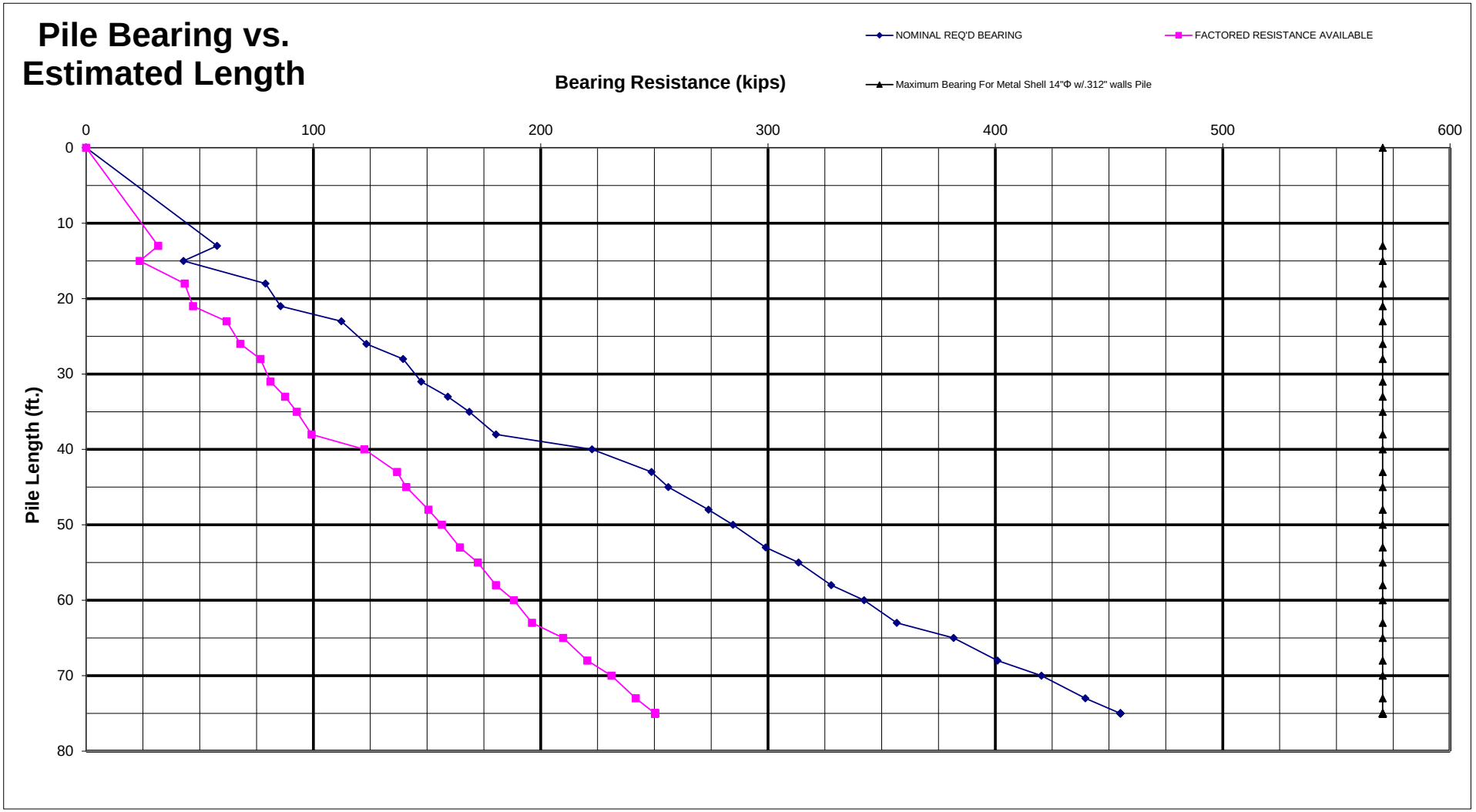
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**455** KIPS	**250** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
699.50	0.50	3.40	13		4.8		***57.6***				58	0	0	32	13
697.00	2.50	4.50	10		29.8	52.8	***42.8***				43	0	0	24	15
694.00	3.00	0.70			9.1	8.2	***78.9***				79	0	0	43	18
691.50	2.50	3.00			21.9	35.2	***85.6***				86	0	0	47	21
689.00	2.50	1.70			15.0	19.9	***112.3***				112	0	0	62	23
686.50	2.50	2.70			20.4	31.7	***123.3***				123	0	0	68	26
684.00	2.50	1.90			16.2	22.3	***139.5***				139	0	0	77	28
681.50	2.50	1.90			16.2	22.3	***147.4***				147	0	0	81	31
679.00	2.50	1.20			11.8	14.1	***159.2***				159	0	0	88	33
677.00	2.00	1.20			9.4	14.1	***168.6***				169	0	0	93	35
674.50	2.50	1.20			11.8	14.1	***180.3***				180	0	0	99	38
672.00	2.50	1.20			11.8	14.1	***222.6***				223	0	0	122	40
669.50	2.50	3.80	19		26.1	44.6	***248.7***				249	0	0	137	43
667.00	2.50	3.80	19		26.1	44.6	***256.1***				256	0	0	141	45
664.50	2.50	2.20			17.7	25.8	***273.8***				274	0	0	151	48
662.00	2.50	2.20			17.7	25.8	***284.5***				285	0	0	156	50
659.50	2.50	1.60			14.4	18.8	***298.9***				299	0	0	164	53
657.00	2.50	1.60			14.4	18.8	***313.4***				313	0	0	172	55
654.50	2.50	1.60			14.4	18.8	***327.8***				328	0	0	180	58
652.00	2.50	1.60			14.4	18.8	***342.2***				342	0	0	188	60
649.50	2.50	1.60			14.4	18.8	***356.6***				357	0	0	196	63
647.00	2.50	1.60			14.4	18.8	***381.6***				382	0	0	210	65
644.50	2.50	2.50			19.3	29.3	***400.9***				401	0	0	221	68
642.00	2.50	2.50			19.3	29.3	***420.2***				420	0	0	231	70
639.50	2.50	2.50			19.3	29.3	***439.6***				440	0	0	242	73
637.50	2.00	2.50			15.5	29.3	***455.0***				455	0	0	250	75
637.00	0.50	2.50				29.3									

Pile Bearing vs. Estimated Length



Pile Design Table for N Abutment, Center utilizing Boring #SC-03

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
279	153	58
291	160	60
303	167	63
323	178	65
340	187	68
357	196	70
373	205	73
386	213	75
Metal Shell 14"Φ w/.25" walls		
285	156	50
299	164	53
313	172	55
328	180	58
342	188	60
357	196	63
382	210	65
401	221	68
420	231	70
440	242	73
455	250	75
Metal Shell 14"Φ w/.312" walls		
285	156	50
299	164	53
313	172	55
328	180	58
342	188	60
357	196	63
382	210	65

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
269	148	75
Steel HP 10 X 57		
274	151	75
Steel HP 12 X 53		
278	153	65
291	160	68
305	168	70
318	175	73
329	181	75
Steel HP 12 X 63		
281	154	65
294	162	68
308	169	70
321	177	73
332	183	75
Steel HP 12 X 74		
285	157	65
298	164	68
312	172	70
326	179	73
336	185	75

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
265	146	63
289	159	65
302	166	68
316	174	70
330	181	73
341	188	75
Steel HP 14 X 73		
284	156	58
296	163	60
308	169	63
337	185	65
353	194	68
369	203	70
384	211	73
397	218	75
Steel HP 14 X 89		
276	152	55
287	158	58
299	165	60
311	171	63
341	188	65
357	196	68
373	205	70
389	214	73
402	221	75
Steel HP 14 X 102		
279	153	55
291	160	58

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== S Abutment, Center
REFERENCE BORING ========== SC-04
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

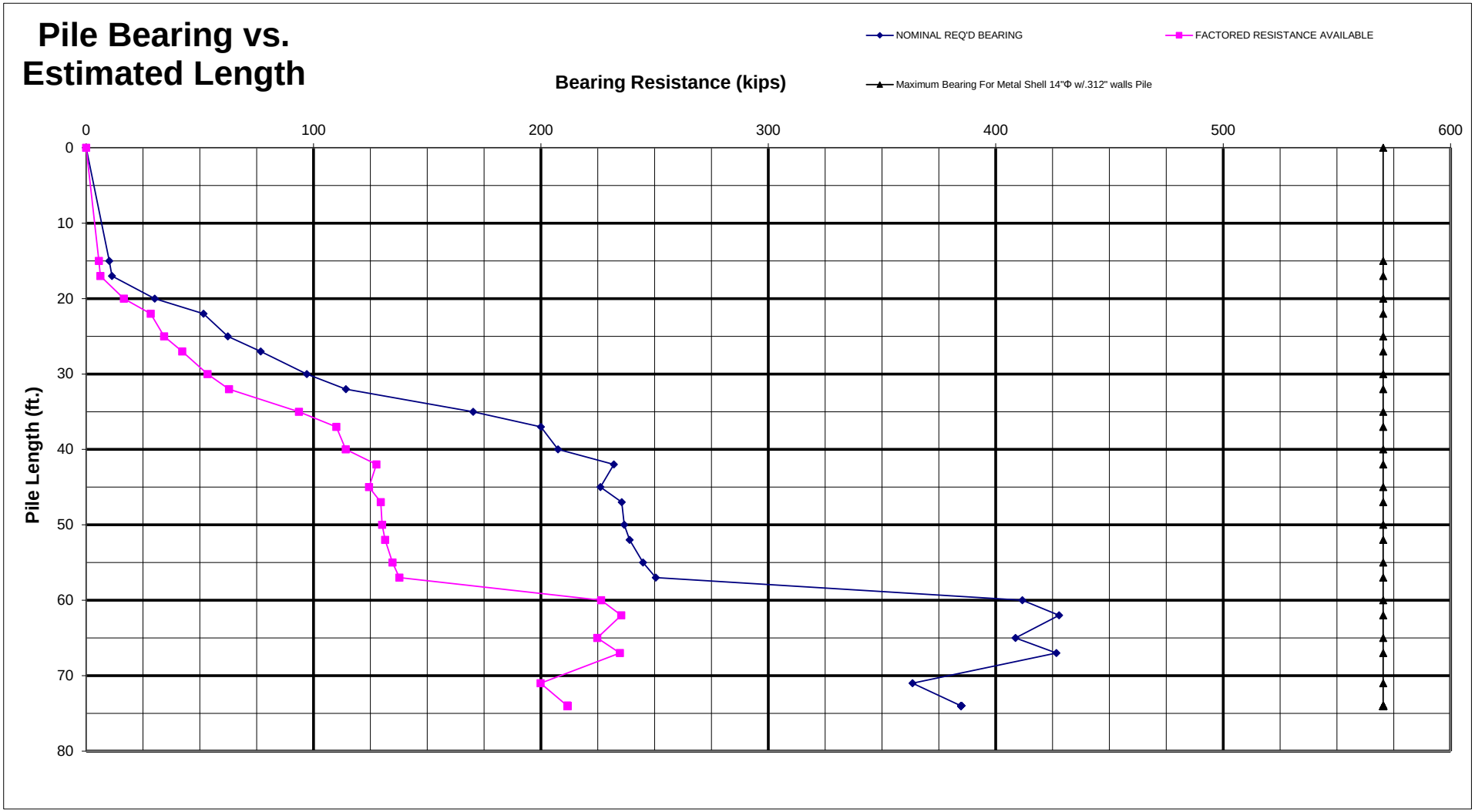
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**385** KIPS	**212** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
697.40	2.60	0.70			7.9		***10.2***				10	0	0	6	15
694.90	2.50	0.20			2.4	2.3	***11.4***				11	0	0	6	17
692.40	2.50	0.10			1.2	1.2	***30.2***				30	0	0	17	20
689.90	2.50	1.60			14.4	18.8	***51.6***				52	0	0	28	22
687.40	2.50	2.20			17.7	25.8	***62.3***				62	0	0	34	25
684.90	2.50	1.60			14.4	18.8	***76.7***				77	0	0	42	27
682.40	2.50	1.60			14.4	18.8	***97.0***				97	0	0	53	30
679.90	2.50	2.10			17.2	24.6	***114.3***				114	0	0	63	32
677.40	2.50	2.10			17.2	24.6	***170.2***				170	0	0	94	35
674.90	2.50	5.40	23		29.8	63.3	***200.0***				200	0	0	110	37
672.40	2.50	5.40	23		29.8	63.3	***207.5***				208	0	0	114	40
669.90	2.50	3.50	14		24.6	41.0	***232.1***				232	0	0	128	42
667.40	2.50	3.50	14		24.6	41.0	***226.2***				226	0	0	124	45
664.90	2.50	0.90			9.4	10.6	***235.5***				236	0	0	130	47
662.40	2.50	0.90			9.4	10.6	***236.7***				237	0	0	130	50
659.90	2.50	0.20			2.4	2.3	***239.0***				239	0	0	131	52
657.40	2.50	0.20			2.4	2.3	***244.9***				245	0	0	135	55
654.90	2.50	0.50			5.6	5.9	***250.5***				250	0	0	138	57
652.40	2.50	0.50			5.6	5.9	***411.7***				412	0	0	226	60
649.90	2.50		32	Hard Till	16.1	161.5	***427.9***				428	0	0	235	62
647.40	2.50		32	Hard Till	16.1	161.5	***408.7***				409	0	0	225	65
644.90	2.50		25	Very Fine Silty Sand	18.0	126.2	***426.7***				427	0	0	235	67
640.90	4.00		25	Very Fine Silty Sand	28.8	126.2	***363.4***				363	0	0	200	71
638.40	2.50	2.90			21.4	34.0	***384.8***				385	0	0	212	74
637.90	0.50	2.90				34.0									

Pile Bearing vs. Estimated Length



Pile Design Table for S Abutment, Center utilizing Boring #SC-04

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
214	118	57
307	169	71
326	179	74
Metal Shell 14"Φ w/.25" walls		
250	138	57
363	200	71
385	212	74
Metal Shell 14"Φ w/.312" walls		
250	138	57
363	200	71
385	212	74
Metal Shell 16"Φ w/.312" walls		
281	154	55
287	158	57
421	231	71
445	245	74
Metal Shell 16"Φ w/.375" walls		
281	154	55
287	158	57
421	231	71
445	245	74
Steel HP 8 X 36		
158	87	74
Steel HP 10 X 42		
198	109	74
Steel HP 10 X 57		
202	111	74
Steel HP 12 X 53		
245	135	74
Steel HP 12 X 63		
247	136	74
Steel HP 12 X 74		
251	138	74
Steel HP 12 X 84		
254	140	74
Steel HP 14 X 73		
281	155	71
299	164	74
Steel HP 14 X 89		
281	155	65
285	157	71
302	166	74
Steel HP 14 X 102		
215	118	57
285	157	65
288	159	71
306	168	74
Steel HP 14 X 117		
217	119	57
289	159	65
292	161	71
310	171	74
Precast 14"x 14"		
264	145	40

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== N Abutment, East End, NB
REFERENCE BORING ========== SC-05
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

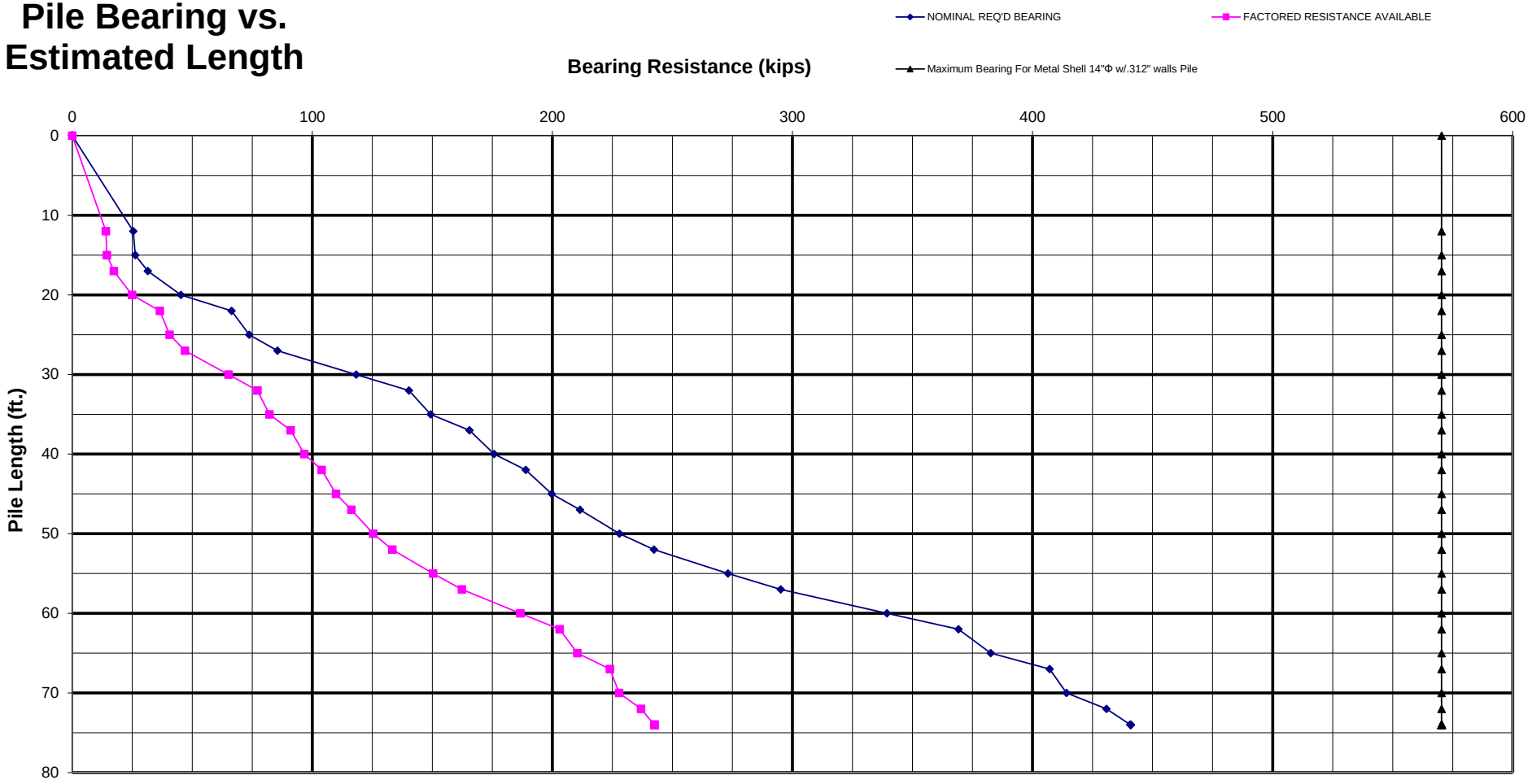
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**441** KIPS	**242** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
699.80	0.20	1.00			0.8		***25.4***				25	0	0	14	12
697.30	2.50	2.10			17.2	24.6	***26.2***				26	0	0	14	15
694.80	2.50	0.70			7.6	8.2	***31.4***				31	0	0	17	17
692.30	2.50	0.50			5.6	5.9	***45.2***				45	0	0	25	20
689.80	2.50	1.20			11.8	14.1	***66.4***				66	0	0	37	22
687.30	2.50	2.00			16.7	23.5	***73.7***				74	0	0	41	25
684.80	2.50	1.20			11.8	14.1	***85.4***				85	0	0	47	27
682.30	2.50	1.20			11.8	14.1	***118.3***				118	0	0	65	30
679.80	2.50	3.00			21.9	35.2	***140.2***				140	0	0	77	32
677.30	2.50	3.00			21.9	35.2	***149.3***				149	0	0	82	35
674.80	2.50	1.90			16.2	22.3	***165.5***				165	0	0	91	37
672.30	2.50	1.90			16.2	22.3	***175.8***				176	0	0	97	40
669.80	2.50	1.40			13.2	16.4	***188.9***				189	0	0	104	42
667.30	2.50	1.40			13.2	16.4	***199.7***				200	0	0	110	45
664.80	2.50	1.20			11.8	14.1	***211.5***				211	0	0	116	47
662.30	2.50	1.20			11.8	14.1	***227.9***				228	0	0	125	50
659.80	2.50	1.60			14.4	18.8	***242.3***				242	0	0	133	52
657.30	2.50	1.60			14.4	18.8	***273.2***				273	0	0	150	55
654.80	2.50	3.00			21.9	35.2	***295.1***				295	0	0	162	57
652.30	2.50	3.00			21.9	35.2	***339.3***				339	0	0	187	60
649.80	2.50	4.90	30		29.8	57.5	***369.1***				369	0	0	203	62
647.30	2.50	4.90	30		29.8	57.5	***382.5***				383	0	0	210	65
644.80	2.50	3.50	27		24.6	41.0	***407.1***				407	0	0	224	67
642.30	2.50	3.50	27		24.6	41.0	***414.1***				414	0	0	228	70
639.80	2.50	2.00			16.7	23.5	***430.8***				431	0	0	237	72
638.30	1.50	2.00			10.0	23.5	***440.8***				441	0	0	242	74
637.80	0.50	2.00				23.5									

Pile Bearing vs. Estimated Length



Pile Design Table for N Abutment, East End, NB utilizing Boring #SC-05

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
284	156	60
309	170	62
323	178	65
344	189	67
352	194	70
366	202	72
375	206	74
Metal Shell 14"Φ w/.25" walls		
273	150	55
295	162	57
339	187	60
369	203	62
383	210	65
407	224	67
414	228	70
431	237	72
441	242	74
Metal Shell 14"Φ w/.312" walls		
273	150	55
295	162	57
339	187	60
369	203	62
383	210	65
407	224	67
414	228	70
431	237	72
441	242	74
Metal Shell 16"Φ w/.312" walls		
280	154	52
318	175	55
343	189	57
397	218	60
431	237	62
444	244	65
472	260	67
477	262	70
496	273	72
508	279	74
Metal Shell 16"Φ w/.375" walls		
280	154	52
318	175	55
343	189	57
397	218	60
431	237	62
444	244	65
472	260	67
477	262	70
496	273	72
508	279	74
Steel HP 8 X 36		
209	115	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
259	143	74
Steel HP 10 X 57		
265	146	74
Steel HP 12 X 53		
284	156	65
298	164	70
309	170	72
316	174	74
Steel HP 12 X 63		
265	146	60
286	157	62
287	158	65
300	165	70
312	172	72
319	175	74
Steel HP 12 X 74		
269	148	60
290	160	62
291	160	65
304	167	70
316	174	72
323	178	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
274	150	60
295	162	62
296	163	65
309	170	70
321	176	72
328	180	74
Steel HP 14 X 73		
271	149	57
326	179	60
347	191	65
359	197	70
372	205	72
381	209	74
Steel HP 14 X 89		
274	151	57
330	182	60
352	194	65
363	200	70
377	207	72
385	212	74
Steel HP 14 X 102		
278	153	57
335	184	60
356	196	65
367	202	70
381	210	72
390	214	74
Steel HP 14 X 117		
282	155	57
339	187	60
361	198	65
371	204	70
386	212	72
394	217	74
Precast 14"x 14"		
254	140	45

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== S Abutment, East End, NB
REFERENCE BORING ========== SC-06
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 712.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 700.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 11000 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 210.80 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 417.46 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 156.55 KIPS

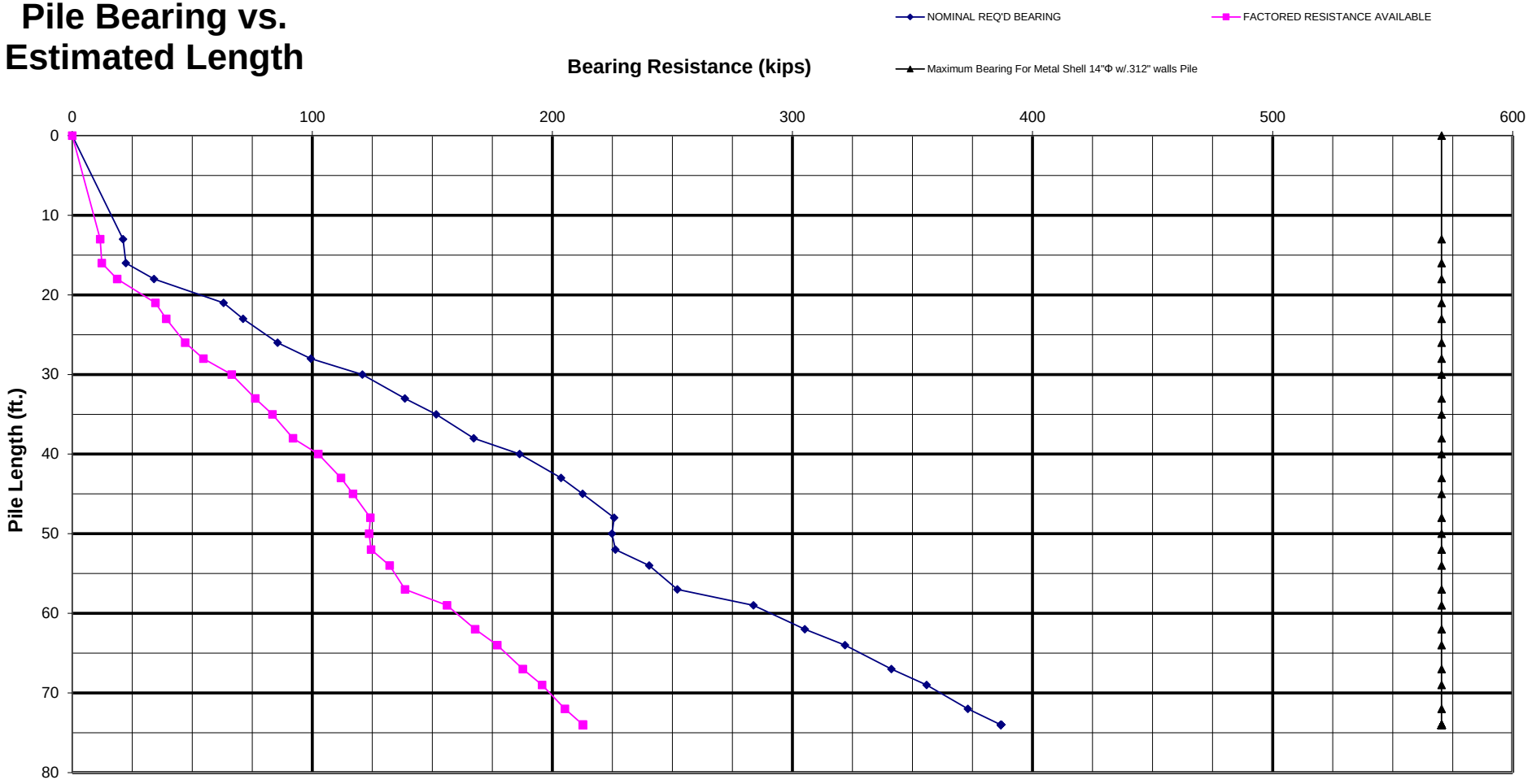
PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**387** KIPS	**213** KIPS	*** Below Boring

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
699.00	1.00	2.20			7.1		***21.2***				21	0	0	12	13
696.50	2.50	1.20			11.8	14.1	***22.4***				22	0	0	12	16
694.00	2.50	0.30			3.5	3.5	***34.0***				34	0	0	19	18
691.50	2.50	1.00			10.2	11.7	***63.0***				63	0	0	35	21
689.00	2.50	2.60			19.8	30.5	***71.1***				71	0	0	39	23
686.50	2.50	1.60			14.4	18.8	***85.5***				86	0	0	47	26
684.10	2.40	1.60			13.8	18.8	***99.4***				99	0	0	55	28
681.60	2.50	1.60			14.4	18.8	***120.8***				121	0	0	66	30
679.10	2.50	2.20			17.7	25.8	***138.6***				139	0	0	76	33
676.60	2.50	2.20			17.7	25.8	***151.6***				152	0	0	83	35
674.10	2.50	1.80			15.6	21.1	***167.2***				167	0	0	92	38
671.60	2.50	1.80			15.6	21.1	***186.3***				186	0	0	102	40
669.10	2.50	2.10			17.2	24.6	***203.6***				204	0	0	112	43
666.60	2.50	2.10			17.2	24.6	***212.6***				213	0	0	117	45
664.10	2.50	1.40			13.2	16.4	***225.7***				226	0	0	124	48
661.60	2.50	1.40			13.2	16.4	***224.8***				225	0	0	124	50
660.10	1.50	0.20			1.4	2.3	***226.2***				226	0	0	124	52
657.60	2.50	0.20			2.4	2.3	***240.3***				240	0	0	132	54
655.10	2.50	1.20			11.8	14.1	***252.1***				252	0	0	139	57
652.60	2.50	1.20			11.8	14.1	***283.8***				284	0	0	156	59
650.10	2.50	2.90			21.4	34.0	***305.2***				305	0	0	168	62
647.60	2.50	2.90			21.4	34.0	***321.9***				322	0	0	177	64
645.10	2.50	2.50			19.3	29.3	***341.2***				341	0	0	188	67
642.60	2.50	2.50			19.3	29.3	***355.8***				356	0	0	196	69
640.10	2.50	2.10			17.2	24.6	***373.1***				373	0	0	205	72
638.10	2.00	2.10			13.8	24.6	***386.8***				387	0	0	213	74
637.60	0.50	2.10				24.6									

Pile Bearing vs. Estimated Length



Pile Design Table for S Abutment, East End, NB utilizing Boring #SC-06

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
272	150	64
289	159	67
302	166	69
317	174	72
329	181	74
Metal Shell 14"Φ w/.25" walls		
284	156	59
305	168	62
322	177	64
341	188	67
356	196	69
373	205	72
387	213	74
Metal Shell 14"Φ w/.312" walls		
284	156	59
305	168	62
322	177	64
341	188	67
356	196	69
373	205	72
387	213	74
Metal Shell 16"Φ w/.312" walls		
277	152	54
290	160	57
330	181	59
354	195	62
373	205	64
395	217	67

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
228	126	74
Steel HP 10 X 57		
233	128	74
Steel HP 12 X 53		
279	154	74
Steel HP 12 X 63		
282	155	74
Steel HP 12 X 74		
276	152	72
286	157	74

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
280	154	72
290	159	74
Steel HP 14 X 73		
278	153	62
288	158	64
304	167	67
312	172	69
326	179	72
337	186	74
Steel HP 14 X 89		
282	155	62
292	160	64
308	169	67
316	174	69
330	181	72
341	188	74
Steel HP 14 X 102		
267	147	59
285	157	62
295	162	64
311	171	67
319	176	69
334	184	72
345	190	74
Steel HP 14 X 117		
271	149	59
289	159	62
299	164	64