

February 8, 2021

To: Thomas Paolicchi, PE, LEED AP BD+C
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Re: **Structure Geotechnical Report (SGR)**
IL 132 Dry Land Bridge
IL Route 132
Oak Lane Drive to McKinley Avenue
Lake Villa, Illinois

Rubino Report No. G16.099_REV1

Via email: TPaolicchi@abnacorp.com

Dear Mr. Paolicchi,

Rubino Engineering, Inc. (Rubino) is pleased to submit our Structure Geotechnical Report for the proposed IL 132 Dry Land Bridge in Lake Villa, Illinois.

Report Description

Enclosed is the Geotechnical Services Report including results of field and laboratory testing, as well as recommendations for foundation design and general site development.

Authorization and Correspondence History

- ABNA Engineering, Inc. Phase II Agreement for Subconsultant Services; dated August 10th, 2016.

Closing

Rubino appreciates the opportunity to provide geotechnical services for this project and we look forward to continued participation during the design and in future construction phases of this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully submitted,
RUBINO ENGINEERING, INC.

Michelle A. Lipinski, PE
President

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MAL/file/ Enclosures

IL 132 DRY LAND BRIDGE

**IL ROUTE 132
OAK LANE DRIVE TO MCKINLEY
AVENUE**

LAKE VILLA, ILLINOIS

**RUBINO PROJECT NO.
G16.099_REV1**

Structure

Geotechnical

Report

(SGR)

PTB175 Item 6



**Michelle A. Lipinski, PE
President
IL No. 062-061241, Exp. 11/30/21**

PREPARED FOR:

ABNA ENGINEERING, INC.

**9901 SOUTH WESTERN AVE.,
SUITE 001**

CHICAGO, ILLINOIS

FEBRUARY 8, 2021

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PROJECT INFORMATION

Rubino understands that the Illinois Department of Transportation is planning to improve IL 132 between McKinley Avenue and Oak Lane Drive to a three-lane cross section, including widening the existing dry land bridge. Rubino has included information from existing reports regarding the roadway and structure.



Project Correspondence:

- RFP Email from Thomas Paolicchi of ABNA Engineering, Inc. on May 28th, 2015.
- Report updated October 2020 to include latest TS&L from ABNA
- Report updated to include comments from IDOT Speed Letter dated November 23, 2020

Structural Loads are based on an Email from Robert Loehr of ABNA Engineering, Inc. on November 15th, 2016:

- 12" diameter or 14" diameter Metal Shell Piles.
- Factored Load per Pile is about 67 tons or approximately 150 kips per pile

The geotechnical recommendations presented in this report are based on the available project information, structure locations, and the subsurface materials described in this report. If any of the information on which this report is based is incorrect, please inform Rubino in writing so that we may amend the recommendations presented in this report (if appropriate, and if desired by the client). Rubino will not be responsible for the implementation of our recommendations if we are not notified of changes in the project.

DRILLING, FIELD, AND LABORATORY TEST PROCEDURES

Rubino selected the number of borings, the boring depths and located the borings in the field by using a Garmin GPSMap 64s. The borings were advanced utilizing 3 ¼ inch inside-diameter, hollow stem auger drilling methods and soil samples were routinely obtained during the drilling process.



Selected soil samples were tested in the laboratory to determine material properties for this report. Drilling, sampling, and laboratory tests were accomplished in general accordance with ASTM procedures. The following items are further described in the Appendix of this report.

- *Field Penetration Tests and Split-Barrel Sampling of Soils (AASHTO T206)*
- *Cone Penetrometer Testing (ASTM D5778)*
- *Field Water Level Measurements*
- *Laboratory Determination of Water (Moisture) Content of Soil by Mass (AASHTO T265)*
- *Laboratory Determination of Atterberg Limits (AASHTO T89 & AASHTO T90)*
- *Laboratory Determination of Particle Size (Hydrometer) Analysis of Soils (AASHTO T88)*
- *Laboratory Organic Content by Loss on Ignition (AASHTO T267)*

The laboratory testing program was conducted in general accordance with applicable ASTM specifications. The results of these tests are to be found on the accompanying boring logs located in the Appendix.

SITE AND SUBSURFACE CONDITIONS

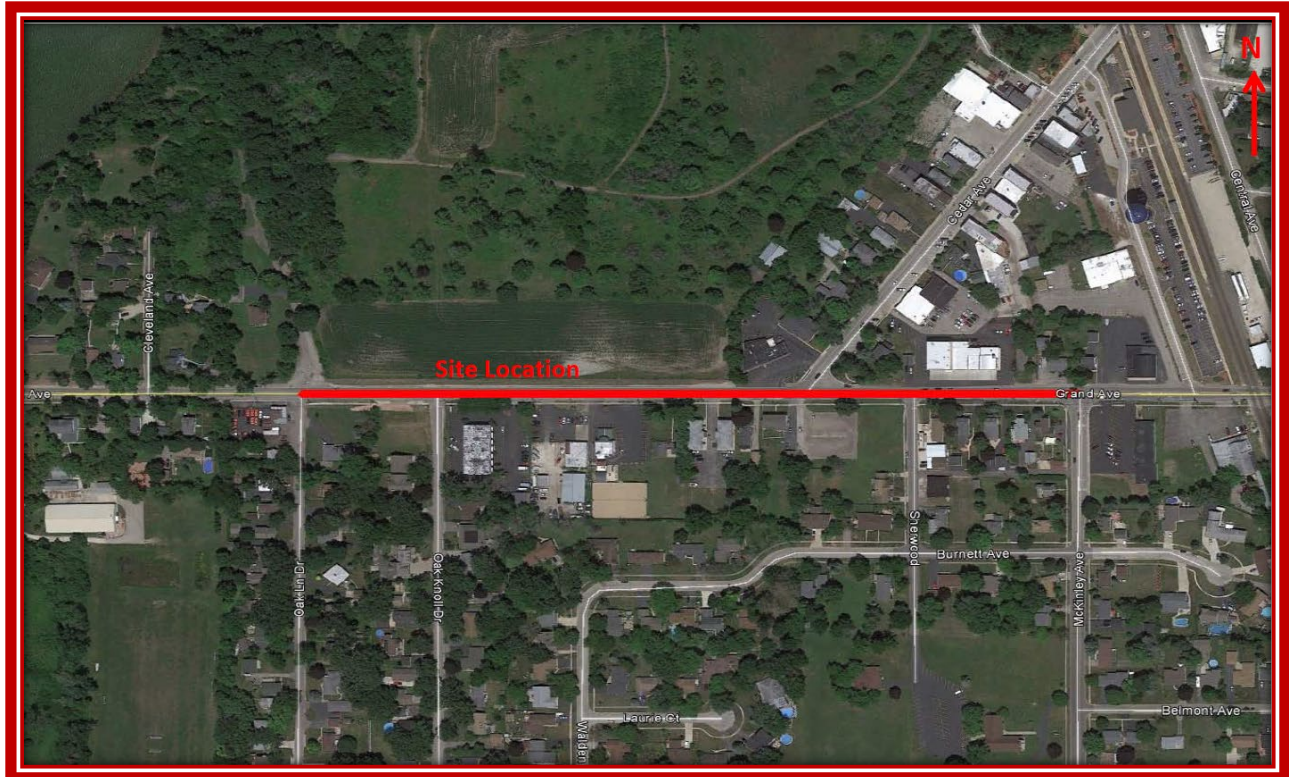
Site Location and Description

The general site location of exploration included the right of way of IL Route 132 (Grand Avenue) from Oak Lane Drive (Station Number 288+00) to McKinley Avenue (Station Number 307+00) in Lake Villa, Illinois.

WESTERN PROJECT LIMIT LATITUDE OAK LANE DRIVE STATION No. 288+00	WESTERN PROJECT LIMIT LONGITUDE OAK LANE DRIVE STATION No. 288+00
42° 24' 55.75" N	88° 05' 11.70" W
EASTERN PROJECT LIMIT LATITUDE MCKINLEY AVENUE STATION No. 307+00	EASTERN PROJECT LIMIT LONGITUDE MCKINLEY AVENUE STATION No. 307+00
42° 24' 55.75" N	88° 04' 47.57" W

The soil borings were taken within existing paved areas and the map below shows the general site location:





Subsurface Conditions

Beneath the existing undocumented fill soils, subsurface conditions generally consisted of black, peat, brown to gray, silty clay soils and brown to gray, granular soils.

- The **undocumented fill** soils were generally cohesive in nature.
- The peat soils were highly compressible with low shear strengths.
- The native **silty clay** soils were generally medium stiff to hard in consistency with softer soils observed in some borings.
- The native **granular** soils were generally medium dense to very dense in consistency with looser soils observed in some borings.

The following cross section provides a generalized visual of subsurface conditions. This cross section is **not to scale**. The borings are arranged in order from East to West as they were drilled on IL RT 132 (Grand Avenue) in Lake Villa, Illinois:



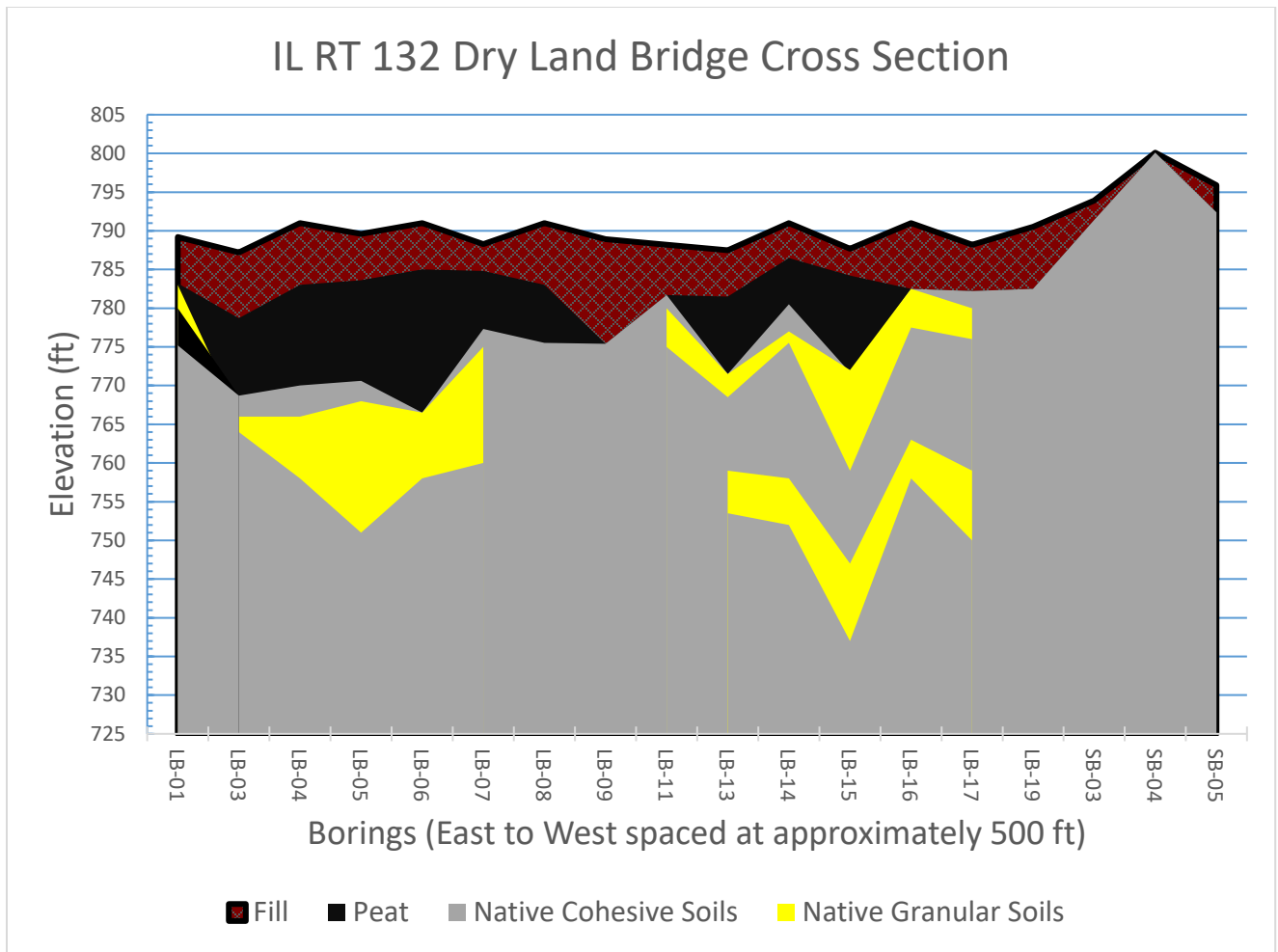


Table 1: Subsurface Conditions Summary

DEPTH RANGE (FT)	SOIL DESCRIPTION	ESTIMATED TOTAL UNIT WEIGHT; Y (PCF)	UNDRAINED SHEAR STRENGTH; C _u (PSF)	ESTIMATED FRICTION ANGLE; φ (%)
LB-01 through LB-07 (Station # 288+50 through 291+50)				
791.00 – 779.00	UNDOCUMENTED FILL: Loam	110 – 120	N/A	N/A
785.00 – 766.50	PEAT	40 – 60	N/A	N/A
777.00 – 746.00	Very soft to medium stiff silty CLAY	120	0 – 600 psf	N/A
777.00 – 751.00	Loose to medium dense SAND	110	N/A	30 - 32°
773.00 – 706.00	Medium stiff to hard silty CLAY	120	1,200 – 4,000 psf	N/A
LB-08 through LB-11 (Station # 292+00 through 293+50)				
791.00 – 775.50	UNDOCUMENTED FILL: Loam	110 – 120	N/A	N/A
783.00 – 775.50	PEAT (LB-08)	40 – 60	N/A	N/A



DEPTH RANGE (FT)	SOIL DESCRIPTION	ESTIMATED TOTAL UNIT WEIGHT; γ (PCF)	UNDRAINED SHEAR STRENGTH; C_u (PSF)	ESTIMATED FRICTION ANGLE; ϕ (%)
782.00 – 767.50	Very soft to soft silty CLAY	120	0 – 400 psf	N/A
790.00 – 718.00	Loose to medium dense SAND (LB-11)	110	N/A	30°
775.50 – 709.00	Medium stiff to very stiff silty CLAY	120	1,200 – 1,300 psf	N/A
LB-13 through LB-17 (Station # 294+50 through 296+50)				
791.00 – 781.50	UNDOCUMENTED FILL: Loam	110 – 120	N/A	N/A
786.50 – 771.50	PEAT	40 – 60	N/A	N/A
782.50 – 759.00	Very loose to medium dense SAND	110	N/A	30°
777.50 – 747.00	Very soft to hard silty CLAY	120	100 - 2,400 psf	N/A
763.00 – 737.00	Medium dense SAND	110	N/A	30°
758.00 – 702.50	Medium stiff to hard silty CLAY	120	1,200 – 2,200 psf	N/A
LB-19 through SB-05 (Station # 297+50 through 306+00)				
790.50 – 782.50	UNDOCUMENTED FILL: Loam	110 – 120	N/A	N/A
789.90 – 784.90	Medium dense SAND	110	N/A	30°
782.50 – 762.50	Stiff to very stiff silty CLAY	120	1,800 psf	N/A
762.50 – 757.50	Medium dense SAND	110	N/A	32°
757.50 – 715.50	Stiff to very stiff silty CLAY	120	1,200 psf	N/A

The soils were visually classified as silty clay (A-4, A-6 & A-7), fine sand and poorly graded sand (A-2 & A-3) according to the American Association of State Highway and Transportation Officials (AASHTO).

Unconfined compressive strengths were obtained using a calibrated Rimac. Estimated friction angle of granular soils is based on empirical correlations using N-values.

The thicknesses above are based on visual observation and are therefore approximate. The above table is a general summary of subsurface conditions. Please refer to the boring logs for more detailed information.

Groundwater Conditions

Groundwater was encountered in most of the borings. The following table summarizes groundwater observations from the field:



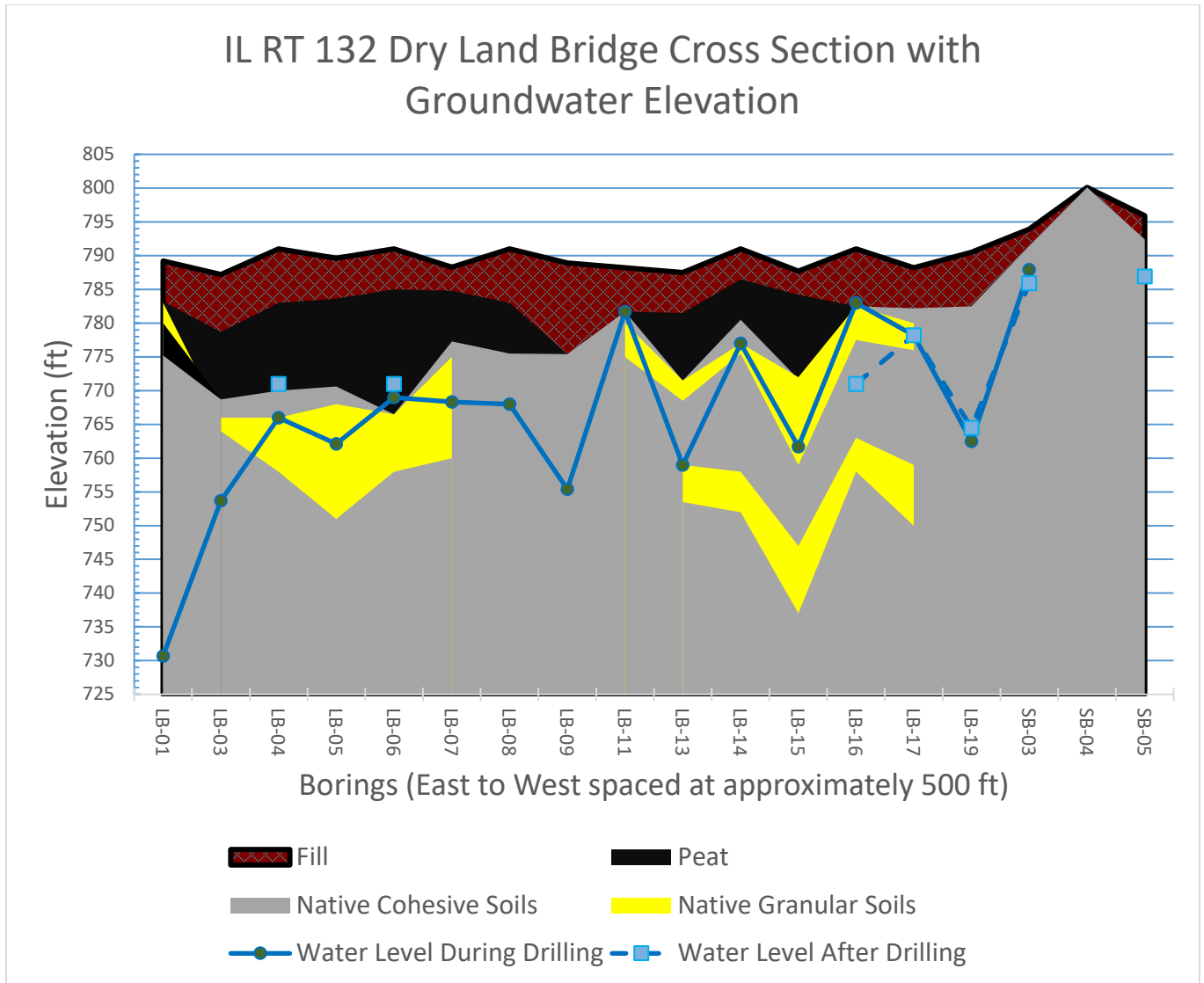


Table 2: Groundwater Observation Summary

BORING NUMBER	GROUNDWATER ELEVATION DURING DRILLING (FEET)	GROUNDWATER ELEVATION UPON AUGER REMOVAL (FEET)
LB-01	730.70 ft. (58.5 ft.)	N/A
LB-03	753.70 ft. (33.5 ft.)	N/A
LB-04	766.00 ft. (25 ft.)	771.00 ft. (20 ft.)
LB-05	762.10 ft. (27.5 ft.)	N/A
LB-06	769.00 ft. (22 ft.)	771.00 ft. (20 ft.)
LB-07	768.30 ft. (20 ft.)	N/A
LB-08	768.00 ft. (23 ft.)	N/A
LB-09	755.40 ft. (33.5 ft.)	N/A



BORING NUMBER	GROUNDWATER ELEVATION DURING DRILLING (FEET)	GROUNDWATER ELEVATION UPON AUGER REMOVAL (FEET)
LB-11	781.70 ft. (6.5 ft.)	N/A
LB-13	759.00 ft. (28.5 ft.)	N/A
LB-14	773.50 ft. (14 ft.)	N/A
LB-15	761.70 ft. (26 ft.)	N/A
LB-16	761.70 ft. (8 ft.)	771.00 ft. (20 ft.)
LB-17	778.20 ft. (10 ft.)	778.20 ft. (10 ft.)
LB-19	762.50 ft. (28 ft.)	764.50 ft. (26 ft.)
SB-3	787.90 ft. (6 ft.)	785.90 ft. (8 ft.)
SB-4	N/A	N/A
SB-5	N/A	786.90 ft. (9 ft.)

It should be noted that fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. Additionally, discontinuous zones of perched water may exist within the soils. The possibility of groundwater level fluctuation should be considered when developing the design and construction plans for the project.

Cone Penetrometer Testing (CPT) Discussion

Cone Penetrometer Tests were performed in addition to the traditional soil borings. CPT allows continuous data collection of the soil profile to be rapidly collected and can be performed in areas where access is unavailable for standard drill rigs. The CPT data was used in conjunction with SPT data to confirm and enhance estimates of soil behavior/classification, soil strength parameters, water table levels.

The CPT data backed up Rubino's estimates of soil shear strength and bearing capacity for each of the subsurface layers. The continuous data collection allowed Rubino to obtain information on soil layers that were lacking data between sample intervals or where data was lacking due to sample deterioration.

The results of the CPT data indicate that the soils shear strengths may be higher than estimated from traditional SPT data. Rubino welcomes the opportunity to discuss the CPT data further with the designers.

EVALUATION AND RECOMMENDATIONS

The geotechnical-related recommendations in this report are presented based on the subsurface conditions encountered and Rubino's understanding of the project. Should changes in the project criteria occur, a review must be made by Rubino to determine if modifications to our recommendations will be necessary.



Undocumented Fill

Undocumented fill was observed in the borings to elevations from about 791.00 to 775.40 feet.

The undocumented fill soils were generally classified as loam. The soils provided resistance to standard SPT-Sampling, however would not remain in-tact during Rimac Testing.

Deleterious materials were not observed within the undocumented fill materials during the drilling operations. If encountered, deleterious materials could impede excavation or pile driving. Deleterious materials could include, but are not limited to, bricks, asphalt, concrete, metal, wood, or other building debris.

Although deleterious materials were not encountered in all the undocumented fill materials, this does not eliminate the possibility that deleterious materials could be present within the undocumented fill materials at other locations on the site.

Undocumented fill is defined as fill that has been placed without being documented as to its placed density and moisture content.

Deleterious materials could include, but are not limited to, bricks, asphalt, concrete, metal, wood, or other building debris.

Organic Soils Discussion

Organic soils were observed within the borings during the drilling operations.

Peat was encountered in many of the borings at elevations ranging from approximately 786.5 feet to 766.5 feet.

Organic soils can later cause settlement or stability problems for roadway pavements and utilities. This report was prepared to provide recommendations for supporting the proposed dry land bridge by driving piles through the peat soils to suitable bearing soils at varying depths.

Temporary pavements will need to be stabilized as part of construction over organic soils. See the [Temporary Pavement Subgrade Stability](#) section for more information.

Organic soils are defined as soils containing greater than 10% organic matter, typically consisting of decomposed plant material accumulated under conditions of excessive moisture. Organic soils are dark colored in nature and may exhibit the odor of decaying vegetation.

Peat is a highly compressible soil with low shear strength which can be problematic. Partial decomposition of multiple types of plants in wet, anoxic environments encourages production of peat, leading to a soil of a high fibrous organic content.



Table 3: Organic Content by Location

Location	Elevation Range (feet)	Organic Content (Loss on Ignition; LOI %)
IL – 132 Land Bridge (LB-01)	780.20 – 775.20 ft.	31 – 75 %
IL – 132 Land Bridge (LB-03)	778.70 – 768.70 ft.	55 – 93 %
IL – 132 Land Bridge (LB-04)	783.00 – 770.00 ft.	71 – 77 %
IL – 132 Land Bridge (LB-05)	783.60 – 770.60 ft.	15 – 92 %
IL – 132 Land Bridge (LB-06)	781.20 – 766.50 ft.	18 – 83 %
IL – 132 Land Bridge (LB-07)	784.80 – 777.30 ft.	16 – 80 %
IL – 132 Land Bridge (LB-08)	783.00 – 775.50 ft.	22 – 91 %
IL – 132 Land Bridge (LB-11)	788.20 – 781.70 ft.	33 %
IL – 132 Land Bridge (LB-13)	781.50 – 771.50 ft.	55 – 88 %
IL – 132 Land Bridge (LB-14)	786.50 – 780.50 ft.	19 – 39 %
IL – 132 Land Bridge (LB-15)	784.20 – 771.70 ft.	63 – 76 %
IL – 132 Land Bridge (LB-16)	790.83 – 782.50 ft.	12 – 29 %
IL – 132 Land Bridge (LB-17)	788.20 – 782.20 ft.	17 %

Temporary Pavement Subgrade Stability Recommendations

Rubino understands that ABNA is planning on constructing a temporary pavement drive lane on the north side of IL 132 to accommodate traffic during the construction process. Potentially unstable soil should be tested with a static cone penetrometer and treated in accordance with Article 301.04 of the standard specifications and undercut guidelines in the IDOT Subgrade Stability Manual.

If unsuitable soils are removed and the area is still wet or unstable, the underlying soils may be stabilized by “walking-in” consecutive layers of approximately 6 inches of 3-inch stone placed on the subgrade until the voids of the 3-inch stone are filled with the soft soil. Construction grades may then be established using CA-6 stone, or the native soils following moisture conditioning. A layer of geotextile should be placed between the 3-inch stone / clay mixture and an open-graded stone, if applicable.

Please note that additional load from additional fill and/or new roadways may cause settlement over time. The following stabilization methods could be considered to mitigate short-term and long-term settlement in areas outside the proposed dry land bridge structure:



Geosynthetic Options

As a result of the unsuitable soils encountered during drilling operations, Rubino recommends the use of a geosynthetic material to assist in supporting the temporary pavement. More information on each of the following options can be found in **Section 6.18 of IDOT’s Geotechnical Manual**:

- **Lightweight fill such as Geofoam** can be used to prepare subgrade for temporary pavements and long-term bike paths planned over soft, compressible soils as found along the area of proposed temporary pavement construction.
- **Geogrids** are another option to improve subgrade stability in a bridging fashion. Geogrids consist of integrally connected elements that include uniformly distributed openings to increase soil interaction with the geogrid, increasing stability, and ensuring unrestricted vertical drainage. Geogrid / stone mats may not mitigate settlement as much as distribute load to create a more uniform settlement.

Site Preparation & Fill Recommendations

During construction, the site should be stripped of existing concrete, abandoned utilities, and pavement sections including asphalt, subbase, and curbs if applicable.

Please note that clay subgrade soils are sensitive to moisture and can be easily disturbed by precipitation, groundwater, or construction equipment. Therefore, extra care should be used to avoid disturbing these soils during construction activities.

If cohesive soils become wet or unstable during construction, or if near surface soft subgrade soils are encountered, it is recommended that coarse aggregate be placed on the subgrade until a stable base for compaction of fill is achieved. The coarse aggregate should consist of clean, crushed stone or gravel between ¼ and 3 inches in size. The coarse aggregate should be spread in a maximum of 6-inch layers and consolidated with compaction equipment until it is worked as much as possible into the existing soft or loose soil. This will “lock” up the unstable soil and create a bridging-type affect.

Deep Foundation Discussion

The following table summarizes pros and cons for three deep foundation options:

Driven Metal Shell	Driven Steel H-Piles	Drilled Piers / Augered Cast-in-Place (ACIP) Piers
<i>Recommended</i>	<i>Possible Option</i>	<i>Not Recommended</i>
<p><u>Considerations:</u></p> <p>Driven metal shell piles, are recommended based on:</p>	<p><u>Considerations:</u></p> <p>Driven H-Piles are a possibility at this site however,</p>	<p><u>Considerations:</u></p> <p>Drilled piers are not considered due to:</p>



<ul style="list-style-type: none"> • Provide more resistance per pile • Piles can be prefabricated prior to arriving at the site • No spoils are generated during driving • Precast Piles are difficult to splice 	<ul style="list-style-type: none"> • Capacity per pile is less than with the pipe piles. • Piles can be prefabricated prior to arriving at the site • These are more suitable for driving to a pre-determined hard layer or bedrock 	<ul style="list-style-type: none"> • The presence of shallow groundwater • No hard layer was encountered • Drilled Piers produce spoils that would need to be hauled off site.
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Additional Notes:

- Driven piles involve cutting off extra lengths or adding more lengths which could increase cost due to the possibility of soil variability across the site.
- As a part of the foundation selection process, there is a cost/benefit evaluation. Although we are recommending a specific foundation type, we have not performed a cost/benefit evaluation.
- **Precast concrete 14”X14” piles** were analyzed for this project, however the maximum nominal required bearing capacity of the pile results in a factored pile capacity less than 67 tons (150 kips) in most cases.

Deep Foundation – Driven Metal Shell Piles

Based on the factors considered above, Rubino is providing the following geotechnical recommendations for driven metal shell piles with the capacity largely obtained from skin friction.

The following plot provides a generalized visual of subsurface conditions with estimated pile lengths corresponding to an approximate bearing capacity of 150 kips/pile for both 12” and 14” Φ Metal Shell Piles with 0.25” walls. It is not to scale. The borings are arranged in order from East to West as they were drilled on IL RT 132.

The driven metal shell piles should be designed to be at least **3 diameters apart** (center-to-center) from each other or group reduction factors will need to be employed in the design capacity of these members. **Based on the soil boring data (cobbles and dense soils not encountered), hard pile driving is not anticipated during installation; therefore metal shoes are not recommended at this time.**

Based on the subgrade information obtained during this investigation, vertical capacities of multiple types of **driven metal shell piles** for each boring were calculated and can be found in the Appendix.

The capacities were derived using the IDOT Static Method of Estimating Pile Length Spreadsheet and the procedure outlined in the IDOT Design Guide AGMU 10-2 Geotechnical Pile Design.

The IDOT Static Method of Estimating Pile Length Spreadsheet calculates the factored resistance available in the boring using LRFD and the WSDOT Method for calculating pile capacities. The following excerpt can be found in the above referenced Design Guide:



Verify??

The Geotechnical Resistance Factor (ϕ_G) shall be selected to represent the reliability of the construction method used to verify that the R_N has been developed. Our analysis using both national and local driving records and load tests indicated a ϕ_G of 0.55 should be used to compute R_F if the WSDOT formula is specified for construction verification. When more accurate construction verification methods are proposed, such as with static load test or a Pile Driving Analyzer (PDA), the resistance factor used may be increased to the values provided in the AASHTO specifications.

The WSDOT (IDOT) spreadsheets with ranges of factored pile resistances, corresponding nominal required bearings, and estimated pile lengths can be found in the Appendix.

A factored load per pile of 67 tons (150 kips) was provided by ABNA. An estimated factored load of 1000 kips was used in calculation of the recommended pile lengths to provide a range of factored pile capacities and pile lengths, including the 150kips/pile requested by ABNA. Generally, pile lengths were not recommended within 15 feet of the termination of our boring, exceptions are noted below where some piles were able to achieve the maximum nominal bearing of the pile within the boring within 15 feet of the end of our boring.

The following tables summarize the recommended pile lengths and corresponding pile capacities for each boring and each boring covers multiple bents.

Table 4: Pile Capacity – West Abutment, Bent 1 through Bent 3 (LB-03)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
132	73	36	749
203	112	44	742
288	158	51	734
392*	216*	65*	721*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
138	76	34	752
275	151	46	739
375	206	56	729
459*	252*	65	721
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
138	76	34	752
275	151	46	739
375	206	56	729

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth



Table 5: Pile Capacity – Bent 4 (LB-04)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
135	74	41	744
211	116	54	732
281	155	64	722
392*	216*	80	706*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
136	75	39	747
294	162	59	727
390	214	71	714
459*	252*	80*	706*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
136	75	39	747
294	162	59	727
390	214	71	714

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth

Table 6: Pile Capacity – Bent 5 & Bent 6 (LB-05)

R_N NOMINAL REQUIRED BEARING, (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION, (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
129	71	49	736
152	84	52	734
213	117	57	729
282**	150**	66**	720**
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
128	70	47	739
184	101	52	734
258	142	57	729
293*	150*	62*	724*



R_N NOMINAL REQUIRED BEARING, (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION, (FEET)
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
128	70	47	739
184	101	52	734
258	142	57	729
293*	150*	62*	724*

*These pile lengths are within approximately 10 feet of the boring termination depth

**12" diameter metal shell pile only reached the expected factored load approximately 1-2 feet from the boring termination depth, therefore the actual field pile length may vary due to the lack of information below that depth.

Table 7: Pile Capacity – Bent 7 & Bent 8 (LB-06)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
134	74	46	739
230	126	56	729
294	162	66	719
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
142	78	44	741
275	151	56	729
372	205	69	716
459*	252*	80*	705*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
142	78	44	741
275	151	56	729
372	205	69	716

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth



Table 8: Pile Capacity – Bents 9 through Bent 11 (LB-07)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
153	84	35	750
277	152	55	730
331	182	65	720
392*	216*	71*	714*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
153	84	30	755
281	155	47	738
377	208	62	723
459*	252*	71*	714*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
153	84	30	755
281	155	47	738
377	208	62	723

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth

Table 9: Pile Capacity – Bents 12 & Bent 13 (LB-08)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
153	84	40	745
275	151	60	725
373	205	70	715
392*	216*	79*	707*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
158	87	35	750
292	160	50	735
360	198	65	720
459*	252*	79*	707*



R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
158	87	35	750
292	160	50	735
360	198	65	720

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth

Table 10: Pile Capacity – Bent 14 through Bent 16 (LB-09)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
155	85	32	753
272	150	47	738
392	216	63	724
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
152	84	27	758
290	159	45	741
459	252	63	722
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
152	84	27	758
290	159	45	741
472	260	65	721

Table 11: Pile Capacity – Bent 17 through Bent 21 (LB-11)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
146	80	23	763
276	152	40	745
392	216	56	729



R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
142	78	18	768
286	157	35	750
459	252	56	729
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
142	78	18	768
286	157	35	750
377	208	45	740

Table 12: Pile Capacity – Bent 22 through Bent 24 (LB-13)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
160	88	38	747
270	149	53	732
392	216	67	719
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
199	109	38	747
282	155	51	735
459	252	67	719
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
199	109	38	747
282	155	51	735
505	278	68	717



Table 13: Pile Capacity – Bent 25 & Bent 26 (LB-14)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
173	95	33	752
276	152	51	734
366	201	71	714
392*	216*	74*	711*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
162	89	26	759
288	158	43	742
384	211	63	722
459*	252*	74*	711*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
162	89	26	759
288	158	43	742
384	211	63	722

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth

Table 14: Pile Capacity – Bent 27 & Bent 28 (LB-15)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
142	78	35	750
274	151	58	272
323	177	70	715
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
146	80	33	752
289	159	53	732
378	208	70	715



R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
146	80	33	752
289	159	53	732
378	208	70	715

Table 15: Pile Capacity – Bent 29 through Bent 31 (LB-16)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
144	79	19	766
290	160	47	738
392	216	65	720
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
155	85	17	768
273	150	32	753
459	252	65	720
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
155	85	17	768
273	150	32	753
379	208	52	733

Table 16: Pile Capacity – Bent 32 through Bent 34 (LB-17)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
163	90	33	753
274	151	53	733
352	193	65	720
392*	216*	71*	714*



R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
147	81	23	763
276	152	45	740
415	228	65	720
459*	252*	71*	714*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
147	81	23	763
276	152	45	740
415	228	65	720

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth

Table 17: Pile Capacity – Bent 36 through Bent 40, East Abutment (LB-19)

R_N NOMINAL REQUIRED BEARING (KIPS)	R_F FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FEET)	ESTIMATED PILE TIP ELEVATION (FEET)
Metal Shell, 12 in. Φ, w / 0.25 in. walls			
154	85	26	760
272	150	43	743
363	200	58	728
392*	216*	62*	724*
Metal Shell, 14 in. Φ, w / 0.25 in. walls			
163	90	21	765
271	149	38	748
429	236	58	728
459*	252*	62*	724*
Metal Shell, 14 in. Φ, w / 0.312 in. walls			
163	90	21	765
271	149	38	748
429	236	58	728

*Maximum Nominal Bearing of the Pile was achieved within the boring but closer than approximately 15 feet of the termination of the boring depth



Lateral Loads

Rubino does not anticipate there to be a lateral load large enough to mobilize the lateral capacity of the surficial undocumented fill soils. In general, the upper 5-feet below grade of the slab is typically ignored in a lateral capacity analysis. Please notify Rubino if lateral capacity of the piles is an issue at this site.

Construction Considerations

Test Piles

Rubino recommends the utilization of at least one test pile in either abutment or at any bent in order to obtain site specific pile bearing and length data. This data can be used in addition to the boring information, to supplement the estimated plan length. This recommendation has been made in accordance with the 2012 IDOT Bridge Manual Section 3.10.1.7.

Existing Utilities

The potential for existing utility conflicts was discussed in the “Final Project” report for this structure, prepared by IDOT.

In areas of potential utility conflict, it may be necessary to pre-drill the locations prior to driving the piles. The pile capacities should be reduced accordingly which may extend the pile length in those locations. The pre-drilled holes should be backfilled with flowable fill upon completion of pile driving.

Seismic Considerations

The seismic site class was determined using the IDOT Spreadsheet “*Seismic Site Class Determination*” dated December 10, 2010. Based on the soils encountered and depth to bedrock, the project area is in Seismic Site Class E. The results of the “*Seismic Site Class Determination*” are shown in the Appendix J.

The USGS Unified Hazard Tool was used to calculate the PGA , S_s , and S_1 values for bedrock motion. Those values were then used to determine the Adjusted Maximum Considered Earthquake (MCE) Spectral Response Acceleration Parameters (S_{MS} and S_{M1}) in accordance with Section 3.10.2 of AASHTO *LRFD Bridge Design Specifications* (AASHTO, 2017). The MCE Spectral Response Acceleration Parameters were then adjusted to determine the Design Spectral Acceleration Parameters at short period (S_{DS}) and 1-second period (S_{D1}). The Design Spectral Acceleration Parameters and Seismic Performance Zone Value (SPZ), in accordance with AASHTO *LRFD Bridge Design Specifications* (AASHTO, 2017) are shown in the table below.



Table 18: Seismic Design Parameters

SEISMIC PARAMETER	VALUE
Design Spectral Acceleration Coefficient at 0.2 sec. (S_{DS})	0.159g
Design Spectral Acceleration Coefficient at 1.0 sec (S_{D1})	0.114g
Seismic Performance Zone (SPZ)	1
Soil Site Class	E

CLOSING

The recommendations submitted are based on the available subsurface information obtained by Rubino Engineering, Inc. and design details furnished by ABNA Engineering, Inc. for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Rubino should be notified immediately to determine if changes in the foundation recommendations are required. If Rubino is not retained to perform these functions, we will not be responsible for the impact of those conditions on the project.

The scope of services did not include an environmental assessment to determine the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air, on, or below or around this site. Any statements in this report and/or on the boring logs regarding odors, colors, and/or unusual or suspicious items or conditions are strictly for informational purposes.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of ABNA Engineering, Inc. and their consultants for the specific application to the proposed IL 132 Dry Land Bridge in Lake Villa, Illinois.



APPENDIX A - DRILLING, FIELD, AND LABORATORY TEST PROCEDURES

Standard Penetration Tests and Split-Barrel Sampling of Soils

During the sampling procedure, Standard Penetration Tests (SPT's) were performed at regular intervals to obtain the standard penetration (N-value) of the soil. The results of the standard penetration test are used to estimate the relative strength and compressibility of the soil profile components through empirical correlations to the soils' relative density and consistency. The split-barrel sampler obtains a soil sample for classification purposes and laboratory testing, as appropriate for the type of soil obtained.

Ground Surface Elevations

The depths indicated on the attached boring logs are relative to the existing ground surface for each individual boring at the time of the exploration. Ground surface elevations were surveyed and provided to Rubino by Accurate Group. Copies of the boring logs are located in the Appendix of this report.

Water (Moisture) Content of Soil by Mass (Laboratory)

The water content is an important index property used in expressing the phase relationship of solids, water, and air in a given volume of material and can be used to correlate soil behavior with its index properties. In fine grained cohesive soils, the behavior of a given soil type often depends on its natural water content. The water content of a cohesive soil along with its liquid and plastic limits as determined by Atterberg Limit testing are used to express the soil's relative consistency or liquidity index.

Atterberg Limits (Laboratory)

Atterberg limit testing defines the liquid limit (LL) and plastic limit (PL) states of a given soil. These limits are used to determine the moisture content limits where the soil characteristics changes from behaving more like a fluid on the liquid limit end to where the soil behaves more like individual soil particles on the plastic limit end. The liquid limit is often used to determine if a soil is a low or high plasticity soil.

The plasticity index (PI) is difference between the liquid limit and the plastic limit. The plasticity index is used in conjunction with the liquid limit to determine if the material will behave like a silt or clay. The material can also be classified as an organic material by comparing the liquid limit of the natural material to the liquid limit of the sample after being oven-dried.

Particle Size Analysis (Laboratory)

The Particle Size Analysis of Soils determines the distribution of particle sizes in order to further classify the soil. The distribution of particle sizes larger than 75 μ m (retained on the No. 200 sieve) is determined by sieving, while the distribution of particle sizes smaller than 75 μ m is determined by a sedimentation process, using a hydrometer to secure the necessary data. These soils are then classified more accurately based on the distribution information.

APPENDIX B- REPORT LIMITATIONS

Subsurface Conditions:

The subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data as well as water level information. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur, and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition between layers may be gradual. The samples, which were not altered by laboratory testing, will be retained for up to 60 days from the date of this report and then will be discarded.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools that geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free, and more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations, presented in the preceding section, constitute Rubino's professional estimate of the necessary measures for the proposed structure to perform according to the proposed design based on the information generated and reference during this evaluation, and Rubino's experience in working with these conditions.

Warranty:

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Federal Excavation Regulations:

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. This federal regulation mandates that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Rubino is providing this information solely as a service to our client. Rubino is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

APPENDIX C - SOIL CLASSIFICATION GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1 3/8" I.D., 2" O.D., unless otherwise noted	PS:	Piston Sample
ST:	Thin-Walled Tube - 3" O.D., Unless otherwise noted	WS:	Wash Sample
PM:	Pressuremeter	HA:	Hand Auger
RB:	Rock Bit	HS:	Hollow Stem Auger
DB:	Diamond Bit - 4", N, B	BS:	Bulk Sample

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler (SS), except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of ground water levels is not possible with only short term observations.

DESCRIPTIVE SOIL CLASSIFICATION:

Soil Classification is based on the Unified Soil Classification System as defined in ASTM D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength, Qu (tsf)	Consistency
< 0.25	Very Soft
0.25 - 0.5	Soft
0.5 - 1	Medium Stiff
1 - 2	Stiff
2 - 4	Very Stiff
4 - 8	Hard
> 8	Very Hard

RELATIVE PROPORTIONS OF SAND & GRAVEL

Descriptive Term	% of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. To 3 in. (300mm to 75mm)
Gravel	3 in. To #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.75mm)

*Descriptive Terms apply to components also present in sample

APPENDIX D- SOIL CLASSIFICATION CHART

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

APPENDIX E – SITE VICINITY MAP & BORING LOCATION PLAN



665 Tollgate Rd. Unit H
Elgin, Illinois 60123

Project Name:

Project Location:

Client:

Rubino Project # :

IL 132 Dry Land Bridge

IL 132 Between Oak Lane Dr and McKinley Ave

Lake Villa, Illinois

ABNA Engineering, Inc.

G16.099

**Site
Vicinity
Map**



rubino
ENGINEERING INC.

665 Tollgate Rd. Unit H
Elgin, Illinois 60123

Project Name:
Project Location:

Client:
Rubino Project # :

IL 132 Dry Land Bridge
IL 132 Between Oak Lane Dr and McKinley Ave
Lake Villa, Illinois
ABNA Engineering, Inc.
G16.099

**Boring
Location
Plan
(1 of 2)**



rubino
ENGINEERING INC.

665 Tollgate Rd. Unit H
Elgin, Illinois 60123

Project Name: IL 132 Dry Land Bridge
Project Location: IL 132 Between Oak Lane Dr and McKinley Ave
 Lake Villa, Illinois
Client: ABNA Engineering, Inc.
Rubino Project # : G16.099

**Boring
Location
Plan
(2 of 2)**

APPENDIX F – BORING LOGS

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

 SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

 COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u> Land Bridge </u> Station <u> N/A </u>	D E P T H S (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T S (%)	Surface Water Elev. <u> N/A </u> ft Stream Bed Elev. <u> N/A </u> ft	D E P T H S (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T S (%)	
BORING NO. <u> LB-01 </u> Station <u> 288+50 </u> Offset <u> 16 N of CL </u> Ground Surface Elev. <u> 789.20 </u> ft					Groundwater Elev.: First Encounter <u> 58.5 </u> ft ▼ Upon Completion <u> N/A </u> ft After <u> N/A </u> Hrs. <u> N/A </u> ft					
	FILL: Black, brown, and gray LOAM	—				A-6: Very soft to very stiff gray silty CLAY <i>(continued)</i>	—			
		—	10			23	—	6	2.9	14
		—	7				—	10	B	
		—	5				—	15		
	—	3		13	—	6	2.5	17		
	—	2			—	8	B			
783.20	—	-5	3		—	-25	9			
						—				
A-3: Medium dense gray poorly-graded fine SAND	—	6			—	4	7.0	14		
	—	7			—	9	B			
	—	3			—	13				
	—	2	0.0	301	—	7	6.2	13		
Black PEAT Organic content: 31 - 75%	—	1			—	11	B			
	—	-10	1		—	-30	14			
	—	1	0.0	157	—	—				
	—	2			—	—				
	—	2			—	—				
775.20	—	1	0.0	24	—	7	3.1	19		
A-6: Very soft to very stiff gray silty CLAY	—	0			—	9	B			
	—	-15	0		—	-35	12			
	—	2	1.2	13	—	—				
	—	3	B		—	—				
	—	5			—	—				
	—	3	1.7	14	—	4	3.5	13		
	—	4	B		—	5	B			
	—	-20	6		—	-40	12			

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

	D E P T H S (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)		D E P T H S (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
STRUCT. NO. <u>Land Bridge</u> Station <u>N/A</u>					Surface Water Elev. <u>N/A</u> ft				
BORING NO. <u>LB-03</u> Station <u>289+50</u> Offset <u>26 N of CL</u> Ground Surface Elev. <u>787.20</u> ft					Stream Bed Elev. <u>N/A</u> ft				
					Groundwater Elev.:				
					First Encounter <u>33.5</u> ft ▼				
					Upon Completion <u>N/A</u> ft				
					After <u>N/A</u> Hrs. <u>N/A</u> ft				
FILL: Black, brown, and gray LOAM	—				A-6: Soft gray silty CLAY (continued)	—			
					766.20				
	— 2			37	A-3: Medium dense gray poorly-graded fine SAND	— 5			
	— 3					— 9			
	— 2					— 8			
					763.70				
	— 5			19	A-6: Soft to very stiff gray silty CLAY	— 0		0.0	21
	— 8					— 2			
	-5 5					-25 1			
						—			
	— 3			28		— 3		1.2	18
	— 2					— 4		B	
	— 4					— 4			
778.70									
Black PEAT Organic content: 55 - 93%	— 0		0.0	265		— 3		2.9	20
	— 1					— 4		B	
	-10 0					-30 6			
						—			
	— 1		0.0	320		—			
	— 1					—			
	— 2					—			
						—			
	— 0		0.0	139		▼			
	— 0					— 4		5.6	15
	-15 0					— 6		B	
						-35 9			
						—			
	— 1		0.0	102		—			
	— 2					—			
	— 2					—			
768.70						—			
A-6: Soft gray silty CLAY	— 1		0.0	41		— 3		2.7	19
	— 2					— 6		B	
	-20 1					-40 8			

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



SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. Station	D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)	Surface Water Elev.	D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
					N/A ft				
<u>Land Bridge</u>									
<u>N/A</u>									
<u>LB-03</u>									
<u>289+50</u>									
<u>26 N of CL</u>									
<u>787.20</u>					<u>33.5</u>	<u>ft ▼</u>			
					<u>N/A</u>	<u>ft</u>			
					<u>N/A</u>	<u>ft</u>			
<u>A-6: Soft to very stiff gray silty CLAY</u>					<u>N/A</u>	<u>Hrs.</u>			
<i>(continued)</i>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>5</u>	<u>2.9</u>	<u>15</u>		<u>3</u>	<u>3.3</u>	<u>22</u>		
	<u>7</u>	<u>B</u>			<u>5</u>	<u>B</u>			
	<u>-45</u>	<u>10</u>			<u>-65</u>	<u>7</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>5</u>	<u>4.7</u>	<u>12</u>		<u>6</u>	<u>3.3</u>	<u>19</u>		
	<u>11</u>	<u>B</u>			<u>10</u>	<u>B</u>			
	<u>-50</u>	<u>9</u>			<u>717.20</u>	<u>-70</u>	<u>14</u>		
<u>A-6: Soft to very stiff gray silty CLAY</u>					<u>End of boring at 70 feet.</u>				
<i>(continued)</i>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>5</u>	<u>5.6</u>	<u>23</u>		<u>—</u>	<u>—</u>			
	<u>9</u>	<u>B</u>			<u>—</u>	<u>—</u>			
	<u>-55</u>	<u>12</u>			<u>-75</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>			
	<u>4</u>	<u>3.5</u>	<u>25</u>		<u>—</u>	<u>—</u>			
	<u>6</u>	<u>B</u>			<u>—</u>	<u>—</u>			
	<u>-60</u>	<u>10</u>			<u>-80</u>	<u>—</u>			

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

BBS, from 137 (Rev. 8-99)

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	DESCRIPTION	D E P T H S	B L O W S	U C S	M O I S T	Surface Water Elev.	Stream Bed Elev.	D E P T H	B L O W S	U C S	M O I S T
BORING NO.	STATION	(ft)	(/6")	(tsf)	(%)	ft	ft	(ft)	(/6")	(tsf)	(%)
Land Bridge	N/A					N/A	N/A				
LB-04	290+25										
	50 S of CL										
	Ground Surface Elev. 787.10	ft									
FILL: Black, brown, and gray LOAM						Black PEAT	Organic content: 71 - 77% (continued)	766.10			
		8			7			1		0.0	53
		12						2			
		6						2			
		2			20			0		0.0	36
		2						0			
		-5	3					1			
							762.10	▼-25			
						A-3: Medium dense gray poorly-graded fine SAND					
		5			16			6			
		6						8			
		6						9			
	779.10										
Black PEAT											
Organic content: 71 - 77%											
		2		0.0	224			4			
		1						6			
		-10	2					-30	6		
		2			296						
		2									
		2									
							754.10				
						A-6: Soft to hard gray silty CLAY					
		1		0.0	467			1		0.5	28
		2						2		B	
		-15	1					-35	2		
		2			441						
		1									
		2									
		0			67			5		2.9	18
		1						7		B	
		▼20	1					-40	10		

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u>	D	B	U	M	Surface Water Elev. <u>N/A</u> ft	D	B	U	M
Station <u>N/A</u>	E	L	C	O	Stream Bed Elev. <u>N/A</u> ft	E	L	C	O
BORING NO. <u>LB-04</u>	P	W	Qu	S	Groundwater Elev.:	T	W	Qu	T
Station <u>290+25</u>	H	S		T	First Encounter <u>25</u> ft ▼	H	S		T
Offset <u>50 S of CL</u>	(ft)	(/6")	(tsf)	(%)	Upon Completion <u>N/A</u> ft	(ft)	(/6")	(tsf)	(%)
Ground Surface Elev. <u>787.10</u> ft					After <u>N/A</u> Hrs. <u>20</u> ft ▼				

A-6: Soft to hard gray silty CLAY (continued)	—				A-6: Soft to hard gray silty CLAY (continued)	—			
	—					—			
	—					—			
	—					—			
	—					—			
	—	5	5.0	15		—	11	2.9	17
	—	8	B			—	19	B	
	-45	18				-65	23		
	—					—			
	—					—			
	—					—			
	—					—			
	—					—			
	—					—			
	—	6	4.3	15		—	5	2.5	19
—	11	B		—	9	B			
-50	18			-70	13				
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—	9	3.7	16	—	6	2.5	22		
—	13	B		—	12	B			
-55	19			-75	20				
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—	5	2.0	17	—	5	2.5	25		
—	7	B		—	8	B			
-60	11			-80	9				

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Land Bridge	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)	Surface Water Elev.	N/A	ft	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
Station	N/A					Stream Bed Elev.	N/A	ft				
BORING NO.	LB-05					Groundwater Elev.:						
Station	290+50					First Encounter	27.5	ft ▼				
Offset	27 N of CL					Upon Completion	N/A	ft				
Ground Surface Elev.	786.60	ft				After	N/A	Hrs.				
FILL: Black, brown, and gray LOAM						A-6: Very soft gray silty CLAY (continued)						
		—					765.10		—	4		
		— 2			32	A-3: Medium dense gray poorly-graded fine SAND						
		— 2							—	7		
		— 2							—	7		
		— 0			33	A-6: Very soft to soft gray silty CLAY						
		— 1					762.60		—	0	0.0	52
		— -5	1						—	0		
		—							—	-25	1	
		—							—			
	780.60											
Black PEAT Organic content: 15 - 92%						A-6: Very soft gray silty CLAY						
		— 2		0.0	44				—	2	0.0	48
		— 5							—	1		
		— 2					759.10 ▼		—	2		
		—				A-3: Medium dense gray poorly-graded fine SAND						
		— 2		0.0	61				—	4		
		— 1							—	7		
		— -10	1						—	-30	8	
		—							—			
		— 2		0.0	466				—			
		— 2							—			
		— 2							—			
		— 1		0.0	236				—	5		
		— 1							—	3		
		— -15	1						—	-35	7	
		—							—			
		— 2		0.0	198				—			
		— 2							—			
		— 2							—			
		—							—			
		—					748.10		—			
	767.60		0	0.0	112	A-6: Soft to very stiff gray silty CLAY Organic content: 11%						
A-6: Very soft gray silty CLAY									—	1	0.0	36
		— 0							—	2		
		— -20	1						—	-40	2	

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	DESCRIPTION	D E P T H S	B L O W S	U C S	M O I S T	Surface Water Elev.	Stream Bed Elev.	D E P T H	B L O W S	U C S	M O I S T
BORING NO.	STATION	(ft)	(/6")	(tsf)	(%)	ft	ft	(ft)	(/6")	(tsf)	(%)
Land Bridge	N/A					N/A	N/A				
LB-06	290+75										
	58 S of CL										
	Ground Surface Elev.	786.90									
FILL: Black, brown, and gray LOAM						Black PEAT Organic content: 18 - 83% (continued)					
		—						—			
		— 6			9			— 2		0.0	125
		— 6						▼ 3			
		— 4						— 9			
		—						—			
		— 1			19			— 2		0.0	67
		— 2					762.40	— 2			
		—5 3						—25 7			
		—						—			
		780.90									
A-6: Medium stiff to stiff gray silty CLAY						A-3: Loose to medium dense gray poorly-graded fine SAND					
		— 2		0.0	21			— 8			
		— 4						— 10			
		— 4						— 11			
		—						—			
		— 1		0.0	23			— 1			
		— 2						— 2			
		—10 3						—30 2			
		777.10						—			
Black PEAT Organic content: 18 - 83%						A-6: Medium stiff to hard gray silty CLAY					
		—						—			
		— 2		0.0	313			—			
		— 3						—			
		— 4						—			
		—					753.90	—			
		— 2		0.0	496			— 3		1.2	24
		— 1						— 4		B	
		—15 1						—35 4			
		—						—			
		— 2		0.0	389			—			
		— 2						—			
		— 3						—			
		—						—			
		— 1		0.0	125			— 4		2.0	16
		— 2						— 6		B	
		▼20 1						—40 10			

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY J.W.

 SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

 COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Station	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev.	Stream Bed Elev.	Groundwater Elev.:	First Encounter	Upon Completion	After	N/A	Hrs.	D E P T H H	B L O W S S	U C S Qu	M O I S T T
		(ft)	(/6")	(tsf)	(%)	ft	ft	ft	ft	ft	ft			(ft)	(/6")	(tsf)	(%)
	Land Bridge N/A					N/A	N/A										
BORING NO.	LB-07								20	N/A	N/A						
Station	291+50																
Offset	25 N of CL																
Ground Surface Elev.	788.30																
FILL: Black, brown, and gray LOAM		—															
		—	3		18									—	3		
		—	3											—	3		
		—	4											—	5		
	784.80																
Black PEAT Organic content: 16 - 80%		—	0	0.0	50									—	4		
		—	2											—	6		
		—	-5	2										—	-25	7	
		—												—			
		—	0	0.0	527									—	5		
		—	1											—	6		
		—	1											—	5		
		—												—			
	759.80																
A-6: Medium stiff to very stiff gray silty CLAY		—		0.0	390									—	3	3.5	18
		—												—	5	B	
		—	-10											—	-30	7	
	777.30																
A-4: Very soft gray silty CLAY		—		0.0	148												
		—															
		—															
	774.80																
A-3: Loose to medium dense gray poorly-graded fine SAND		—	3											—	7	4.7	19
		—	3											—	4	B	
		—	-15	4										—	-35	6	
		—															
		—	3														
		—	3														
		—	4														
		—	3											—	3	2.9	21
		—	4											—	5	B	
		—	-20	5										—	-40	8	

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	DESCRIPTION	D E P T H S	B L O W S	U C S	M O I S T	Surface Water Elev.	ft	D E P T H	B L O W S	U C S	M O I S T
Station		(ft)	(/6")	(tsf)	(%)			(ft)	(/6")	(tsf)	(%)
Land Bridge						N/A	ft				
N/A						N/A	ft				
LB-08											
292+00											
55 S of CL											
788.20											
Approximately 3 inches of ASPHALT	787.95										
Approximately 9 inches of GRAVEL BASE	787.20										
FILL: Black, brown, and gray LOAM		4			16			0		0.0	37
		6						0			
		8						0			
		6			9			3		1.2	18
		4						4		B	
		-5	5					-25	4		
		4			31			6		3.1	17
		3						8		B	
		5						8			
	780.20										
Black PEAT											
Organic content: 22 - 91%		1		0.0	412			3		3.1	19
		2						6		B	
		-10	2					-30	10		
		1		0.0	441						
		2									
		2									
		0		0.0	152			3		1.9	28
		1						3		B	
		-15	1					-35	5		
	772.70										
A-6: Very soft to very stiff gray silty CLAY											
		2		0.0	27						
		3									
		5									
		0		0.0	37			3		3.7	21
		0						6		B	
		-20	0					-40	10		

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Station	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)	Surface Water Elev.	Stream Bed Elev.	Groundwater Elev.:	First Encounter	Upon Completion	After	N/A Hrs.	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
Land Bridge	N/A					N/A	N/A									
LB-09	292+50								33.5	N/A	N/A					
	20 N of CL															
	Ground Surface Elev. 788.90															
FILL: Black, brown, and gray LOAM		—														
		—	4		23								—	7	2.9	17
		—	4										—	8	B	
		—	4										—	10		
		—	3		17								—	5	2.9	17
		—	3										—	5	B	
		—	-5	3									—	-25	8	
		—	3		35								—	4	2.5	16
		—	3										—	5	B	
		—	3										—	9		
		—	1		13								—	4	4.1	17
		—	2										—	7	B	
		—	-10	3									—	-30	10	
		—	5		18								—			
		—	5										—			
		—	5										—			
	775.40	—											—			
A-6: Stiff to very stiff gray silty CLAY		—	2	2.1	17								—	6	0.0	21
		—	3	B									—	6		
		—	-15	6									—	-35	5	
		—	5	3.3	16								—			
		—	7	B									—			
		—	9										—			
		—	3	2.9	17								—	3	2.9	26
		—	4	B									—	5	B	
		—	-20	6									—	-40	5	

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. Land Bridge
Station N/A

BORING NO. LB-09
Station 292+50
Offset 20 N of CL
Ground Surface Elev. 788.90 ft

D E P T H (ft)
B L O W S (/6")
U C S (tsf)
M O I S T (%)

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter 33.5 ft ▼
Upon Completion N/A ft
After N/A Hrs. N/A ft

D E P T H (ft)
B L O W S (/6")
U C S (tsf)
M O I S T (%)

Soil Description	SPT Data		UCS Data	Moisture (%)	Soil Description	SPT Data		UCS Data	Moisture (%)
	Blows	Depth (ft)				Blows	Depth (ft)		
A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—	A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	3	3	2.9 B	25	A-6: Stiff to very stiff gray silty CLAY (continued)	6	6	2.7 B	22
	5	5	—	—		7	7	—	—
	-45	5	—	—		-65	9	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—	A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	3	3	2.7 B	26	A-6: Stiff to very stiff gray silty CLAY (continued)	5	5	3.1 B	20
	4	4	—	—		4	4	—	—
	-50	7	—	—		-70	7	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—	A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	5	5	3.9 B	18	A-6: Stiff to very stiff gray silty CLAY (continued)	3	3	2.5 B	18
	6	6	—	—		6	6	—	—
	-55	8	—	—		-75	10	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—	A-6: Stiff to very stiff gray silty CLAY (continued)	—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
	—	—	—	—		—	—	—	—
A-6: Stiff to very stiff gray silty CLAY (continued)	4	4	2.7 B	18	A-6: Stiff to very stiff gray silty CLAY (continued)	4	4	2.7 B	17
	6	6	—	—		9	9	—	—
	-60	7	—	—		-80	7	—	—
				708.90					



SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. Land Bridge
Station N/A

BORING NO. LB-09
Station 292+50
Offset 20 N of CL
Ground Surface Elev. 788.90 ft

D
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P
T
H
(ft)

B
L
O
W
S
(/6")

U
C
S
Qu
(tsf)

M
O
I
S
T
(%)

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter 33.5 ft ▼
Upon Completion N/A ft
After N/A Hrs. N/A ft

End of boring at 80 feet.

—			
—			
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-85			
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-100			

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Station	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev.	Stream Bed Elev.	Groundwater Elev.:	First Encounter	Upon Completion	After	D E P T H H	B L O W S S	U C S Qu	M O I S T T
		(ft)	(/6")	(tsf)	(%)	ft	ft	ft	ft	ft	ft	(ft)	(/6")	(tsf)	(%)
FILL: Black, brown, and gray LOAM Organic content: 33%		—										—			
		—	4		21							—	6	3.9	20
		—	2									—	9	B	
		—	4									—	10		
		—										—			
		—	1		43							—	3	2.7	21
		—	2									—	5	B	
		—	-5	2								—	-25	6	
		—										—			
	781.70 ▼	—	1	0.0	26							—	5	2.7	23
A-6: Soft gray silty CLAY		—	1									—	10	B	
		—	2									—	15		
		—										—			
	779.70	—										—			
A-2: Loose to medium dense gray poorly-graded fine SAND		—	3									—	5	6.2	22
		—	3									—	9	B	
		—	-10	3								—	-30	11	
		—										—			
		—	3									—			
		—	4									—			
		—	6									—			
		—										—			
	774.70	—										—			
A-6: Stiff to very stiff gray silty CLAY		—	3	5.0	16							—	3	2.7	24
		—	5	B								—	4	B	
		—	-15	7								—	-35	5	
		—										—			
		—	9	4.7	16							—			
		—	12	B								—			
		—	16									—			
		—										—			
		—	2	3.3	16							—	3	2.7	25
		—	4	B								—	4	B	
		—	-20	6								—	-40	5	

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

SOIL BORING LOG

 ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

 SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

 COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u>	D	B	U	M	Surface Water Elev. <u>N/A</u> ft	D	B	U	M
Station <u>N/A</u>	E	L	C	O	Stream Bed Elev. <u>N/A</u> ft	E	L	C	O
BORING NO. <u>LB-11</u>	P	W	S	I	Groundwater Elev.:	T	W	Q	S
Station <u>293+50</u>	H	S	Qu	T	First Encounter <u>6.5</u> ft ▼	H	S	Qu	T
Offset <u>27 N of CL</u>	(ft)	(/6")	(tsf)	(%)	Upon Completion <u>N/A</u> ft	(ft)	(/6")	(tsf)	(%)
Ground Surface Elev. <u>788.20</u> ft					After <u>N/A</u> Hrs. <u>N/A</u> ft				

A-6: Stiff to very stiff gray silty CLAY (continued)	—				A-6: Stiff to very stiff gray silty CLAY (continued)	—			
	—					—			
	—					—			
	—					—			
	—					—			
	—	3	2.7	25		—	5	5.6	22
	—	4	B			—	9	B	
	-45	6				-65	11		
	—					—			
	—					—			
—				—					
—				—					
—				—					
—	1	3.3	17	—	4	2.7	20		
—	4	B		—	5	B			
-50	6			718.20	-70	6			
—				End of boring at 70 feet.	—				
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—	3	2.9	18	—					
—	4	B		—					
-55	6			-75					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—				—					
—	3	2.3	19	—					
—	5	B		—					
-60	6			-80					

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Station	D E P T H H	B L O W S	U C S Qu	M O I S T	Surface Water Elev.	Stream Bed Elev.	D E P T H	B L O W S	U C S Qu	M O I S T
		(ft)	(/6")	(tsf)	(%)			(ft)	(/6")	(tsf)	(%)
Land Bridge	N/A					N/A	N/A				
LB-13	294+50					28.5	N/A				
	27 N of CL										
	787.50										
FILL: Black, brown, and gray LOAM											
		—						—			
		— 2			25			— 1		0.0	55
		— 6						— 1			
		— 8						— 1			
		—						—			
		— 2			25			— 0		0.0	44
		— 3						— 0			
		—5 3						-25 1			
		—						—			
	781.50										
Black PEAT Organic content: 55 - 88%											
		— 2		0.0	43			— 1		0.0	32
		— 4						— 2			
		— 4						— 1			
		—						—			
		— 1		0.0	492			— 4			
		— 1						— 6			
		-10 1						-30 6			
		—						—			
		— 1		0.0	325			—			
		— 1						—			
		— 2						—			
		—						—			
		— 1		0.0	487			— 5		5.4	16
		— 1						— 9		B	
		-15 2						-35 14			
		—						—			
	771.50							—			
A-3: Medium dense gray poorly-graded fine SAND								—			
		— 3						—			
		— 5						—			
		— 8						—			
		—						—			
		—						—			
		— 0		0.0	58			— 7		7.2	16
		— 1						— 16		B	
		-20 0						-40 20			
	768.50										
A-7: Very soft to soft gray silty CLAY of high plasticity											

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u>	D	B	U	M	Surface Water Elev. <u>N/A</u> ft	D	B	U	M
Station <u>N/A</u>	E	L	C	O	Stream Bed Elev. <u>N/A</u> ft	E	L	C	O
BORING NO. <u>LB-13</u>	P	W	Qu	S	Groundwater Elev.:	T	W	Qu	S
Station <u>294+50</u>	H	S		T	First Encounter <u>28.5</u> ft ▼	H	S		T
Offset <u>27 N of CL</u>	(ft)	(/6")	(tsf)	(%)	Upon Completion <u>N/A</u> ft	(ft)	(/6")	(tsf)	(%)
Ground Surface Elev. <u>787.50</u> ft					After <u>N/A</u> Hrs. <u>N/A</u> ft				

A-6: Stiff to hard gray silty CLAY (continued)	—				A-6: Stiff to hard gray silty CLAY (continued)	—			
	—					—			
	—					—			
	—					—			
	—					—			
	—	6	7.0	16		—	6	2.5	25
	—	9	B			—	6	B	
	-45	13				-65	8		
	—					—			
	—					—			
—				—					
—				—					
—				—					
—				—					
—	6	3.3	17	—	5	3.1	27		
—	8	B		—	9	B			
-50	10			-70	11				
—				—					
—				—					
—				—					
—				—					
—				—					
—	4	3.1	19	—	14	8.0	16		
—	7	B		—	10	B			
-55	11			-75	15				
—				—					
—				—					
—				—					
—				—					
—				—					
—	5	4.7	20	—	5	1.0	18		
—	7	B		—	5	B			
-60	11			-80	8				



SOIL BORING LOG

Date 9/29/16

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. Land Bridge
 Station N/A
 BORING NO. LB-13
 Station 294+50
 Offset 27 N of CL
 Ground Surface Elev. 787.50 ft

D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
-------------------------------	--------------------------------	----------------------------	------------------------------

Surface Water Elev. N/A ft
 Stream Bed Elev. N/A ft
 Groundwater Elev.:
 First Encounter 28.5 ft ▼
 Upon Completion N/A ft
 After N/A Hrs. N/A ft

A-6: Stiff to hard gray silty CLAY (continued)	—		
	—		
	—		
	—		
	—		
	—		
	—		
	7	2.5	19
	8	B	
	702.50	-85	10
End of boring at 85 feet.	—		
	—		
	—		
	—		
	—		
	—		
	—		
	-90		
	—		
	—		
-95			
—			
—			
—			
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—			
—			
—			
—			
-100			

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u> Station <u>N/A</u>	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)	Surface Water Elev. <u>N/A</u> ft Stream Bed Elev. <u>N/A</u> ft Groundwater Elev.: First Encounter <u>14</u> ft ▼ Upon Completion <u>N/A</u> ft After <u>N/A</u> Hrs. <u>N/A</u> ft	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
Approximately 2 inches of ASPHALT / 787.13 FILL: Black, brown, and gray LOAM	—	—	—	—	A-6: Very stiff to hard gray silty CLAY <i>(continued)</i>	—	—	—	—
	—	5		11		—	5	4.7	13
	—	6				—	13	B	
	—	3				—	15		
	—	2		22		—	4	2.3	17
782.80	—	3				—	7	B	
Black PEAT	-5	3				-25	9		
	—	—				—	—		
	—	2	0.0	187		—	8	1.7	19
	—	2				—	22	B	
	—	2				—	26		
	—	—				—	—		
	—	1	0.0	156		—	5	3.1	20
	—	1				—	7	B	
776.80	-10	2				-30	9		
A-6: Soft gray silty CLAY	—	—				—	—		
	—	1	0.0	35		—	—		
	—	1				—	—		
	—	1				—	—		
	—	—				—	—		
773.30 ▼	—	0				—	—		
A-3: Medium dense gray poorly-graded fine SAND	—	6				—	10		
	—	6				—	14		
	-15	5				-35	7		
771.80	—	—				—	—		
A-6: Very stiff to hard gray silty CLAY	—	—				—	—		
	—	4	3.3	16		—	—		
	—	6	B			—	—		
	—	10				—	—		
	—	—				—	—		
	—	6	5.4	16		—	—		
	—	9	B			—	—		
748.30	-20	14				—	—		
A-6: Very stiff gray silty CLAY	—	—				—	6	2.1	21
	—	—				—	7	B	
	—	—				—	—		
	-40	—				-40	9		

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u>	D	B	U	M	Surface Water Elev. <u>N/A</u> ft	D	B	U	M
Station <u>N/A</u>	E	L	C	O	Stream Bed Elev. <u>N/A</u> ft	E	L	C	O
BORING NO. <u>LB-14</u>	P	W	Qu	S	Groundwater Elev.:	T	W	Qu	T
Station <u>294+75</u>	H	S		T	First Encounter <u>14</u> ft ▼	H	S		T
Offset <u>59 S of CL</u>	(ft)	(/6")	(tsf)	(%)	Upon Completion <u>N/A</u> ft	(ft)	(/6")	(tsf)	(%)
Ground Surface Elev. <u>787.30</u> ft					After <u>N/A</u> Hrs. <u>N/A</u> ft				

A-6: Very stiff gray silty CLAY (continued)	—				A-6: Very stiff gray silty CLAY (continued)	—			
	—					—			
	—					—			
	—					—			
	—					—			
	—	5	4.3	15		—	6	1.2	16
	—	9	B			—	6	B	
	-45	11				-65	10		
	—					—			
	—					—			
—				—					
—				—					
—				—					
—				—					
—	5	1.3	21	—	9	1.2	17		
—	7	B		—	11	B			
-50	9			-70	14				
—				—					
—				—					
—				—					
—				—					
—				—					
—	6	1.2	18	—	4	1.8	21		
—	8	B		—	5	B			
-55	9			-75	7				
—				—					
—				—					
—				—					
—				—					
—				—					
—	5	1.3	18	—	5	1.9	21		
—	7	B		—	8	B			
-60	11			-80	12				

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Land Bridge	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)	Surface Water Elev.	N/A	ft	D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
Station	N/A					Stream Bed Elev.	N/A	ft				
BORING NO.	LB-15					Groundwater Elev.:						
Station	295+25					First Encounter	26	ft ▼				
Offset	27 N of CL					Upon Completion	N/A	ft				
Ground Surface Elev.	787.70	ft				After	N/A	Hrs.				
FILL: Black, brown, and gray LOAM						A-3: Very loose to medium dense gray poorly-graded fine SAND (<i>continued</i>)						
			3		16					3		
			6							5		
			5							7		
	784.20											
Black PEAT Organic content: 63 - 76%						A-3: Very loose to medium dense gray poorly-graded fine SAND (<i>continued</i>)						
			2	0.0	31					3		
			3							3		
			-5	2						-25	6	
			3	0.0	40					▼		
			4							4		
			5							4		
										5		
			0	0.0	467							
			1							6	5.0	15
			-10	0						10	B	
										-30	14	
			1	0.0	433							
			1									
			1									
			0	0.0	444							
			0							4	2.7	17
			-15	1						5	B	
										-35	9	
	771.70											
A-3: Very loose to medium dense gray poorly-graded fine SAND						A-6: Stiff to very stiff gray silty CLAY						
			1									
			2									
			2									
			1									
			1							6	3.9	18
			1							10	B	
			-20	2						-40	14	

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.C.

 SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

 COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u> Station <u>N/A</u>	D E P T H B L O W S U C S M O I S T Qu (ft) (/'6") (tsf) (%)	Surface Water Elev. <u>N/A</u> ft	D E P T H B L O W S U C S M O I S T Qu (ft) (/'6") (tsf) (%)
BORING NO. <u>LB-15</u> Station <u>295+25</u> Offset <u>27 N of CL</u> Ground Surface Elev. <u>787.70</u> ft		Stream Bed Elev. <u>N/A</u> ft	
		Groundwater Elev.:	
		First Encounter <u>26</u> ft ▼	
		Upon Completion <u>N/A</u> ft	
		After <u>N/A</u> Hrs. <u>N/A</u> ft	

A-6: Stiff to very stiff gray silty CLAY (continued) 746.70				A-6: Stiff to very stiff gray silty CLAY (continued)			
A-3: Medium dense gray poorly-graded fine SAND							
	9		17		8	2.3	19
	3				13	B	
	-45	13			-65	16	
	4		19		7	1.3	16
	6				7	B	
	-50	9			-70	8	
736.70							
A-6: Stiff to very stiff gray silty CLAY							
	6	2.5	27		6	0.9	17
	8	B			7	B	
	-55	9			-75	9	
	6	4.1	28		6	3.3	18
	10	B			9	B	
	-60	15			-80	12	

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u> Station <u>N/A</u>	D E P T H H	B L O W S	U C S	M O I S T	Surface Water Elev. <u>N/A</u> ft Stream Bed Elev. <u>N/A</u> ft Groundwater Elev.: First Encounter <u>8</u> ft ▼ Upon Completion <u>N/A</u> ft After <u>N/A</u> Hrs. <u>20</u> ft ▼	D E P T H H	B L O W S	U C S	M O I S T
BORING NO. <u>LB-16</u> Station <u>296+00</u> Offset <u>52 S of CL</u> Ground Surface Elev. <u>788.90</u> ft	(ft)	(/6")	(tsf)	(%)	(ft)	(/6")	(tsf)	(%)	

Description	(ft)	(/6")	(tsf)	(%)	Description	(ft)	(/6")	(tsf)	(%)
Approximately 2 inches of ASPHALT FILL: Black, brown, and gray LOAM Organic content: 12 - 29%	—				A-6: Stiff to hard gray silty CLAY <i>(continued)</i>	—			
	—	5		69		—	10	2.5	16
	—	2				—	13	B	
	—	5				—	15		
	—					—			
	—	2		94		—	11	2.3	17
	—	2				—	10	B	
	—	-5	1			—	-25	9	
	—					—			
	—	2		35		—	10	2.5	21
	—	1				—	9	B	
	—	1				—	12		
▼					760.90				
A-3: Medium dense gray poorly-graded fine SAND	—	4			A-3: Medium dense gray poorly-graded fine SAND	—	5		
	—	7				—	11		
	—	-10	9			—	-30	11	
	—					—			
	—	5				—			
	—	7				—			
	—	10				—			
▼					755.90				
A-6: Stiff to hard gray silty CLAY	—	4	5.2	15	A-6: Medium stiff to very stiff gray silty CLAY	—	2	2.1	23
	—	6	B			—	3	B	
	—	-15	10			—	-35	5	
	—					—			
	—	10	4.1	16		—			
	—	29	B			—			
	—	38				—			
	—					—			
	—	4	2.9	15		—	4	3.3	16
	—	6	B			—	5	B	
	—	9				—	6		
▼20						—	-40		

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



SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley AvenueCOUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. <u>Land Bridge</u>	D	B	U	M	Surface Water Elev.	<u>N/A</u>	ft	D	B	U	M
Station <u>N/A</u>	E	L	C	O	Stream Bed Elev.	<u>N/A</u>	ft	P	L	C	O
BORING NO. <u>LB-16</u>	T	W		I	Groundwater Elev.:			H	W		S
Station <u>296+00</u>	H	S	Qu	T	First Encounter	<u>8</u>	ft ▼			Qu	
Offset <u>52 S of CL</u>	(ft)	(/6")	(tsf)	(%)	Upon Completion	<u>N/A</u>	ft				
Ground Surface Elev. <u>788.90</u> ft					After <u>N/A</u> Hrs.	<u>20</u>	ft ▼	(ft)	(/6")	(tsf)	(%)

Description	Soil Properties		UCS	Moisture	Soil Properties	Soil Properties		UCS	Moisture
	(ft)	(/6")				(ft)	(/6")		
A-6: Medium stiff to very stiff gray silty CLAY (continued)	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	4	—	1.9	18	5	—	2.0	21	
	5	—	B		7	—	B		
	-45	4			-65	9			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	4	—	0.0	20	5	—	1.7	19	
	5	—			5	—	B		
	-50	7			-70	8			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	6	—	2.5	19	6	—	2.1	19	
	8	—	B		8	—	B		
	-55	8			-75	12			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	—	—			—	—			
	4	—	2.3	19	5	—	1.2	18	
	5	—	B		6	—	B		
	-60	8			-80	8			

SOIL BORING LOG

Date 10/3/16

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY J.W.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Land Bridge		D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev.	N/A ft		D E P T H H	B L O W S S	U C S Qu	M O I S T T
Station	N/A						Stream Bed Elev.	N/A ft					
BORING NO.	LB-17						Groundwater Elev.:						
Station	296+50						First Encounter	10	ft ▼				
Offset	23 N of CL		Upon Completion	N/A	ft								
Ground Surface Elev.	788.20	ft	After	N/A	Hrs.	10	ft ▼	(ft)	(/6")	(tsf)	(%)		
FILL: Black, brown, and gray LOAM Organic content: 17%			—				A-6: Stiff to very stiff gray silty CLAY <i>(continued)</i>			—			
			—	3		24				—	4	2.5	20
			—	3						—	5	B	
			—	5						—	8		
			—	2		64				—	3	3.1	22
			—	2						—	5	B	
			—	-5	2					—	-25	7	
			—							—			
		782.20											
A-6: Very soft gray silty CLAY			—	0	0.0	34				—	3	2.5	27
			—	0						—	5	B	
			—	0						—	8		
		780.20											
A-3: Medium dense gray poorly-graded fine SAND			—	2					759.20	—	10		
			—	3						—	10		
			▼	10						—	-30	7	
			—							—			
			—	5						—			
			—	4						—			
		775.95	—	1						—			
A-6: Stiff to very stiff gray silty CLAY			—							—			
			—	3	3.1	17				—	5		
			—	6	B					—	5		
			—	-15	7					—	-35	8	
			—							—			
			—	4	2.3	17				—			
			—	4	B					—			
			—	8						—			
			—							—			
			—							—			
			—						749.70				
			—	4	3.3	17				—	3	1.9	26
			—	7	B					—	4	B	
			—	-20	10					—	-40	5	

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

SOIL BORING LOG

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	DESCRIPTION	D	B	U	M	Surface Water Elev.	ft	D	B	U	M
Station		P	L	C	O	Stream Bed Elev.	ft	E	L	S	O
BORING NO.		T	W	S	I	Groundwater Elev.:		H	W	Qu	S
Station		H	S	Qu	T	First Encounter	ft	S	S		T
Offset		(ft)	(/6")	(tsf)	(%)	Upon Completion	ft	(ft)	(/6")	(tsf)	(%)
Ground Surface Elev.	ft					After N/A Hrs.	ft				
	FILL: Black, brown, and gray LOAM	—				A-6: Stiff to very stiff gray silty CLAY (continued)		—			
		—	3		17			—	7	2.5	19
		—	4					—	9		
		—	4					—	10		
		—						—			
		—	1		23			—	4	2.9	18
		—	2					—	6		
		—	-5	2				—	-25	8	
		—						—			
		—	2		21			—	5	3.1	25
		—	2					—	10		
		—	3					—	12		
	782.50							762.50			
	A-6: Stiff to very stiff gray silty CLAY					A-3: Medium dense gray poorly-graded fine SAND					
		—	3	0.0	17			—	5		
		—	5					—	8		
		—	-10	8				—	-30	8	
		—						—			
		—	5	4.1	16			—			
		—	8					—			
		—	10					—			
		—						—			
		—						757.50			
		—	5	2.1	16	A-6: Medium stiff to very stiff gray silty CLAY		—	4	1.8	21
		—	7					—	6		
		—	-15	9				—	-35	7	
		—						—			
		—	6	2.9	17			—			
		—	9					—			
		—	11					—			
		—						—			
		—	3	2.5	18			—	2	2.3	24
		—	5					—	3		
		—	-20	7				—	-40	5	

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

ROUTE IL 132 / Grand Avenue DESCRIPTION Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue on IL Rt. 132 LOGGED BY D.K.

SECTION WR(2)-R-1 LOCATION Oak Lane Drive to McKinley Avenue

COUNTY Lake County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. Land Bridge	Station N/A	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev. N/A ft	D E P T H H	B L O W S S	U C S Qu	M O I S T T
						Stream Bed Elev. N/A ft				
BORING NO. LB-19	Station 297+50	Ground Surface Elev. 790.50 ft	4	2.1	30	Groundwater Elev.:	7	3.1	18	
Offset 14 N of CL	Ground Surface Elev. 790.50 ft					First Encounter 28 ft ▼				
			4			Upon Completion N/A ft	10			
			-45			After N/A Hrs. 26 ft ▼	-65			

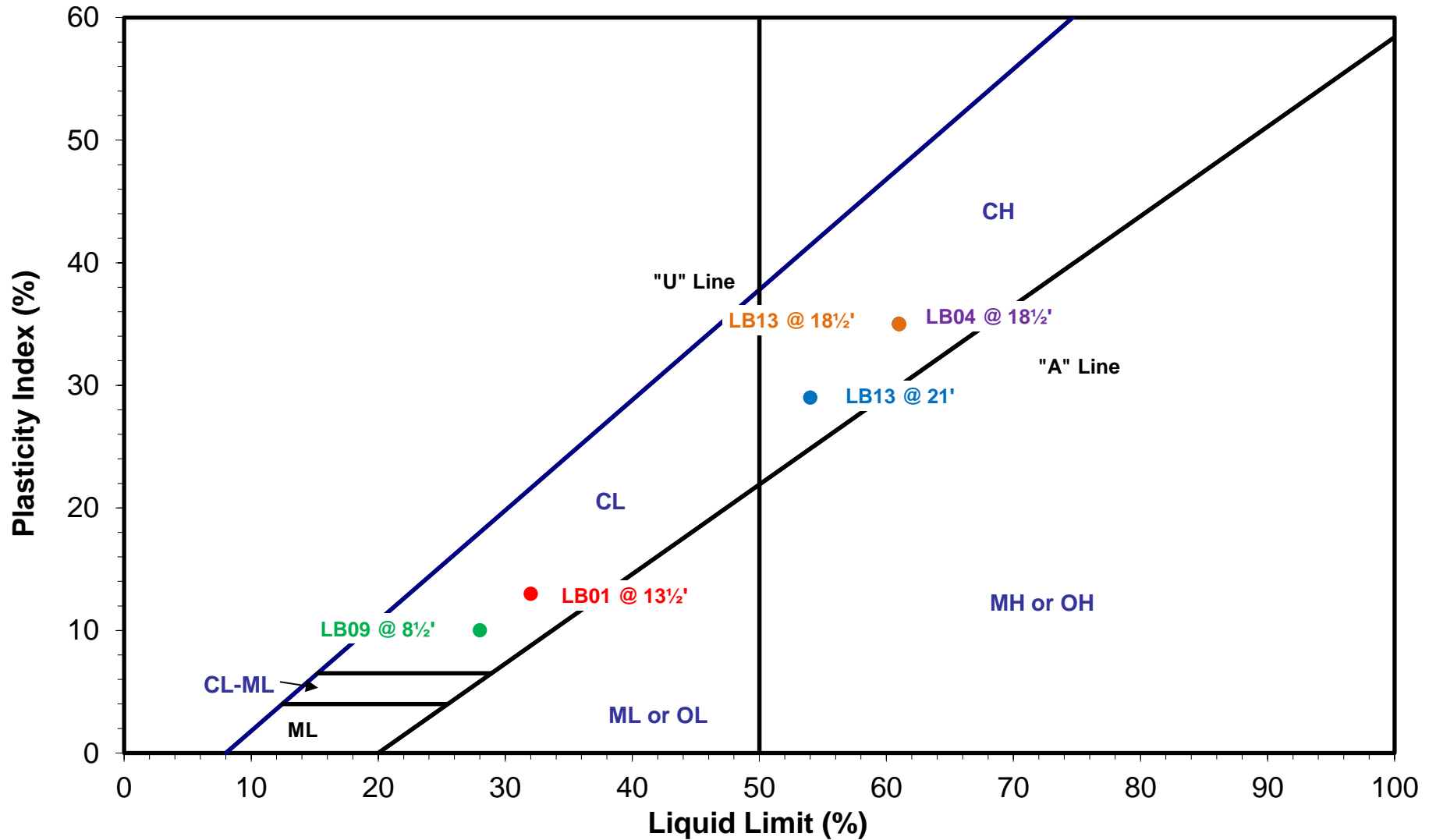
A-6: Medium stiff to very stiff gray silty CLAY (continued)	—	—	—	—	—	A-6: Medium stiff to very stiff gray silty CLAY (continued)	—	—	—	—	
	—	—	—	—	—		—	—	—	—	—
	—	—	—	—	—		—	—	—	—	—
	4	2.1	30	7	3.1		18	8			
			-45								
			6								
			9								
			-50								
			6								
			9								
			-50								
			4								
			7								
			-55								
			4								
			7								
			-55								
			4								
			6								
			-60								
			4								
			6								
			-60								

End of boring at 75 feet.

715.50 75 7

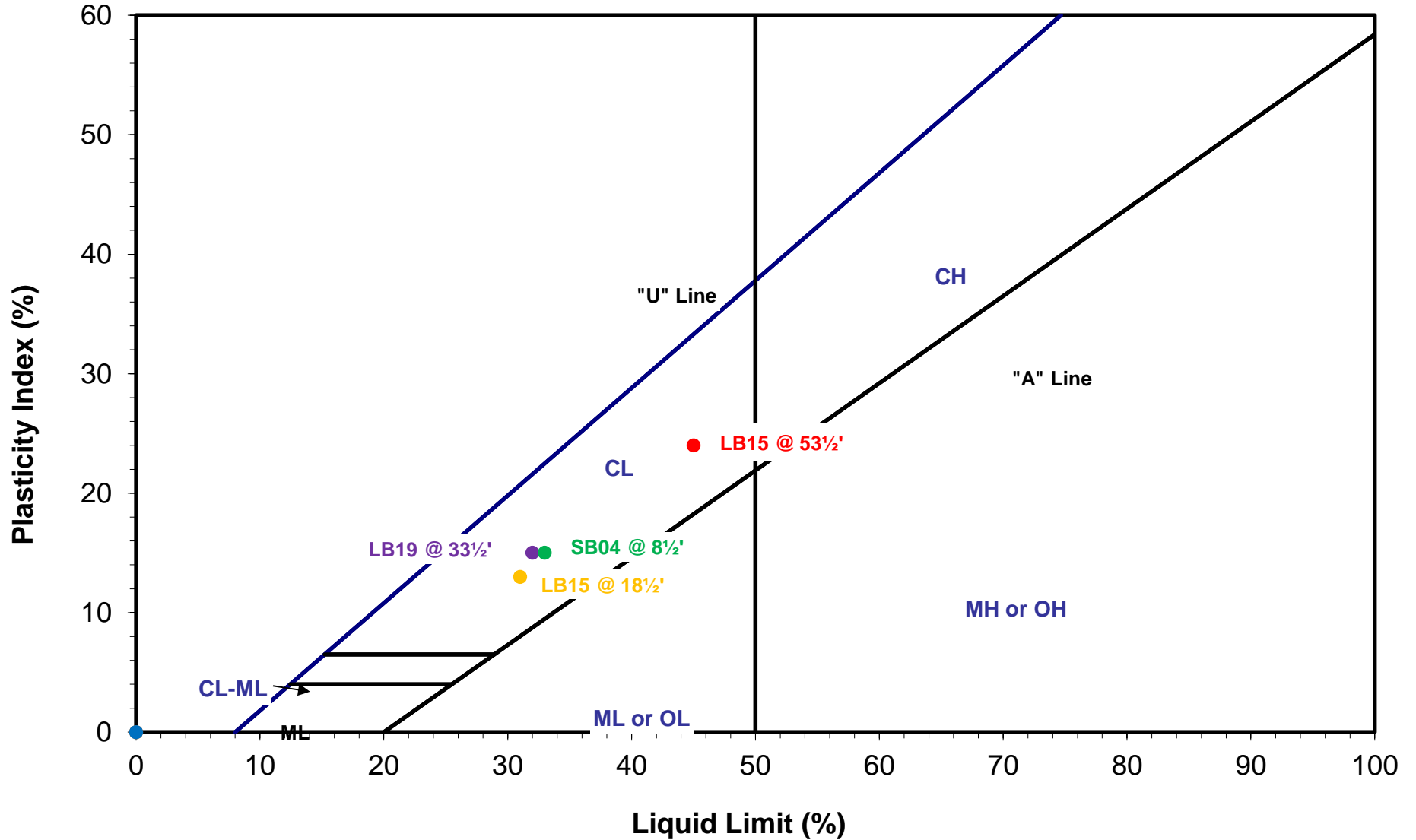
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

APPENDIX G – LABORATORY TESTS



Boring #	LB01 @ 11'	LB01 @ 13½'	LB04 @ 18½'	LB09 @ 8½'	LB13 @ 18½'	LB13 @ 21'
LL	113	32	61	28	61	54
PL	57	19	26	18	26	25
PI	56	13	35	10	35	29

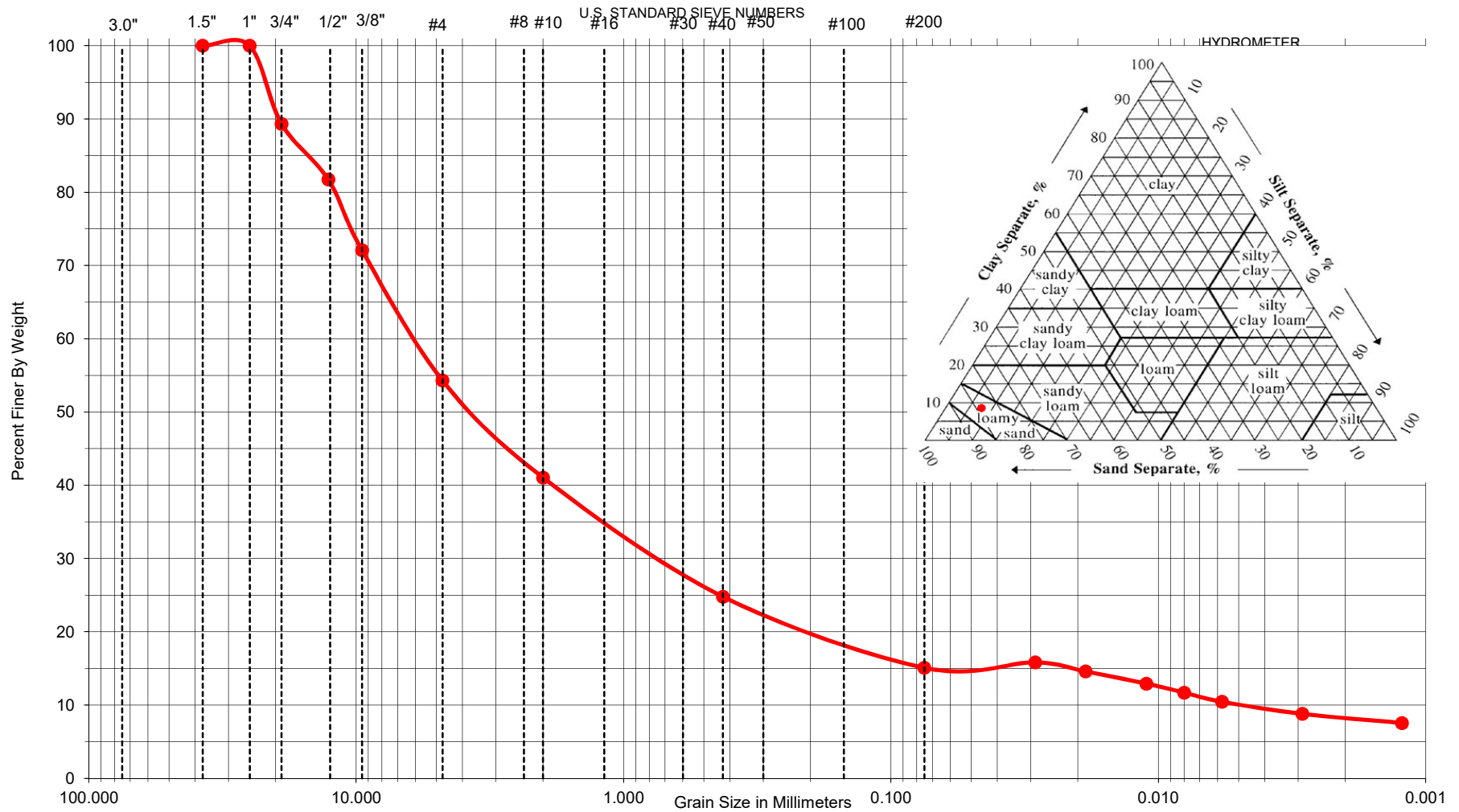
Project: IL Rt. 132 Dry Land Bridge
Location: Lake Villa, Illinois
Client: ABNA Engineering, Inc.
Project #: G16.099



Boring #	LB15 @ 18½'	LB15 @ 53½'	LB19 @ 33½'	SB04 @ 8½'		
LL	31	45	32	33		
PL	18	21	17	18		
PI	13	24	15	15		

Project: IL RT. 132 Dry Land Bridge
Location: Lake Villa, Illinois
Client: ABNA Engineering, Inc.
Project #: G16.099

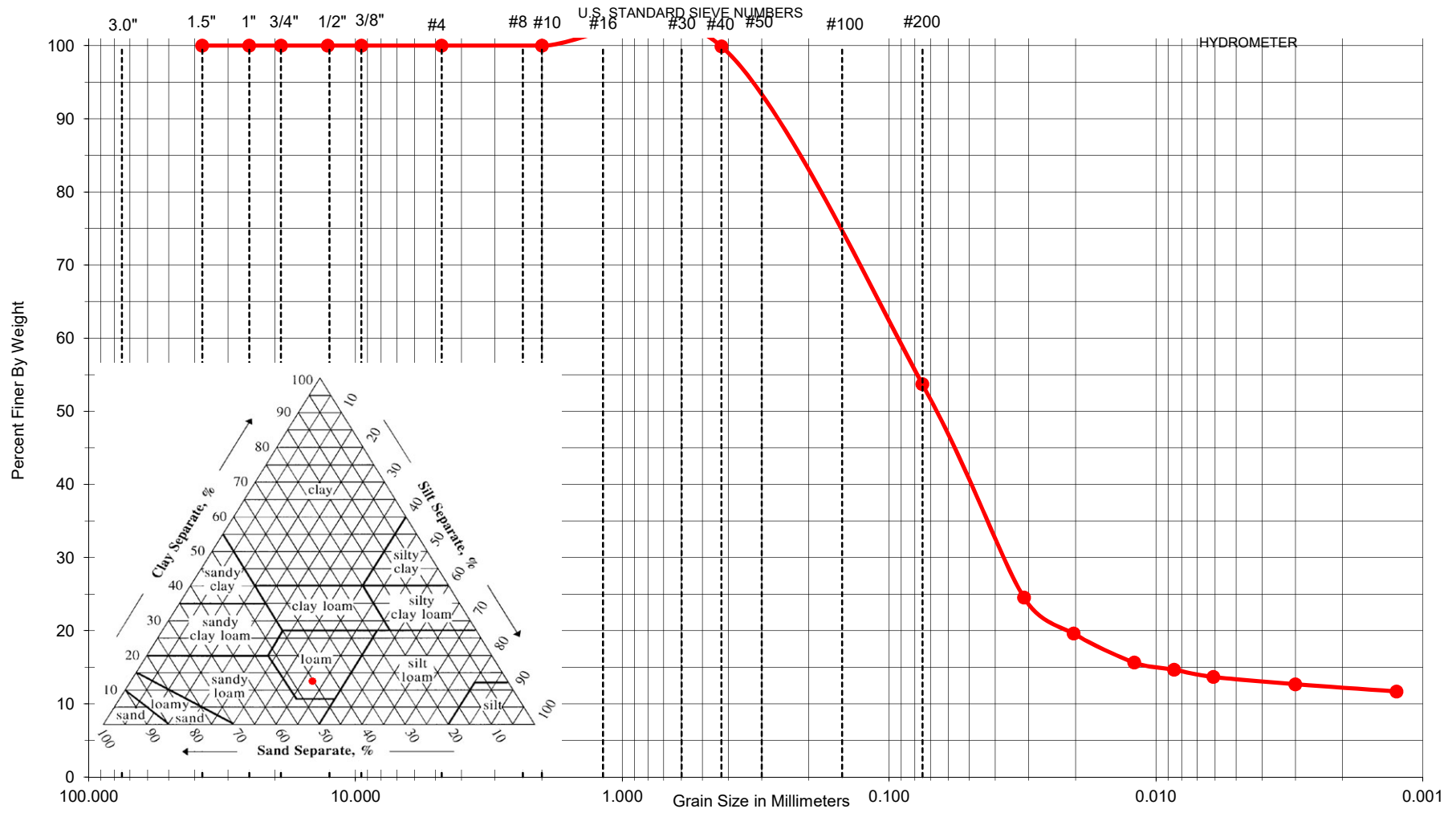
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	LB 01	58.5	Loamy Fine Sand	N/A	N/A	27.53	1256	45.7	39.2	7.0	8.1	6.272	0.929	0.005
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge				File No.		G16.099					



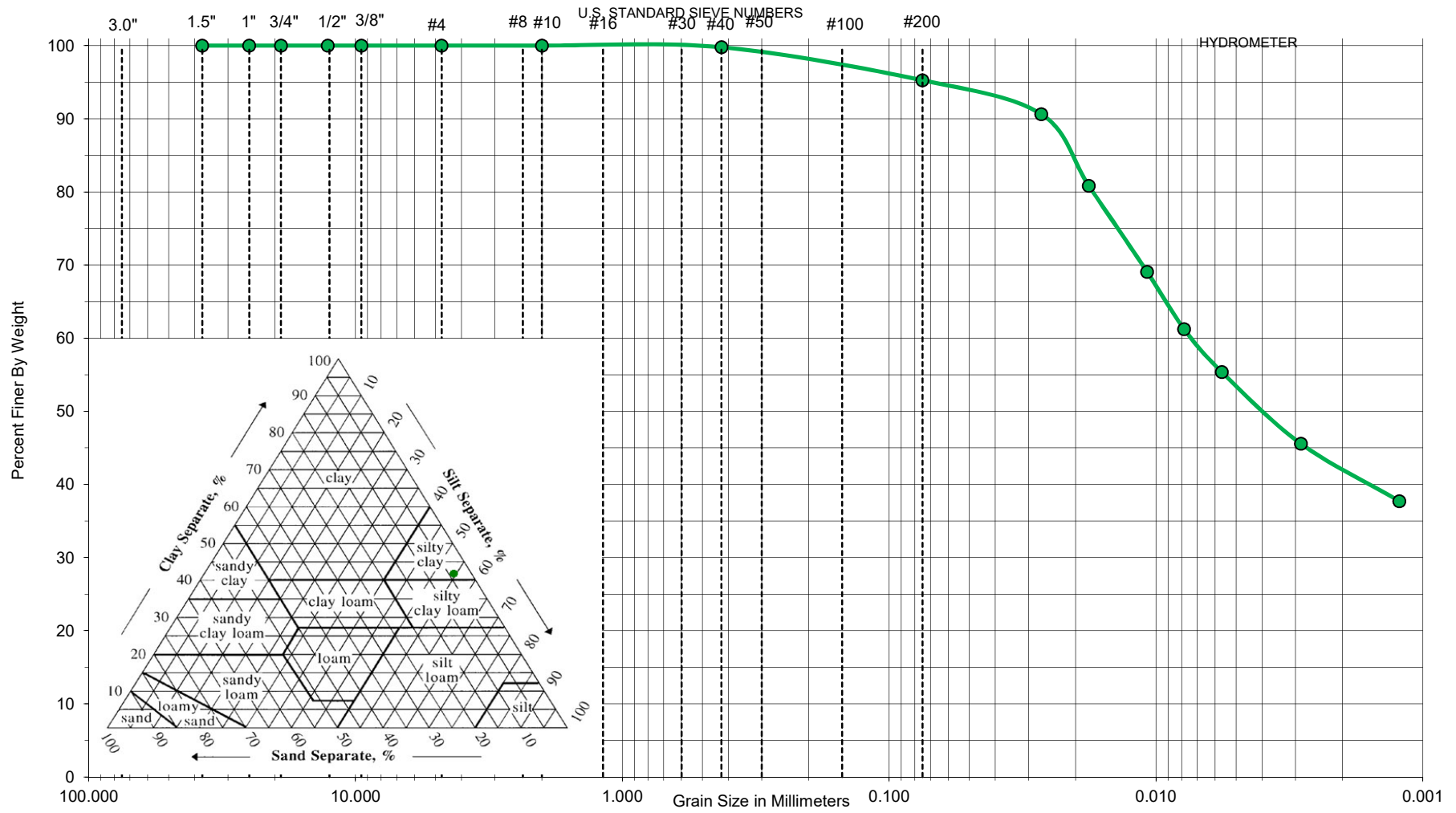
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60	D30	
●	LB-05	21'	Loam	N/A	N/A	0.0	46.3	41.6	12.1	0.123	0.039	
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge				File No.		G16.099			

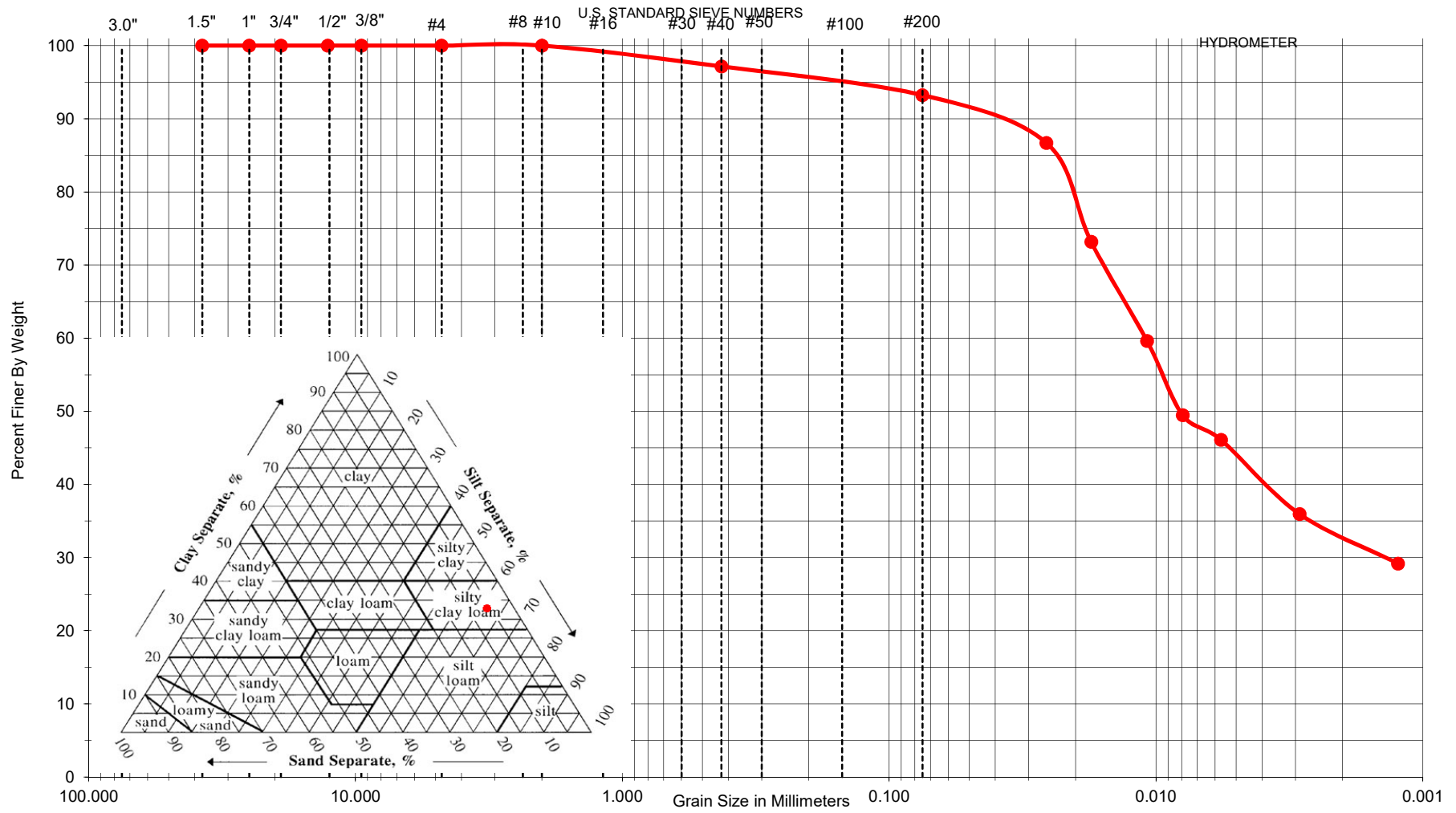
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REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60
●	LB 06	23.5'	Silty Clay	N/A	N/A	0.0	4.7	53.8	41.4	0.007
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Brgde			File No.		G16.099		

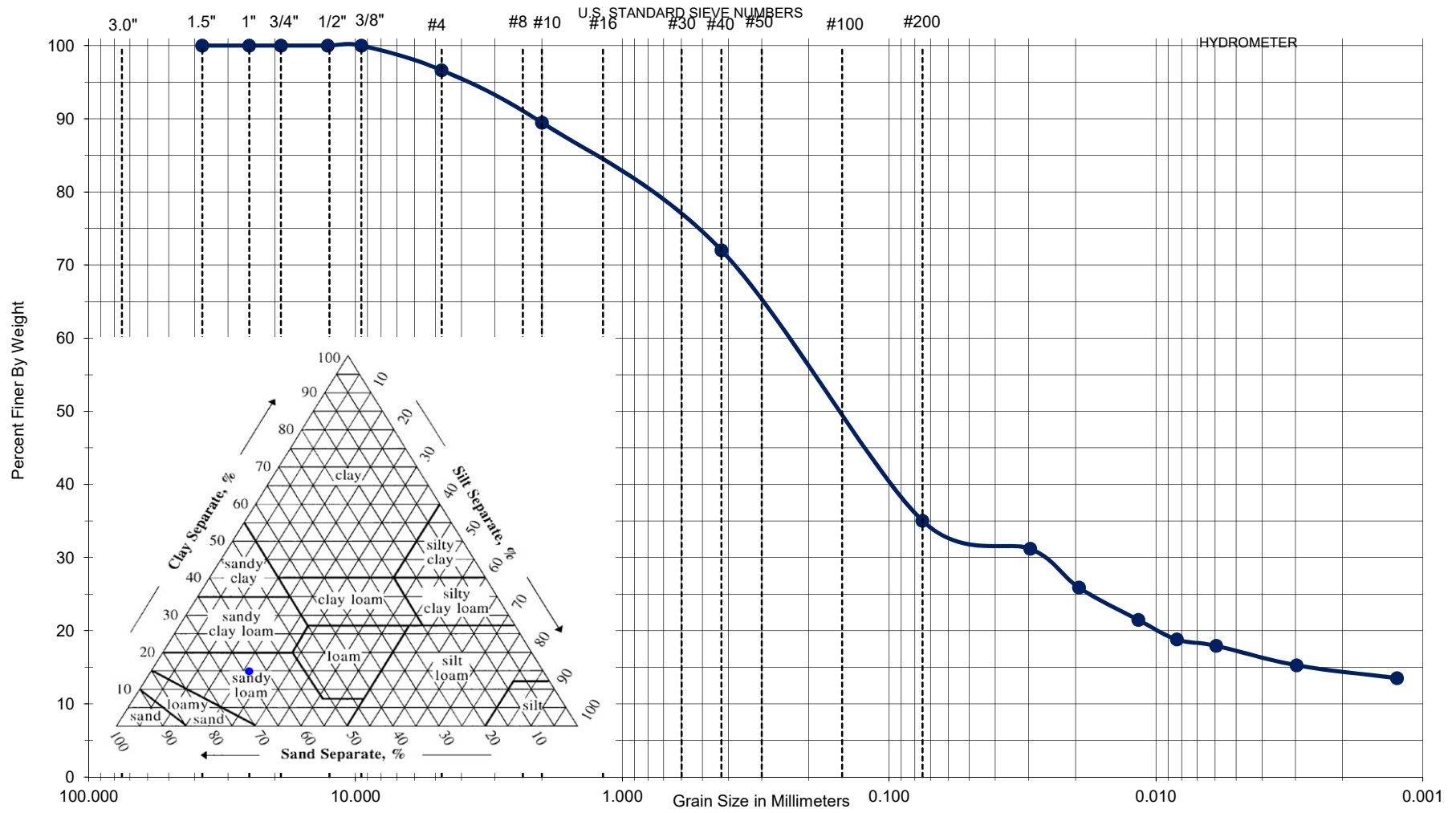
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60	D30	
●	LB 07	11'	Silty Clay Loam	N/A	N/A	0.0	6.8	60.9	32.3	0.011	0.001	
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge				File No.		G16.099			



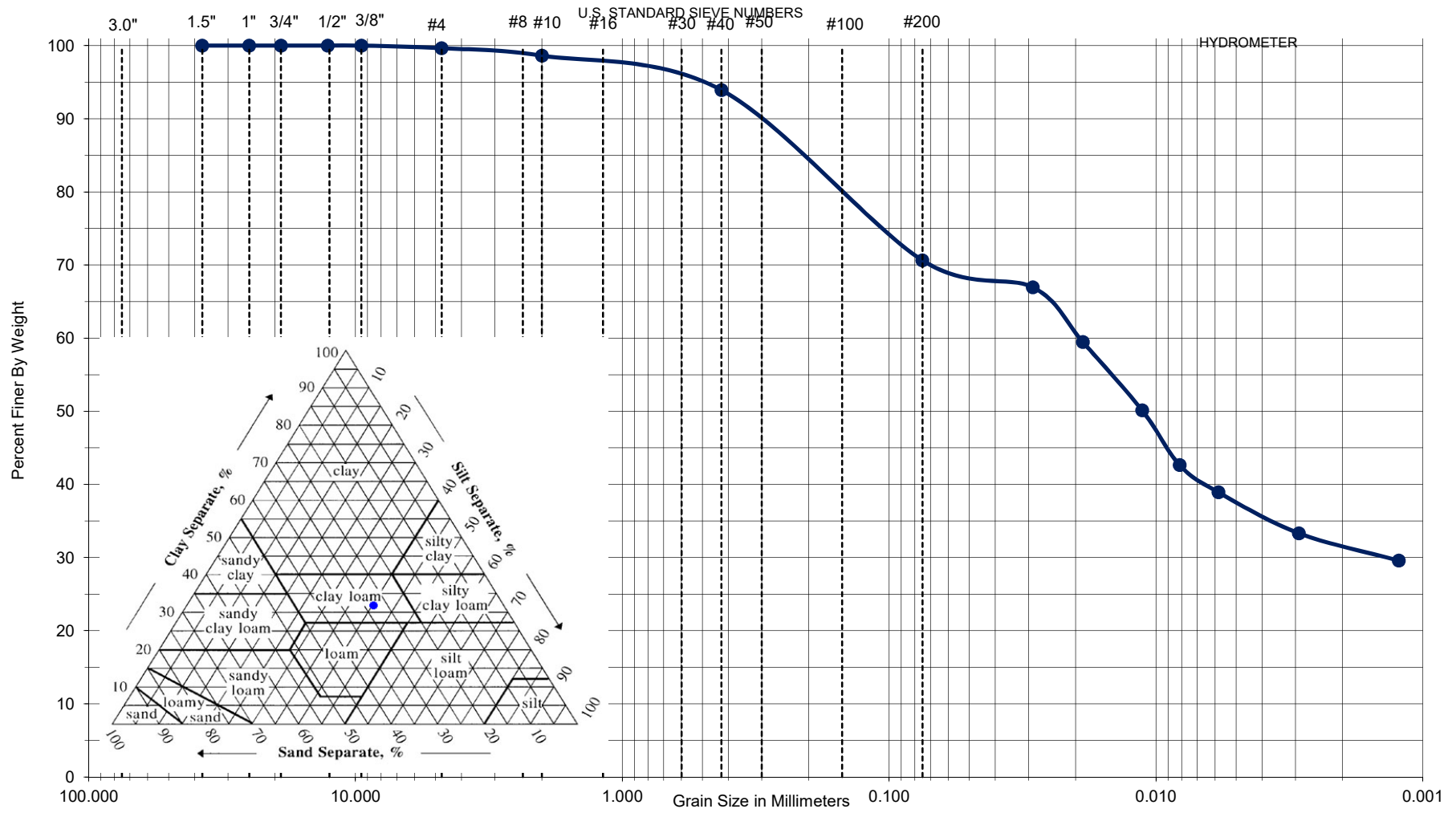
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60	D30	
●	LB-07	13.5'	Sandy Loam	N/A	N/A	3.4	61.6	20.8	14.3	0.311	0.027	
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge				File No.		G16.099			

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Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	Cc	%Gravel	%Sand	%Silt	%Clay	D60	D30
●	LB-09	8.5'	Clay Loam	N/A	N/A		0.3	29.0	39.3	31.3	0.019	0.001

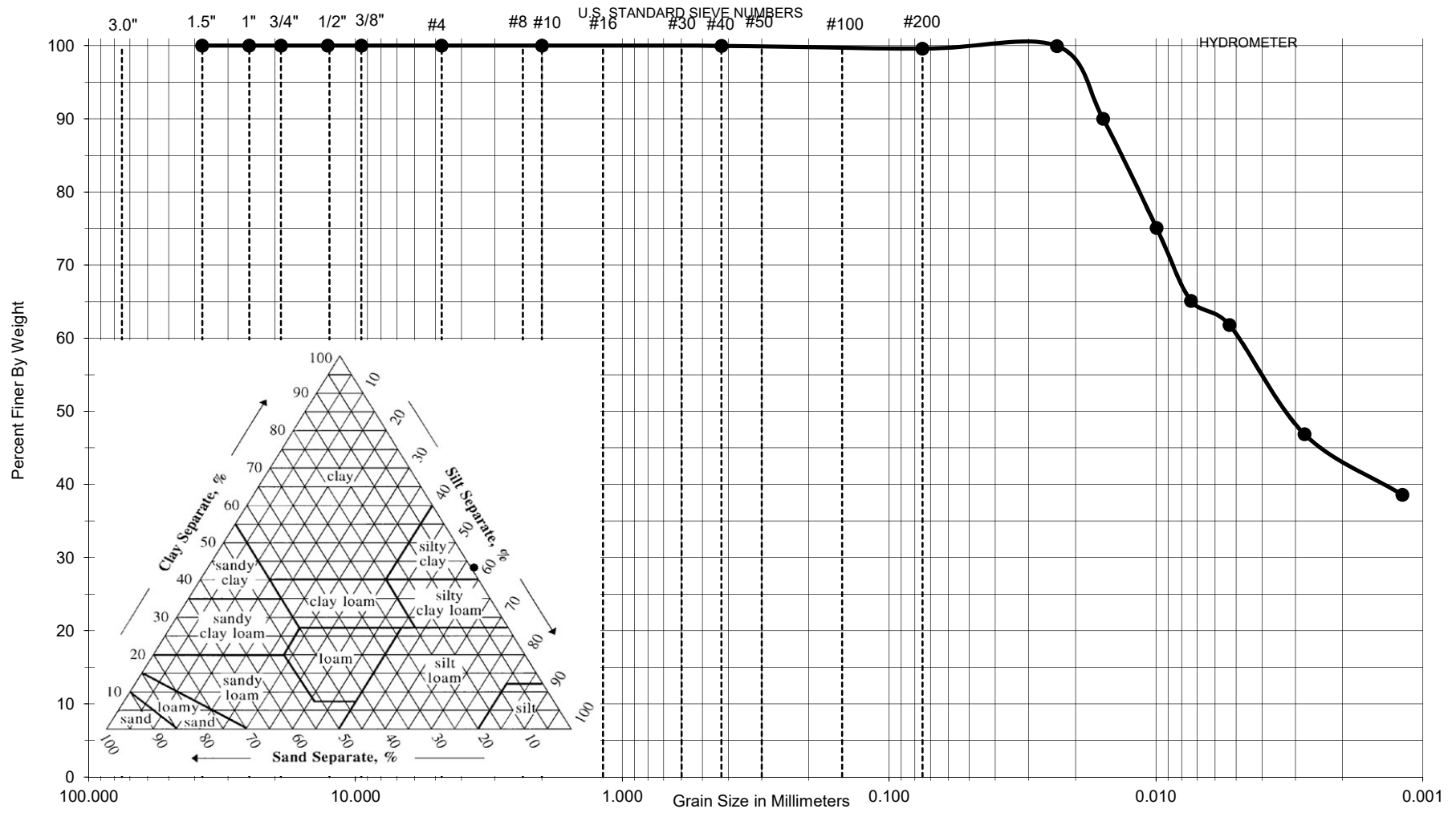
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL

IL Route 132 Dry Land Bridge

File No.

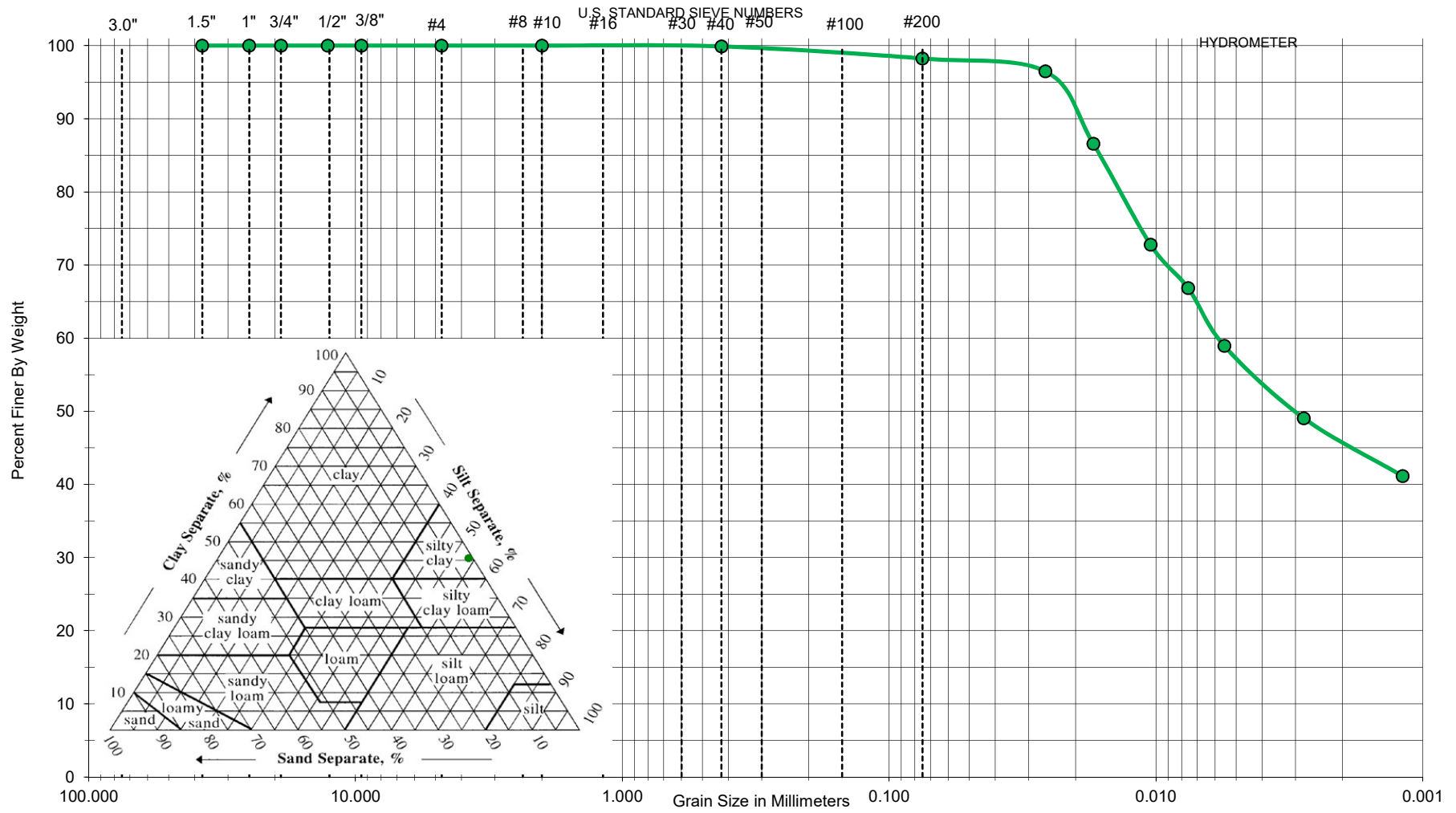
G16.099

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



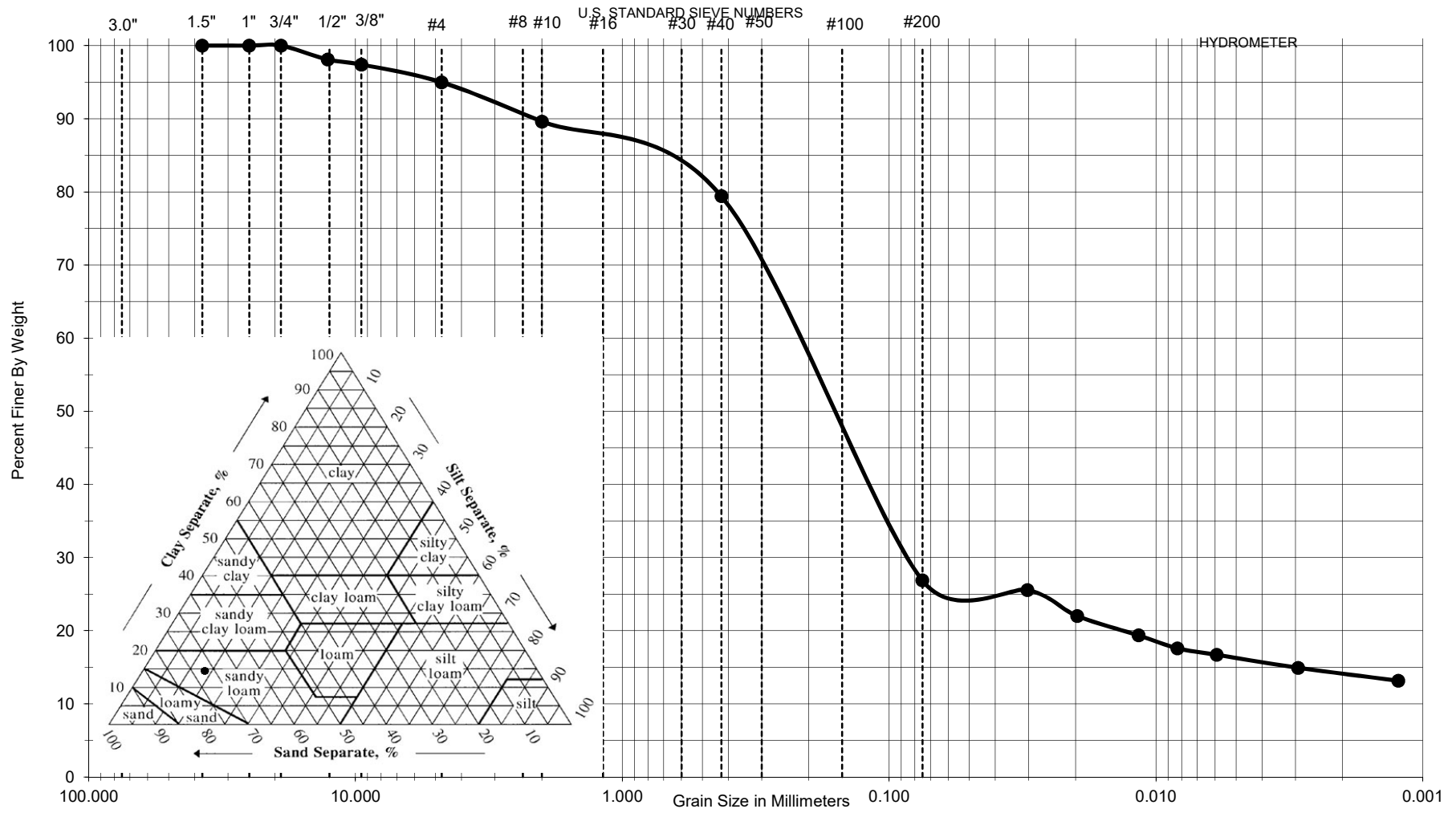
Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60
●	LB 13	18.5'	Silty Clay	N/A	N/A	0.0	0.4	56.8	42.8	0.005
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge			File No.		G16.099		

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



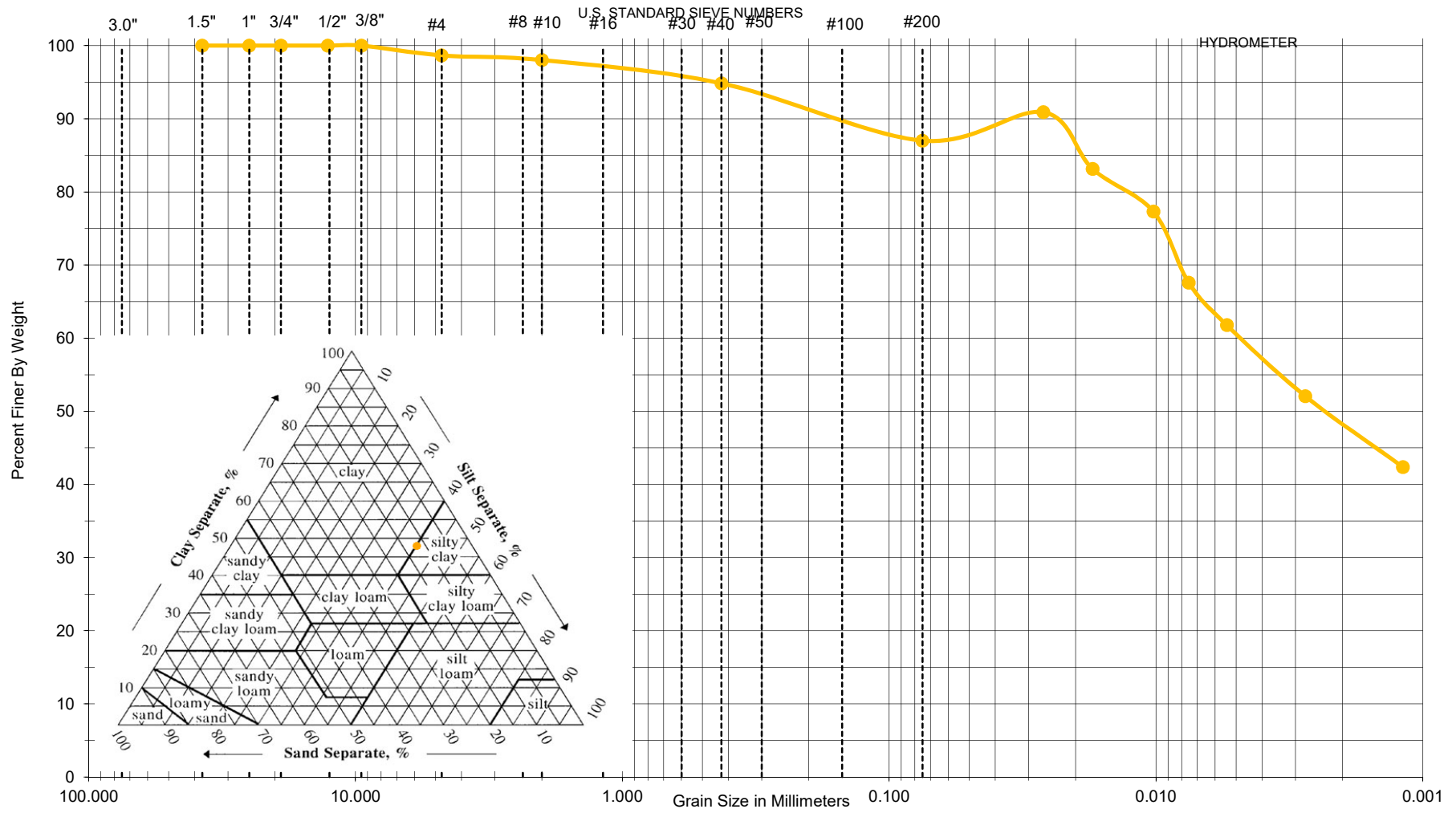
Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60
●	LB-15	18.5	Silty Clay	N/A	N/A	0.0	1.8	53.1	45.2	0.006
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge			File No.		G16.099		

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



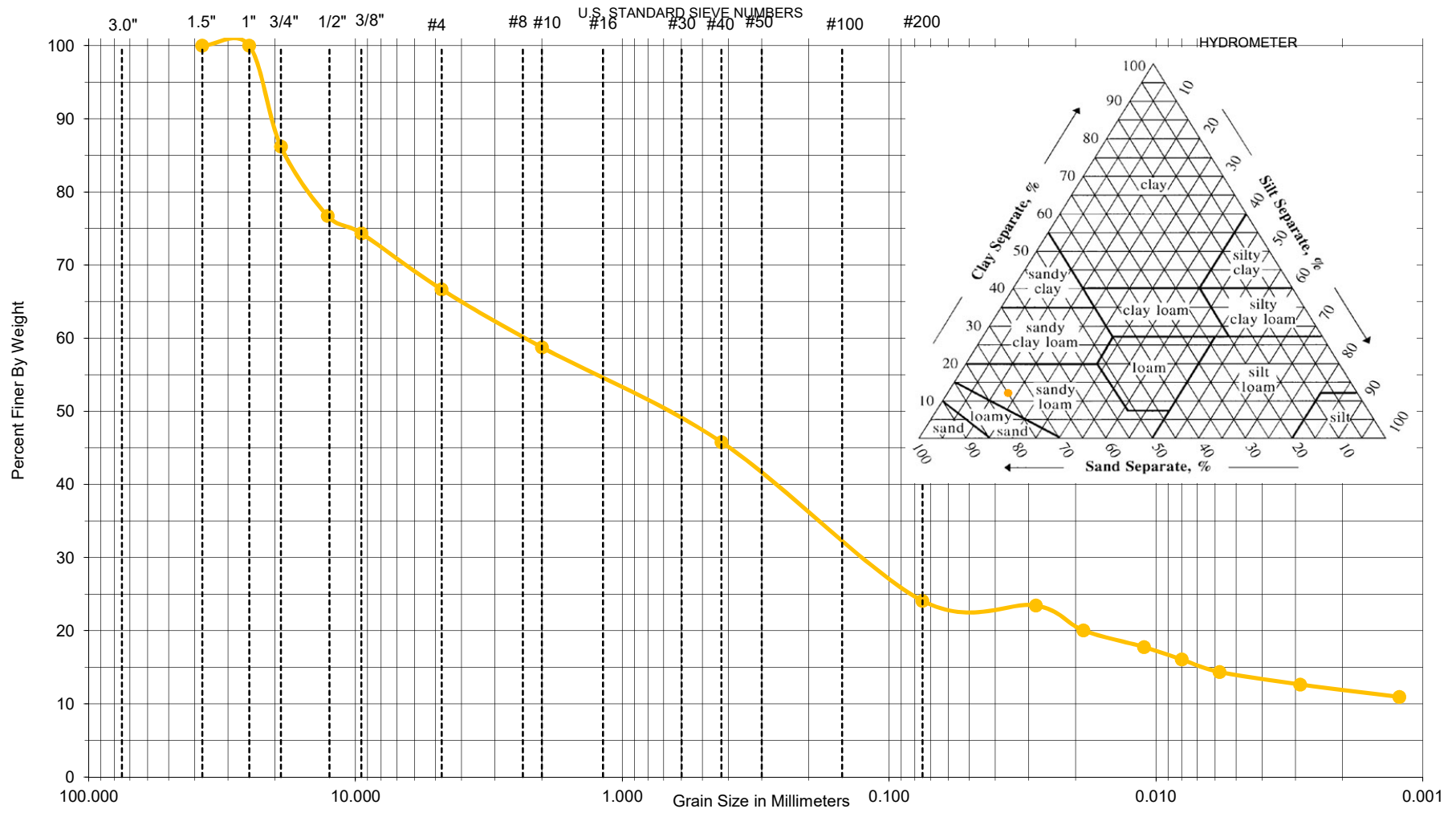
Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60	D30	
●	LB-17	8.5'	Sandy Loam	N/A	N/A	5.0	68.1	12.9	14.0	0.296	0.096	
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge				File No.		G16.099			

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60
●	SB-04	8.5'	Clay	N/A	N/A	1.3	11.7	39.6	47.4	0.005
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge			File No.		G16.099		

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



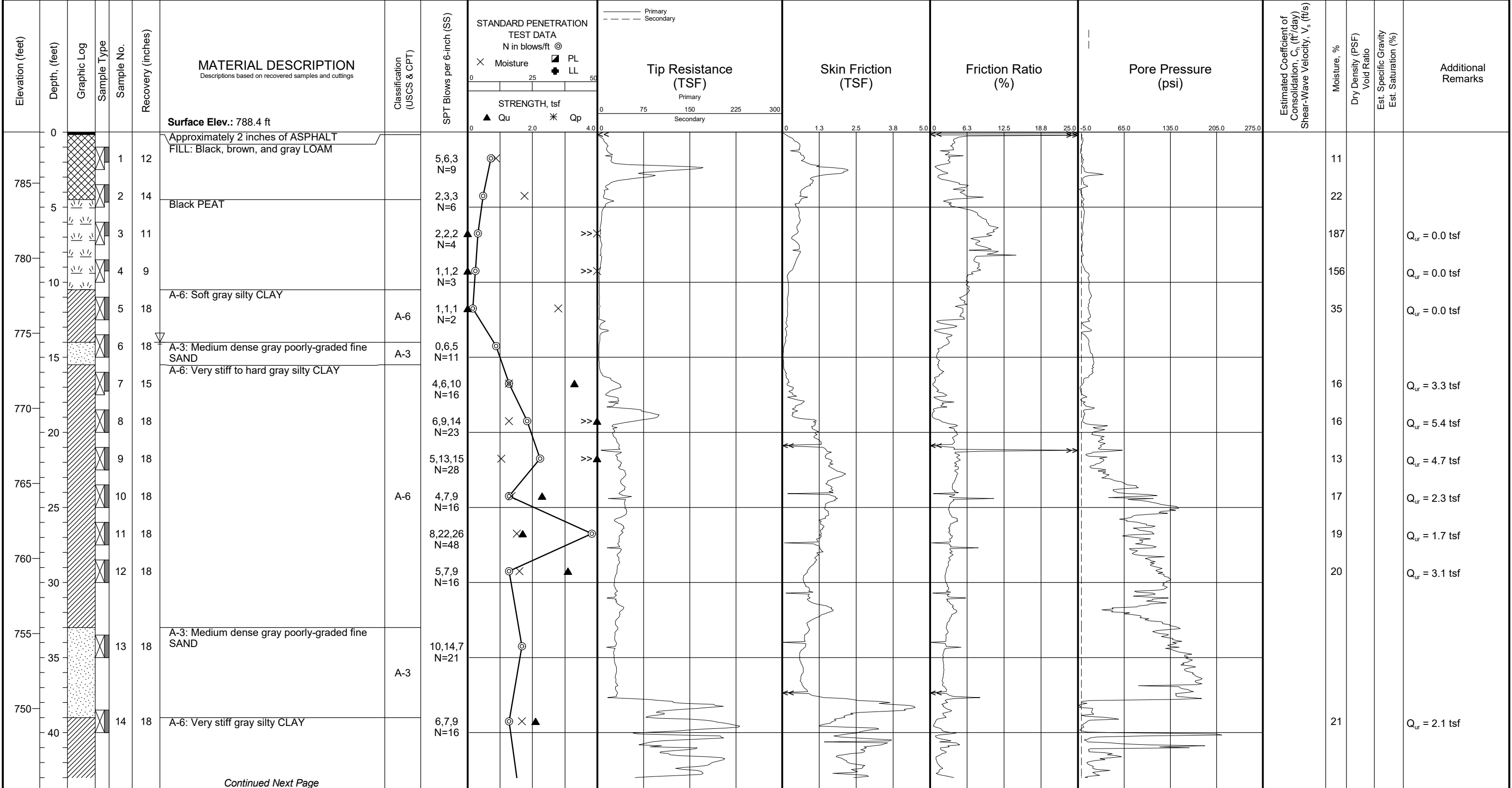
Key	Boring No.	Depth	USDA Soil Texture	WC%	ORG%	%Gravel	%Sand	%Silt	%Clay	D60	D30	
●	SB-05	6'	Sandy Loam	N/A	N/A	33.3	42.6	12.4	11.7	2.434	0.170	
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL			IL Route 132 Dry Land Bridge			File No.		G16.099				

APPENDIX H – CONE PENETROMETER TEST (CPT) DATA

LOG OF BORING CPT-01

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 14 FT ▾ Upon Completion N/A FT ▾ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue				Latitude: 42.4153905° Longitude: -088.0841889° Station: 294+75 Offset: 39' S of CL



Continued Next Page

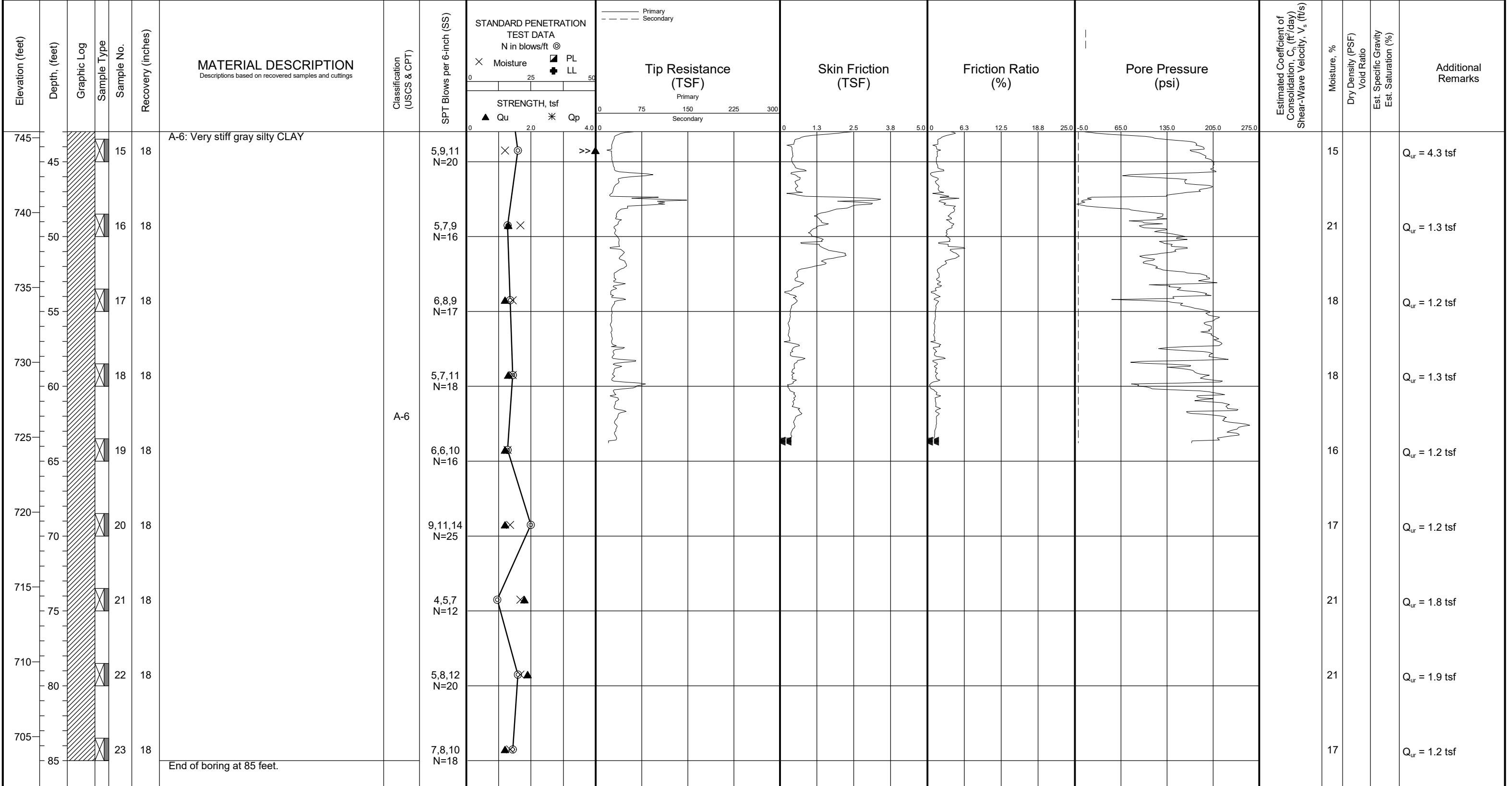
Completion Depth: 85.0 ft	Date Boring Started: 9/29/16	Logged By: J.W.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger	Remarks: (Soil data from LB-14)
Date Boring Completed: 9/29/16	Drilling Contractor: Rubino Engineering, Inc.		<input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-01

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 14 FT ▾ Upon Completion N/A FT ▾ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue				Latitude: 42.4153905° Longitude: -088.0841889° Station: 294+75 Offset: 39' S of CL



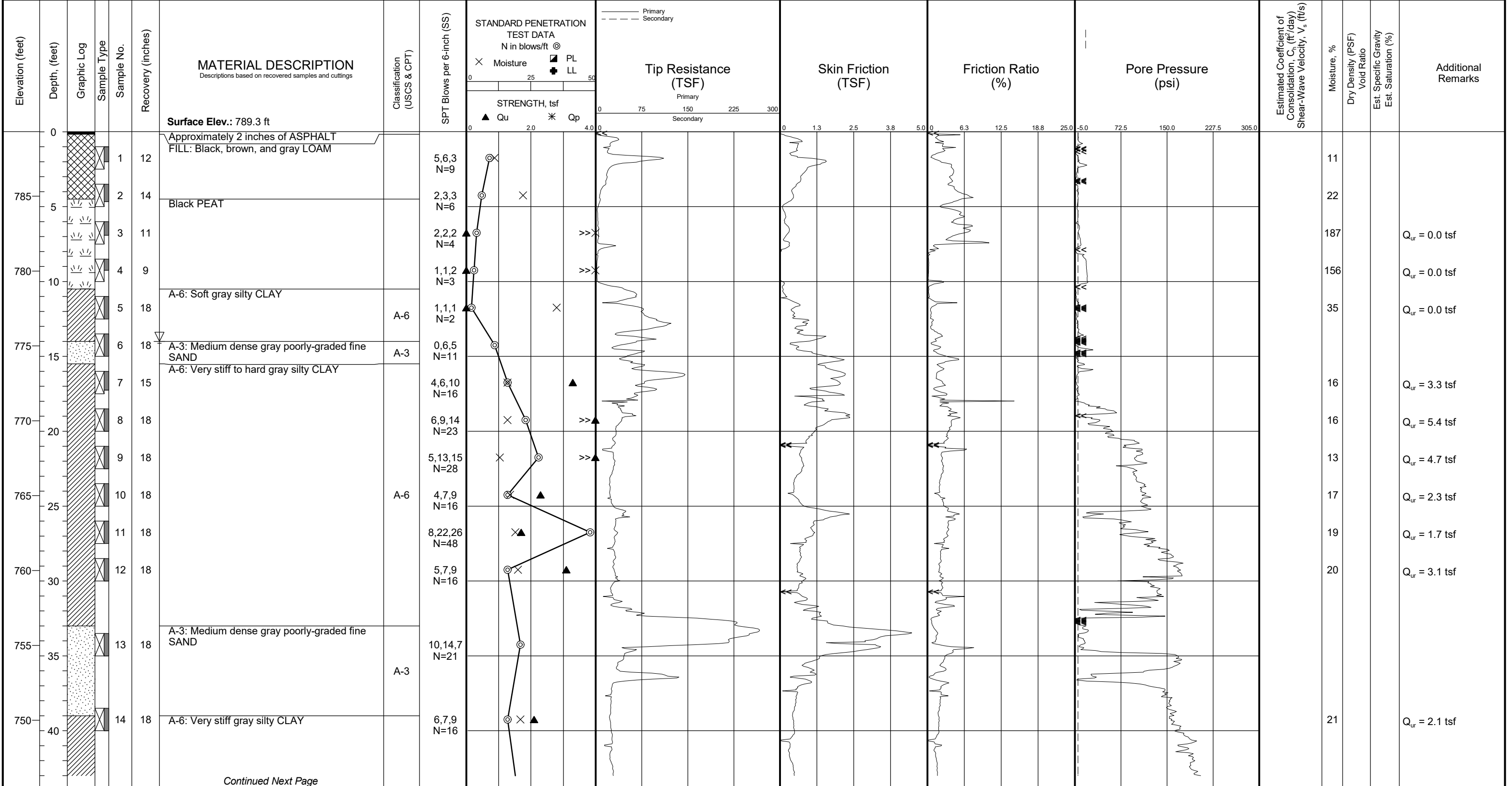
Completion Depth: 85.0 ft	Date Boring Started: 9/29/16	Logged By: J.W.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger	Remarks: (Soil data from LB-14)
Date Boring Completed: 9/29/16	Drilling Contractor: Rubino Engineering, Inc.		<input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-02

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 14 FT ▾ Upon Completion N/A FT ▾ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153915° Longitude: -088.0845266° Station: 293+75 Offset: 38' S of CL		



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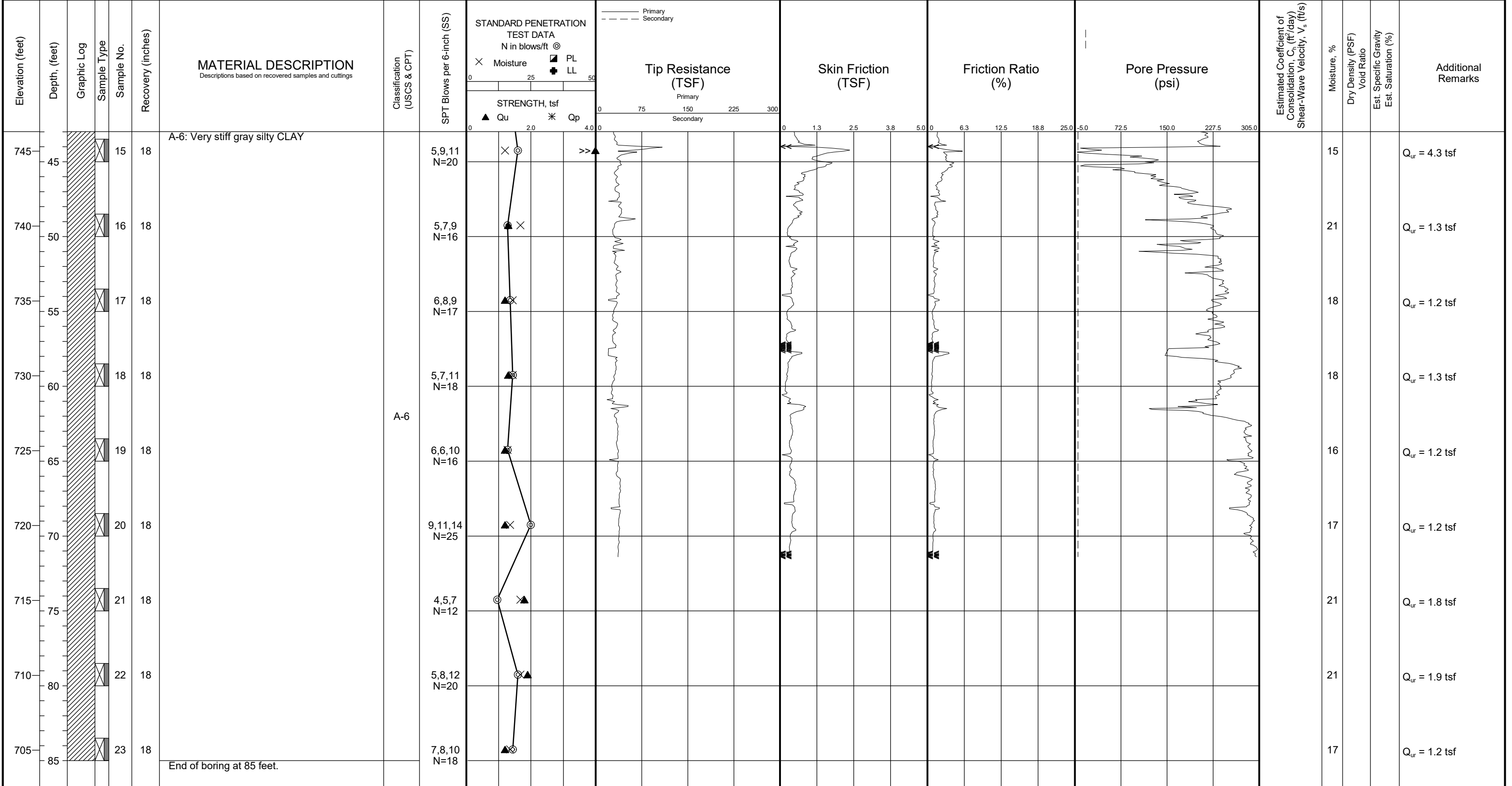
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Date Boring Completed: 9/27/16	Drilling Contractor: Rubino Engineering, Inc.	<input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone		

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-02

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 14 FT ▽ Upon Completion N/A FT ▽ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153915° Longitude: -088.0845266° Station: 293+75 Offset: 38' S of CL		



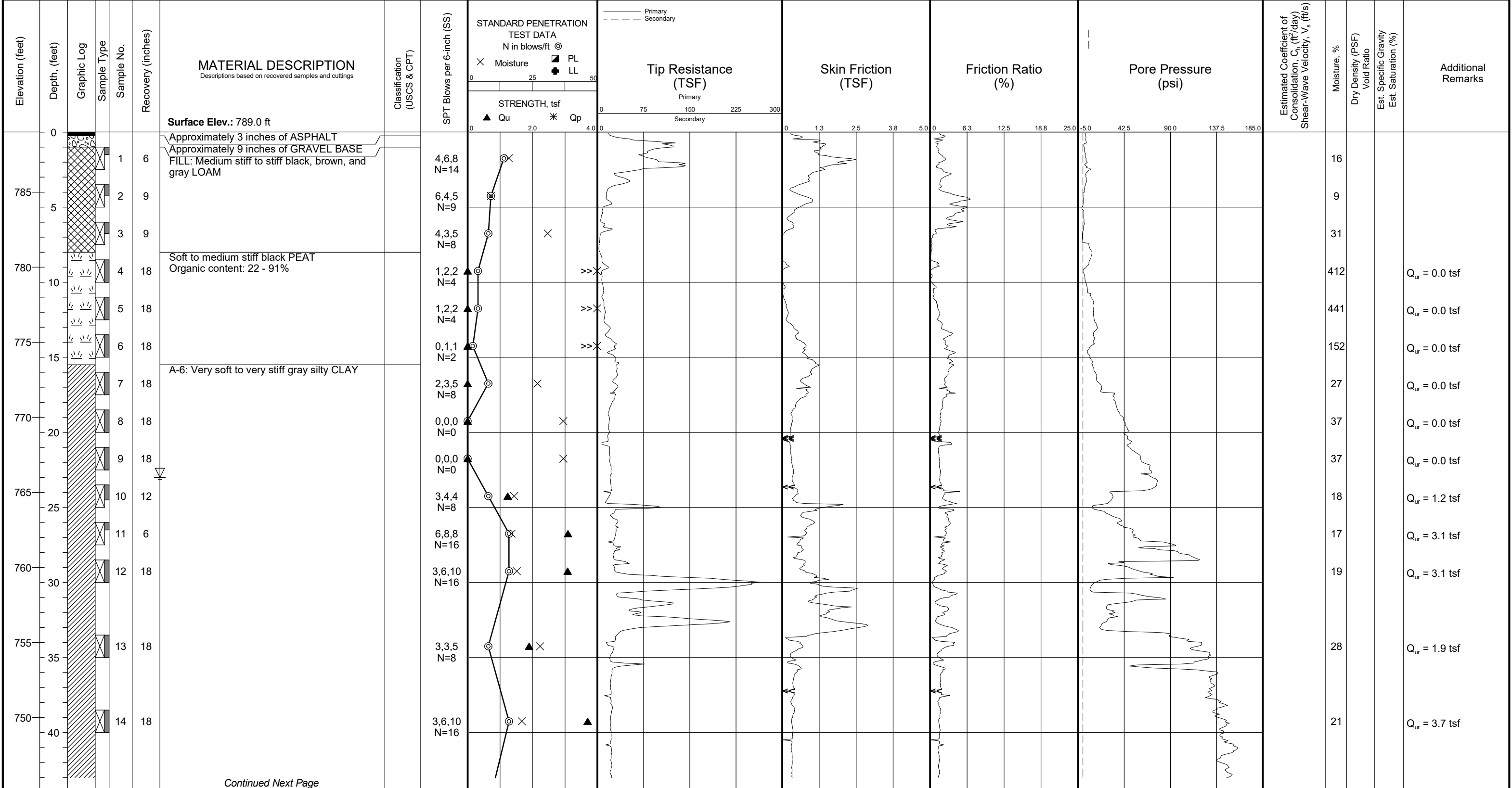
Completion Depth: 85.0 ft	Date Boring Started: 9/27/16	Date Boring Completed: 9/27/16	Logged By: J.W.	Drilling Contractor: Rubino Engineering, Inc.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger <input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	Remarks: (Soil data from LB-14)
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The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-03

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 23 FT ▾ Upon Completion N/A FT ▾ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue				Latitude: 42.4153953° Longitude: -088.0849505° Station: 292+75 Offset: 37' S of CL



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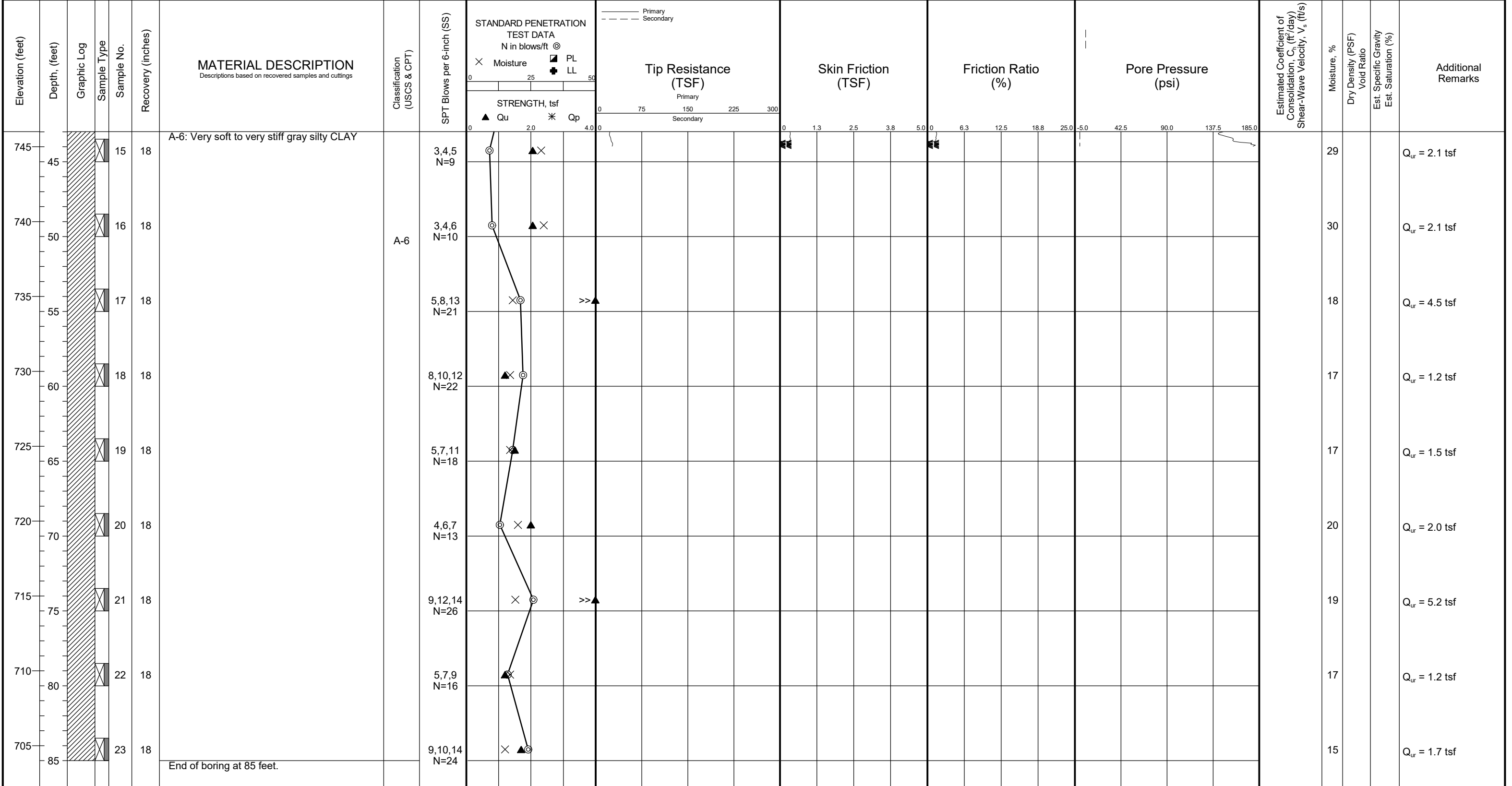
Completion Depth: 85.0 ft	Date Boring Started: 9/27/16	Logged By: J.W.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger	Remarks: (Soil data from LB-08)
Date Boring Completed: 9/27/16	Drilling Contractor: Rubino Engineering, Inc.		<input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-03

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 23 FT ▽ Upon Completion N/A FT ▽ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153953° Longitude: -088.0849505° Station: 292+75 Offset: 37' S of CL		



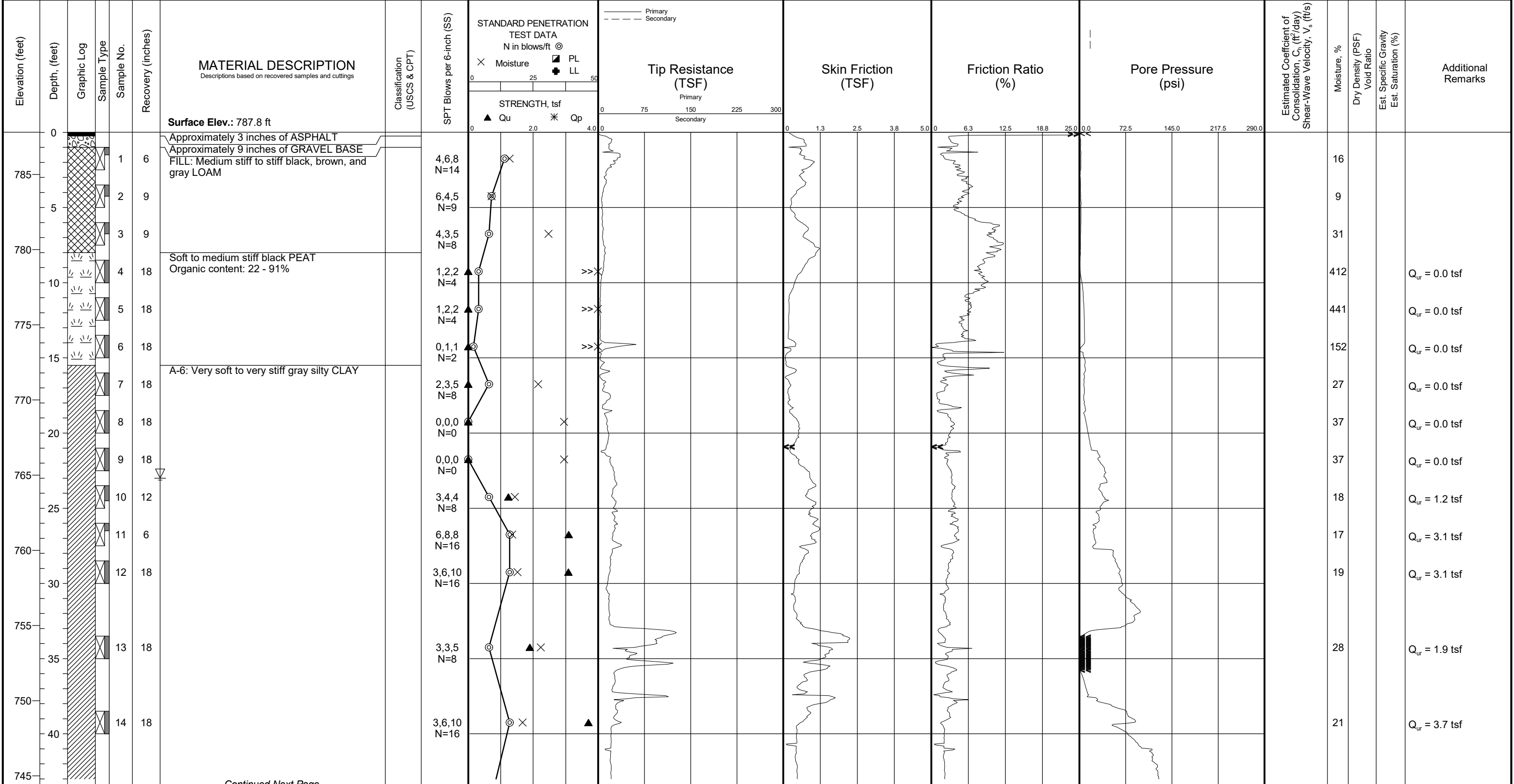
Completion Depth: 85.0 ft	Date Boring Started: 9/27/16	Date Boring Completed: 9/27/16	Logged By: J.W.	Drilling Contractor: Rubino Engineering, Inc.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger <input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	Remarks: (Soil data from LB-08)
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The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-04

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 23 FT ▾ Upon Completion N/A FT ▾ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153939° Longitude: -088.0852204° Station: 292+00 Offset: 38' S of CL		



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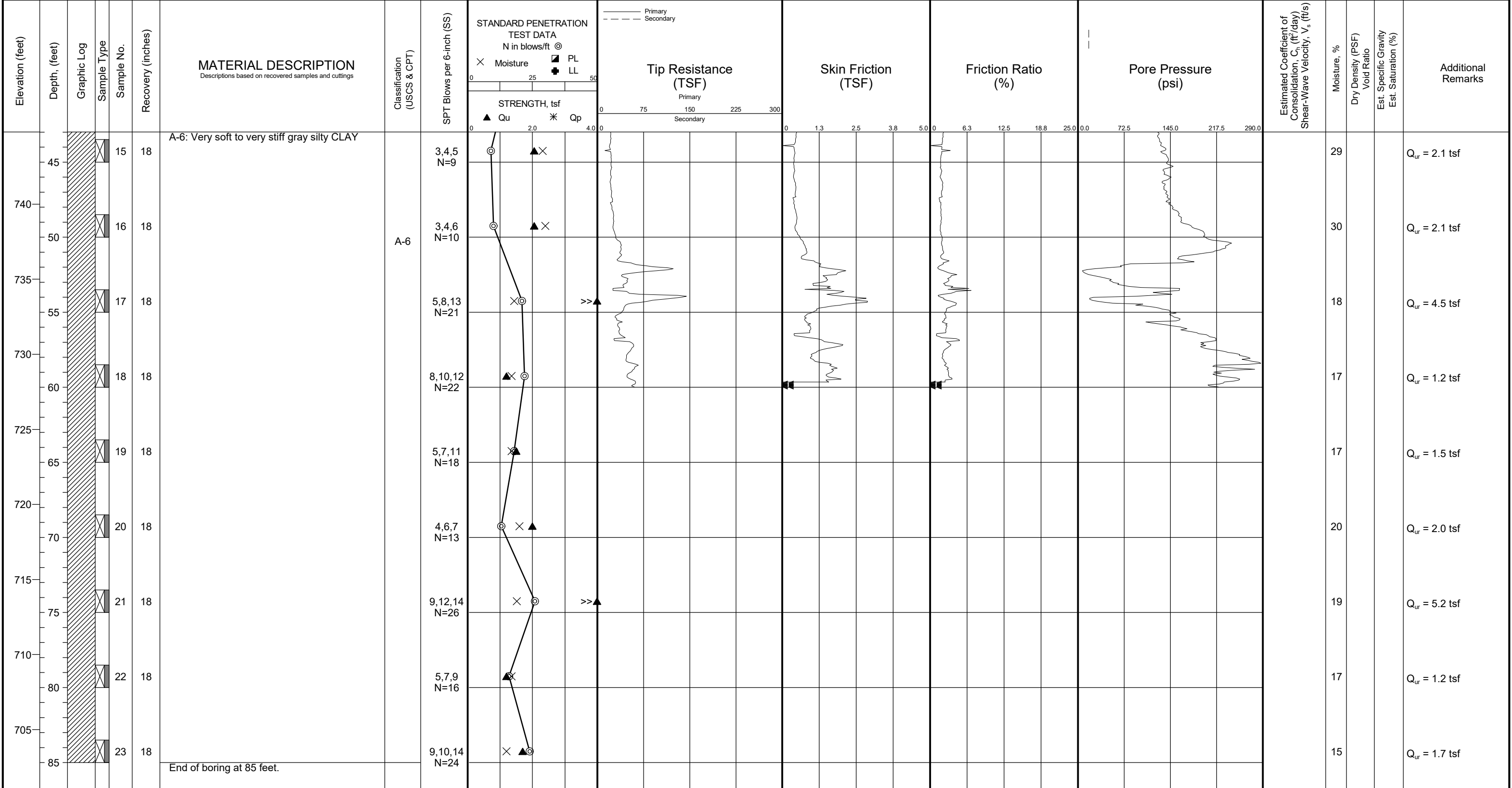
Completion Depth: 85.0 ft	Date Boring Started: 9/27/16	Date Boring Completed: 9/27/16	Logged By: J.W.	Drilling Contractor: Rubino Engineering, Inc.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger <input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	Remarks: (Soil data from LB-08)
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The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-04

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099 Location: IL Route 132 Drilling Method: 3 1/4" Hollow Stem Auger Boring Location: IL Route 132 WATER LEVELS: ▽ While Drilling 23 FT ▽ Upon Completion N/A FT ▽ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue Lake Villa, Illinois Sampling Method: Split Spoon Lake Villa, Illinois Latitude: 42.4153939° Longitude: -088.0852204° Station: 292+00 Offset: 38' S of CL
Hammer Type: Automatic



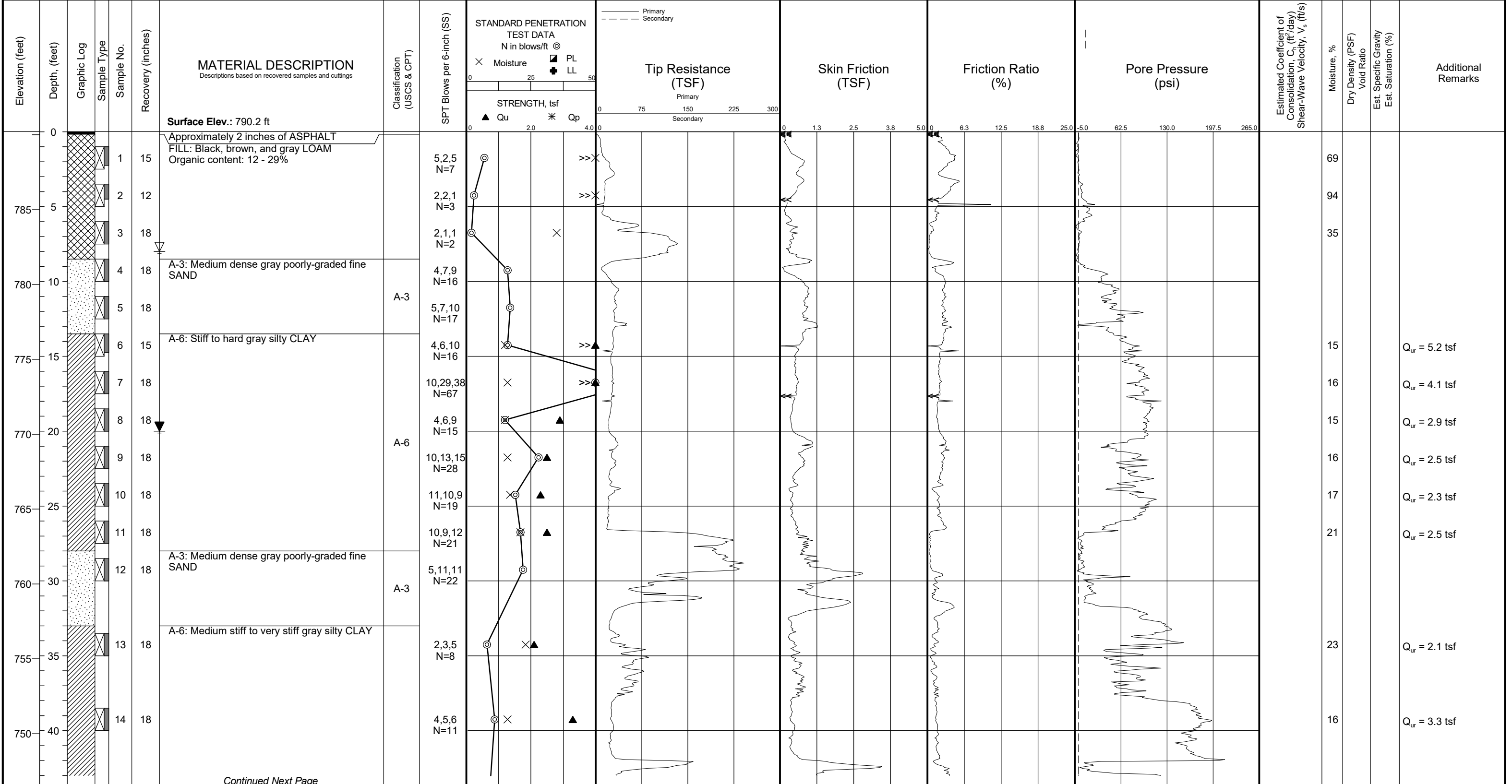
Completion Depth: 85.0 ft Date Boring Started: 9/27/16 Logged By: J.W. Sample Types: Auger Cutting Shelby Tube Hand Auger
Date Boring Completed: 9/27/16 Drilling Contractor: Rubino Engineering, Inc. Split-Spoon Rock Core Texas Cone Remarks: (Soil data from LB-08)

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-05

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 8 FT ▽ Upon Completion 20 FT ▽ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153988° Longitude: -088.0834022° Station: 297+00 Offset: 35' S of CL		



Continued Next Page

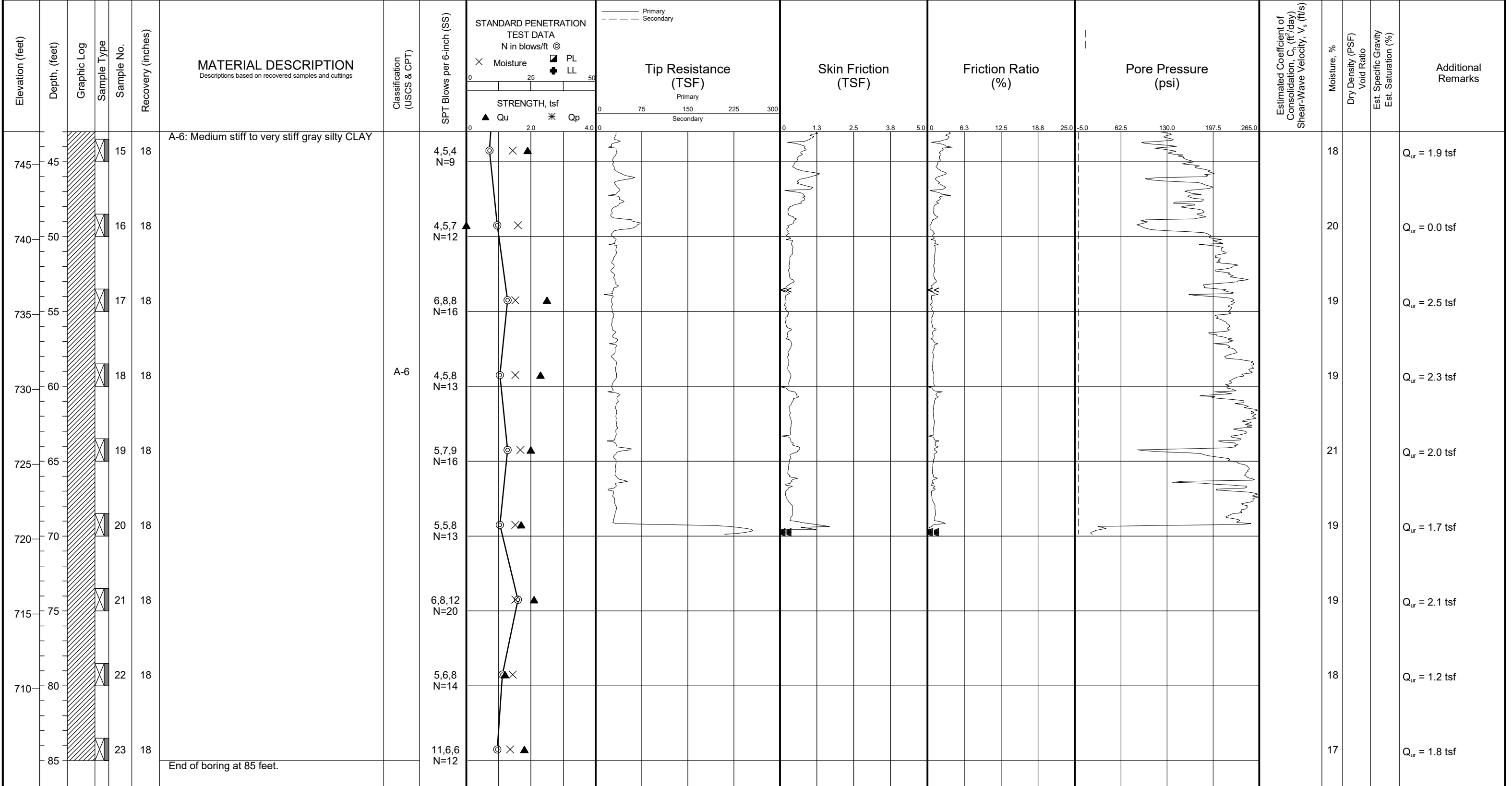
Completion Depth: 85.0 ft	Date Boring Started: 9/29/16	Logged By: J.W.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger	Remarks: (Soil data from LB-16)
	Date Boring Completed: 9/29/16	Drilling Contractor: Rubino Engineering, Inc.	<input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING CPT-05

SPT Data included for
general reference
See Boring Location Plan
for specific locations

Project No.: G16.099	Location: IL Route 132 Lake Villa, Illinois	Drilling Method: 3 1/4" Hollow Stem Auger Sampling Method: Split Spoon Hammer Type: Automatic	Boring Location: IL Route 132 Lake Villa, Illinois	WATER LEVELS: ▽ While Drilling 8 FT ▽ Upon Completion 20 FT ▽ Delay N/A FT
Project: Phase II design services for IL 132 from Oak Lane Drive to McKinley Avenue		Latitude: 42.4153988° Longitude: -088.0834022° Station: 297+00 Offset: 35' S of CL		



Completion Depth: 85.0 ft	Date Boring Started: 9/29/16	Date Boring Completed: 9/29/16	Logged By: J.W.	Drilling Contractor: Rubino Engineering, Inc.	Sample Types: <input checked="" type="checkbox"/> Auger Cutting <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Hand Auger <input checked="" type="checkbox"/> Split-Spoon <input checked="" type="checkbox"/> Rock Core <input checked="" type="checkbox"/> Texas Cone	Remarks: (Soil data from LB-16)
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The stratification lines represent approximate boundaries. The transition may be gradual.

APPENDIX I – SEISMIC SITE CLASS DETERMINATION

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE====G16.099 Dry Land Bridge - Lake Villa, IL

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	788.2 ft.
Pile or Shaft Dia.	12 inches
Boring Number	LB-01
Top of Boring Elev.	789.2 ft.

Approximate Fixity Elev. 782.2 ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E <----Controls
 N_{ch} (bar): 6 (Blows/ft.) Soil Site Class E
 s_u (bar): 2.91 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample Thick. (ft)	Layer Description		
			N (tsf)	Qu (tsf)	Boundary
	786.7	2.50	12		
	784.2	2.50	5		B
0.5	781.7	2.50	10		B
3.0	779.2	2.50	2	0.00	
5.5	776.7	2.50	4	0.00	B
8.0	774.2	2.50	1	0.00	
10.5	771.7	2.50	8	1.20	
13.0	769.2	2.50	10	1.70	
15.5	766.7	2.50	25	2.90	
18.0	764.2	2.50	17	2.50	
20.5	761.7	2.50	22	7.00	
23.0	759.2	2.50	25	6.20	
28.0	754.2	5.00	21	3.10	
33.0	749.2	5.00	17	3.50	
38.0	744.2	5.00	19	5.80	
43.0	739.2	5.00	12	2.10	
48.0	734.2	5.00	13	2.10	B
53.0	729.2	5.00	54		B
58.0	724.2	5.00	25	3.70	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	786.2 ft.
Pile or Shaft Dia.	12 inches
Boring Number	LB-03
Top of Boring Elev.	787.2 ft.

Approximate Fixity Elev. 780.2 ft.

Individual Site Class Definition:

N (bar): 7 (Blows/ft.) Soil Site Class E <----Controls
 N_{ch} (bar): 3 (Blows/ft.) Soil Site Class E
 s_u (bar): 3.14 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample Thick. (ft)	Layer Description		
			N (tsf)	Qu (tsf)	Boundary
	784.7	2.50	5		
	782.2	2.50	13		
0.5	779.7	2.50	6		B
3.0	777.2	2.50	1		
5.5	774.7	2.50	3	0.00	
8.0	772.2	2.50	1	0.00	
10.5	769.7	2.50	4	0.00	B
13.0	767.2	2.50	3	0.00	B
15.5	764.7	2.50	17		B
18.0	762.2	2.50	3	0.00	
20.5	759.7	2.50	8	1.20	
23.0	757.2	2.50	10	2.90	
28.0	752.2	5.00	15	5.60	
33.0	747.2	5.00	14	2.70	
38.0	742.2	5.00	17	2.90	
43.0	737.2	5.00	20	4.70	
48.0	732.2	5.00	21	5.60	
53.0	727.2	5.00	16	3.50	
58.0	722.2	5.00	12	3.30	
63.0	717.2	5.00	24	3.30	B

Substructure 3

Base of Substruct. Elev. (or ground surf for bents)	790 ft.
Pile or Shaft Dia.	12 inches
Boring Number	LB-04
Top of Boring Elev.	791 ft.

Approximate Fixity Elev. 784 ft.

Individual Site Class Definition:

N (bar): 9 (Blows/ft.) Soil Site Class E <----Controls
 N_{ch} (bar): 4 (Blows/ft.) Soil Site Class E
 s_u (bar): 2.85 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample Thick. (ft)	Layer Description		
			N (tsf)	Qu (tsf)	Boundary
	788.5	2.50	18		
	786.0	2.50	5		
0.5	783.5	2.50	12		B
3.0	781.0	2.50	3	0.00	
5.5	778.5	2.50	4	0.00	
8.0	776.0	2.50	3	0.00	
10.5	773.5	2.50	3	0.00	
13.0	771.0	2.50	2	0.00	B
15.5	768.5	2.50	4	0.00	
18.0	766.0	2.50	1	0.00	B
20.5	763.5	2.50	17		
23.0	761.0	2.50	12		B
28.0	756.0	5.00	4	0.50	
33.0	751.0	5.00	17	2.90	
38.0	746.0	5.00	26	5.00	
43.0	741.0	5.00	29	4.30	
48.0	736.0	5.00	32	3.70	
53.0	731.0	5.00	18	2.00	
58.0	726.0	5.00	42	2.90	
63.0	721.0	5.00	22	2.50	
68.0	716.0	5.00	32	2.50	
73.0	711.0	5.00	17	2.50	
78.0	706.0	5.00	15	2.50	B

Substructure 4

Base of Substruct. Elev. (or ground surf for bents)	788.6 ft.
Pile or Shaft Dia.	12 inches
Boring Number	LB-05
Top of Boring Elev.	789.6 ft.

Approximate Fixity Elev. 782.6 ft.

Individual Site Class Definition:

N (bar): 6 (Blows/ft.) Soil Site Class E <----Controls
 N_{ch} (bar): 3 (Blows/ft.) Soil Site Class E
 s_u (bar): 2.91 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample Thick. (ft)	Layer Description		
			N (tsf)	Qu (tsf)	Boundary
	787.1	2.50	4		
	784.6	2.50	2		B
0.5	782.1	2.50	7	0.00	
3.0	779.6	2.50	2	0.00	
5.5	777.1	2.50	4	0.00	
8.0	774.6	2.50	2	0.00	
10.5	772.1	2.50	4	0.00	B
13.0	769.6	2.50	1	0.00	B
15.5	767.1	2.50	14		B
18.0	764.6	2.50	1	0.00	
20.5	762.1	2.50	3	0.00	B
23.0	759.6	2.50	15		
28.0	754.6	5.00	10		B
33.0	749.6	5.00	4	0.00	
38.0	744.6	5.00	9	1.20	
43.0	739.6	5.00	14	3.50	
48.0	734.6	5.00	21	3.90	
53.0	729.6	5.00	24	5.40	
58.0	724.6	5.00	19	3.70	
63.0	719.6	5.00	22	3.10	B

Global Site Class Definition: Substructures 1 through 8

N (bar): 10 (Blows/ft.) Soil Site Class E <----Controls
 N_{ch} (bar): 4 (Blows/ft.) Soil Site Class E
 s_u (bar): 2.71 (ksf) Soil Site Class C

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====G16.099 Dry Land Bridge - Lake Villa, IL

Substructure 5					
Base of Substruct. Elev. (or ground surf for bents)			790 ft.		
Pile or Shaft Dia.			12 inches		
Boring Number			LB-06		
Top of Boring Elev.			791 ft.		
Approximate Fixity Elev.			784 ft.		
Individual Site Class Definition:					
N (bar): <u>13</u> (Blows/ft.)			Soil Site Class E <----Controls		
N _{ch} (bar): <u>7</u> (Blows/ft.)			Soil Site Class E		
s _u (bar): <u>2.6</u> (ksf)			Soil Site Class C		
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	788.5	2.50	10		
	786.0	2.50	5		B
0.5	783.5	2.50	8	0.00	
3.0	781.0	2.50	5	0.00	B
5.5	778.5	2.50	7	0.00	
8.0	776.0	2.50	2	0.00	
10.5	773.5	2.50	5	0.00	
13.0	771.0	2.50	3	0.00	
15.5	768.5	2.50	12	0.00	
18.0	766.0	2.50	9	0.00	B
20.5	763.5	2.50	21		
23.0	761.0	2.50	4		B
28.0	756.0	5.00	8	1.20	
33.0	751.0	5.00	16	2.00	
38.0	746.0	5.00	50	2.50	
43.0	741.0	5.00	35	2.30	
48.0	736.0	5.00	22	3.30	
53.0	731.0	5.00	24	4.10	
58.0	726.0	5.00	16	3.30	
63.0	721.0	5.00	15	2.30	
68.0	716.0	5.00	18	2.90	
73.0	711.0	5.00	17	2.90	
78.0	706.0	5.00	18	1.80	B

Substructure 6					
Base of Substruct. Elev. (or ground surf for bents)			787.3 ft.		
Pile or Shaft Dia.			12 inches		
Boring Number			LB-07		
Top of Boring Elev.			788.3 ft.		
Approximate Fixity Elev.			781.3 ft.		
Individual Site Class Definition:					
N (bar): <u>7</u> (Blows/ft.)			Soil Site Class E <----Controls		
N _{ch} (bar): <u>4</u> (Blows/ft.)			Soil Site Class E		
s _u (bar): <u>2.85</u> (ksf)			Soil Site Class C		
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	785.8	2.50	7		B
	783.3	2.50	4	0.00	
0.5	780.8	2.50	2	0.00	
3.0	778.3	2.50	1	0.00	B
5.5	775.8	2.50	1	0.00	B
8.0	773.3	2.50	7		
10.5	770.8	2.50	7		
13.0	768.3	2.50	9		
15.5	765.8	2.50	8		
18.0	763.3	2.50	13		
20.5	760.8	2.50	11		B
23.0	758.3	2.50	12	3.50	
28.0	753.3	5.00	10	4.70	
33.0	748.3	5.00	13	2.90	
38.0	743.3	5.00	12	2.90	
43.0	738.3	5.00	7	2.50	
48.0	733.3	5.00	9	2.50	
53.0	728.3	5.00	9	1.70	
58.0	723.3	5.00	16	3.10	
63.0	718.3	5.00	12	1.00	
68.0	713.3	5.00	12	3.10	
73.0	708.3	5.00	22	3.50	B

Substructure 7					
Base of Substruct. Elev. (or ground surf for bents)			790 ft.		
Pile or Shaft Dia.			12 inches		
Boring Number			LB-08		
Top of Boring Elev.			791 ft.		
Approximate Fixity Elev.			784 ft.		
Individual Site Class Definition:					
N (bar): <u>10</u> (Blows/ft.)			Soil Site Class E <----Controls		
N _{ch} (bar): <u>3</u> (Blows/ft.)			Soil Site Class E		
s _u (bar): <u>2.02</u> (ksf)			Soil Site Class C		
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	788.5	2.50	14		
	786.0	2.50	9		
0.5	783.5	2.50	8		B
3.0	781.0	2.50	4	0.00	
5.5	778.5	2.50	4	0.00	
8.0	776.0	2.50	2	0.00	B
10.5	773.5	2.50	8	0.00	
13.0	771.0	2.50	1	0.00	
15.5	768.5	2.50	1	0.00	
18.0	766.0	2.50	8	1.20	
20.5	763.5	2.50	16	3.10	
23.0	761.0	2.50	16	3.10	
28.0	756.0	5.00	8	1.90	
33.0	751.0	5.00	16	3.70	
38.0	746.0	5.00	9	2.10	
43.0	741.0	5.00	10	2.10	
48.0	736.0	5.00	22	4.50	
53.0	731.0	5.00	22	1.20	
58.0	726.0	5.00	18	1.50	
63.0	721.0	5.00	13	2.00	
68.0	716.0	5.00	26	5.20	
73.0	711.0	5.00	16	1.20	
78.0	706.0	5.00	24	1.70	B

Substructure 8					
Base of Substruct. Elev. (or ground surf for bents)			787.9 ft.		
Pile or Shaft Dia.			12 inches		
Boring Number			LB-09		
Top of Boring Elev.			788.9 ft.		
Approximate Fixity Elev.			781.9 ft.		
Individual Site Class Definition:					
N (bar): <u>12</u> (Blows/ft.)			Soil Site Class E		
N _{ch} (bar): <u>NA</u> (Blows/ft.)			NA		
s _u (bar): <u>2.75</u> (ksf)			Soil Site Class C <----Controls		
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	786.4	2.50	8		
	783.9	2.50	6		
0.5	781.4	2.50	6		
3.0	778.9	2.50	5		
5.5	776.4	2.50	10		B
8.0	773.9	2.50	9	2.10	
10.5	771.4	2.50	16	3.30	
13.0	768.9	2.50	10	2.90	
15.5	766.4	2.50	18	2.90	
18.0	763.9	2.50	13	2.90	
20.5	761.4	2.50	14	2.50	
23.0	758.9	2.50	17	4.10	
28.0	753.9	5.00	11	0.00	
33.0	748.9	5.00	10	2.90	
38.0	743.9	5.00	10	2.90	
43.0	738.9	5.00	11	2.70	
48.0	733.9	5.00	14	3.90	
53.0	728.9	5.00	13	2.70	
58.0	723.9	5.00	18	2.70	
63.0	718.9	5.00	11	3.10	
68.0	713.9	5.00	16	2.50	
73.0	708.9	5.00	16	2.70	B

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE====G16.099 Dry Land Bridge - Lake Villa, IL

Substructure 5					
Base of Substruct. Elev. (or ground surf for bents)					790 ft.
Pile or Shaft Dia.					12 inches
Boring Number					LB-16
Top of Boring Elev.					791 ft.
Approximate Fixity Elev.					784 ft.
Individual Site Class Definition:					
N (bar):		14 (Blows/ft.)		Soil Site Class E <----Controls	
N _{ch} (bar):		12 (Blows/ft.)		Soil Site Class E	
s _u (bar):		2.08 (ksf)		Soil Site Class C	
Seismic Soil Column Depth	Bot. Of Sample Elevation	Sample Thick.	N	Qu	Layer Description Boundary
(ft)	(ft.)	(ft.)		(tsf)	
	788.5	2.50	7		
	786.0	2.50	3		
0.5	783.5	2.50	2		B
3.0	781.0	2.50	16		
5.5	778.5	2.50	17		B
8.0	776.0	2.50	16	5.20	
10.5	773.5	2.50	67	4.10	
13.0	771.0	2.50	15	2.90	
15.5	768.5	2.50	28	2.50	
18.0	766.0	2.50	19	2.30	
20.5	763.5	2.50	21	2.50	B
23.0	761.0	2.50	22		B
28.0	756.0	5.00	8	2.10	
33.0	751.0	5.00	11	3.30	
38.0	746.0	5.00	9	1.90	
43.0	741.0	5.00	12	0.00	
48.0	736.0	5.00	16	2.50	
53.0	731.0	5.00	13	2.30	
58.0	726.0	5.00	16	2.00	
63.0	721.0	5.00	13	1.70	
68.0	716.0	5.00	20	2.10	
73.0	711.0	5.00	14	1.20	
78.0	706.0	5.00	12	1.80	B

Substructure 6					
Base of Substruct. Elev. (or ground surf for bents)					787.2 ft.
Pile or Shaft Dia.					12 inches
Boring Number					LB-17
Top of Boring Elev.					788.2 ft.
Approximate Fixity Elev.					781.2 ft.
Individual Site Class Definition:					
N (bar):		11 (Blows/ft.)		Soil Site Class E <----Controls	
N _{ch} (bar):		8 (Blows/ft.)		Soil Site Class E	
s _u (bar):		2.28 (ksf)		Soil Site Class C	
Seismic Soil Column Depth	Bot. Of Sample Elevation	Sample Thick.	N	Qu	Layer Description Boundary
(ft)	(ft.)	(ft.)		(tsf)	
	785.7	2.50	8		
	783.2	2.50	4		B
0.5	780.7	2.50	1	0.00	B
3.0	778.2	2.50	10		
5.5	775.7	2.50	5		B
8.0	773.2	2.50	13	3.10	
10.5	770.7	2.50	12	2.30	
13.0	768.2	2.50	17	3.30	
15.5	765.7	2.50	13	2.50	
18.0	763.2	2.50	12	3.10	
20.5	760.7	2.50	13	2.50	B
23.0	758.2	2.50	17		
28.0	753.2	5.00	13		B
33.0	748.2	5.00	9	1.90	
38.0	743.2	5.00	8	2.70	
43.0	738.2	5.00	9	1.50	
48.0	733.2	5.00	9	2.50	
53.0	728.2	5.00	11	0.90	
58.0	723.2	5.00	11	2.30	
63.0	718.2	5.00	11	2.50	
68.0	713.2	5.00	23	2.50	
73.0	708.2	5.00	11	2.50	B

Substructure 7					
Base of Substruct. Elev. (or ground surf for bents)					789.5 ft.
Pile or Shaft Dia.					12 inches
Boring Number					LB-19
Top of Boring Elev.					790.5 ft.
Approximate Fixity Elev.					783.5 ft.
Individual Site Class Definition:					
N (bar):		15 (Blows/ft.)		Soil Site Class D	
N _{ch} (bar):		NA (Blows/ft.)		NA	
s _u (bar):		2.46 (ksf)		Soil Site Class C <----Controls	
Seismic Soil Column Depth	Bot. Of Sample Elevation	Sample Thick.	N	Qu	Layer Description Boundary
(ft)	(ft.)	(ft.)		(tsf)	
	788.0	2.50	8		
	785.5	2.50	4		
0.5	783.0	2.50	5		B
3.0	780.5	2.50	13	0.00	
5.5	778.0	2.50	18	4.10	
8.0	775.5	2.50	16	2.10	
10.5	773.0	2.50	20	2.90	
13.0	770.5	2.50	12	2.50	
15.5	768.0	2.50	19	2.50	
18.0	765.5	2.50	14	2.90	
20.5	763.0	2.50	22	3.10	B
23.0	760.5	2.50	16		B
28.0	755.5	5.00	13	1.80	
33.0	750.5	5.00	8	2.30	
38.0	745.5	5.00	10	2.10	
43.0	740.5	5.00	21	3.10	
48.0	735.5	5.00	14	1.30	
53.0	730.5	5.00	15	2.30	
58.0	725.5	5.00	18	3.10	
63.0	720.5	5.00	18	2.90	
68.0	715.5	5.00	15	3.10	B

Substructure 8					
Base of Substruct. Elev. (or ground surf for bents)					ft.
Pile or Shaft Dia.					inches
Boring Number					ft.
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	Bot. Of Sample Elevation	Sample Thick.	N	Qu	Layer Description Boundary
(ft)	(ft.)	(ft.)		(tsf)	

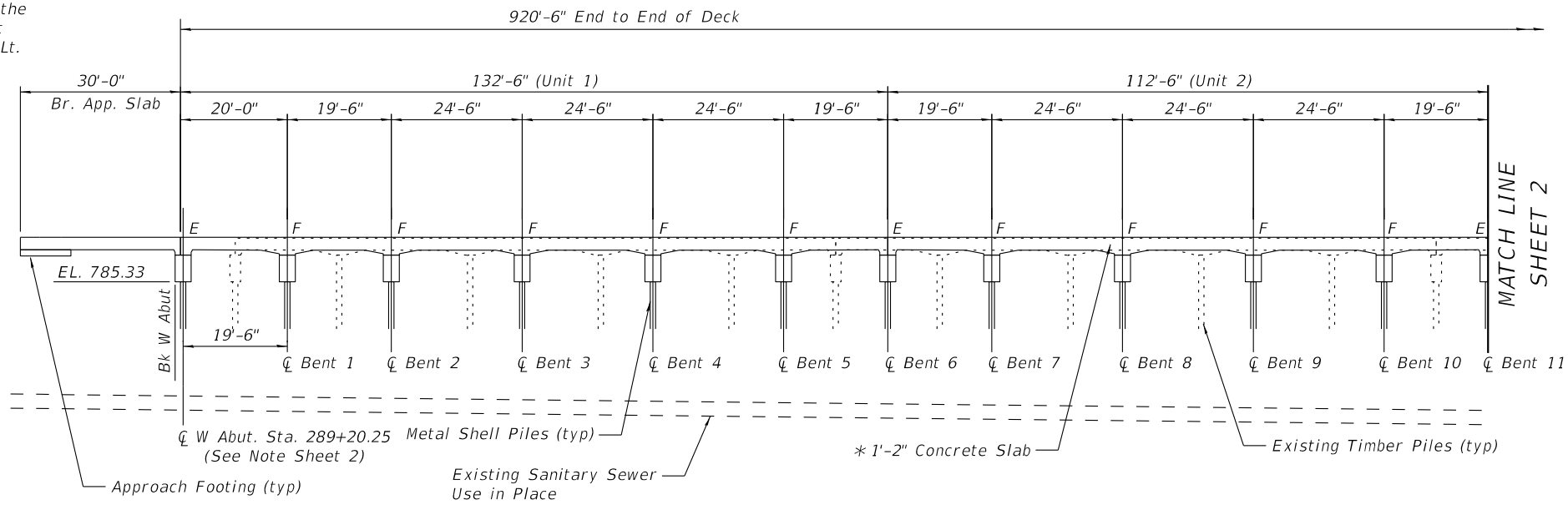
APPENDIX J – TS&L DRAWINGS

Benchmark: SBM-3 - East of 2 north upper flange bolts (Arrow Bolt) of Hydrant located on the north side of IL 132 (Grand Ave.) at Oak Knoll Drive. Sta. 291+49, 23.2' Lt. Elevation = 790.11

Salvage: None.

EXISTING BRIDGE DESCRIPTION

Existing Structure Number: SN 049-D006
 Dry Land Bridge Built in 1938 as S.A. Route 6, Section W-R as 8 units of 5 span continuous RC Slab 20'-0" wide by 112'-6" long, 900'-0" total length, supported on 6 timber pile bents. Slab is 11" thick for center 16'-0" and tapers to 17 1/2" thick along edges and tapers to 24" thick at interior supports. The Structure was widened 4'-0" to the North in 1971 as F.A.S. Rt. 3, Section W & WR. Existing pile bents were widened 4'-0" with a single timber pile bent. The widening slab is 13" thick and tapers to 18 7/8" at the north edge and tapers to 24 3/8" at interior supports. A 3" thick bituminous surface also was added to the existing 1 7/8" bituminous surface in 1971 to the entire 24'-0" wide roadway. There are expansion joints at the ends of the structure and at the ends of each 5-span unit. Existing bridge, including structure slab, pile caps and tops of interfering existing timber piles, to be removed and replaced utilizing stage construction and detours.



ELEVATION (Units 1 - 2)

* Subject to refinement in design

HIGHWAY CLASSIFICATION

FAP Rte 541 IL Rte 132
 Functional Class: Other Principal Arterial
 ADT: 11,200(2012), 14,000(2040)
 ADTT: 1,120(2012), 1,400(2040)
 DHV: 1100
 Design Speed: 30 m.p.h.
 Posted Speed: 30 m.p.h.
 Two-Way Traffic
 Directional Distribution: 50:50

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

FIELD UNITS

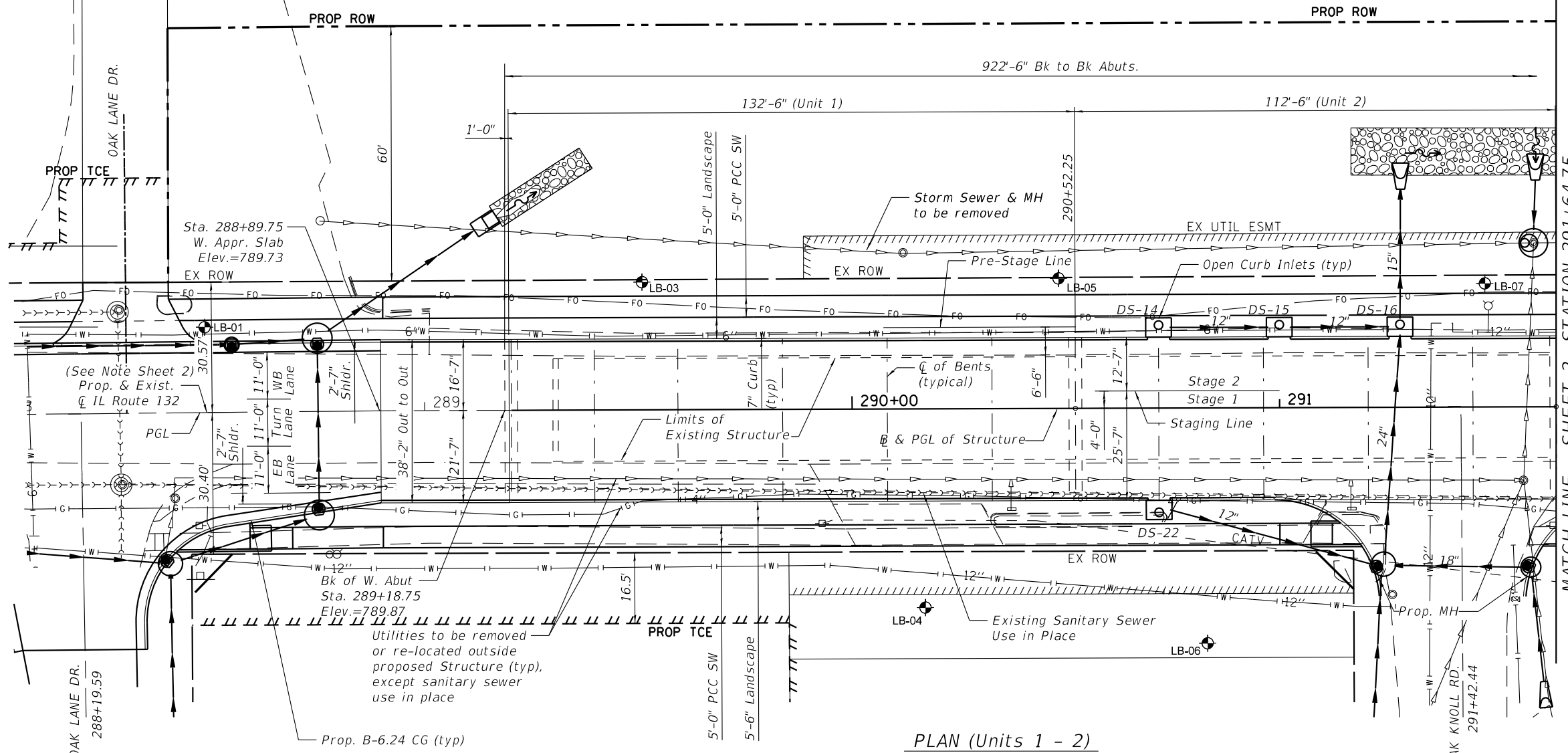
f'c = 3,500 psi
 f'c = 4,000 psi (Superstructure Concrete)
 fy = 60,000 psi (Reinforcement)

LOADING HL-93

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

SEISMIC DATA

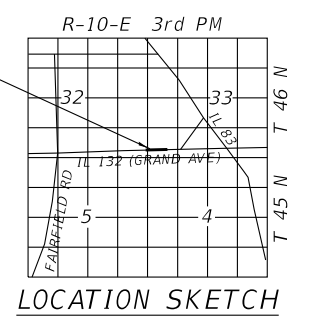
Seismic Performance Zone (SPZ) = 1
 Design Spectral Acceleration at 1.0 sec. (SD1) = 0.110g
 Design Spectral Acceleration at 0.2 sec. (SDs) = 0.194g
 Soil Site Class = E



PLAN (Units 1 - 2)

Bent Data Table

BENT NO.	BL / PGL STATION	BL / PGL ELEV.	BTM OF CAP ELEVATION
Bk W Abut	289+18.75	789.87	785.33
CL of 1	289+39.75	789.96	784.84
CL of 2	289+59.25	790.00	784.88
CL of 3	289+83.75	790.00	784.88
CL of 4	290+08.25	789.94	784.82
CL of 5	290+32.75	789.84	784.72
CL of 6	290+52.25	789.76	785.22
CL of 7	290+71.75	789.73	784.61
CL of 8	290+96.25	789.70	784.58
CL of 9	291+20.75	789.72	784.60
CL of 10	291+45.25	789.77	784.65
CL of 11	291+64.75	789.83	785.29



GENERAL PLAN

ILLINOIS ROUTE 132 DRY LAND BRIDGE,
OAK LANE DR. TO MCKINLEY AVE.
F.A.P. RTE. 541 - SEC. WR(2)-R-1
LAKE COUNTY
STATION 293+80.00
STRUCTURE NO. 049-0690

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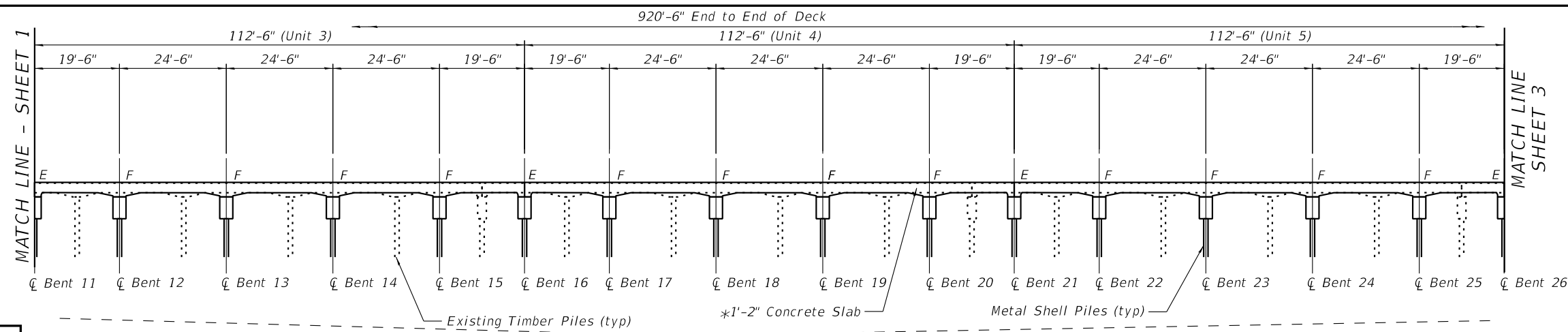
DESIGN FIRM REG. 184.002117

DESIGNED - RJL	REVISED -
DRAWN - MBJ	REVISED -
CHECKED - RD	REVISED -
DATE - 8/6/2020	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

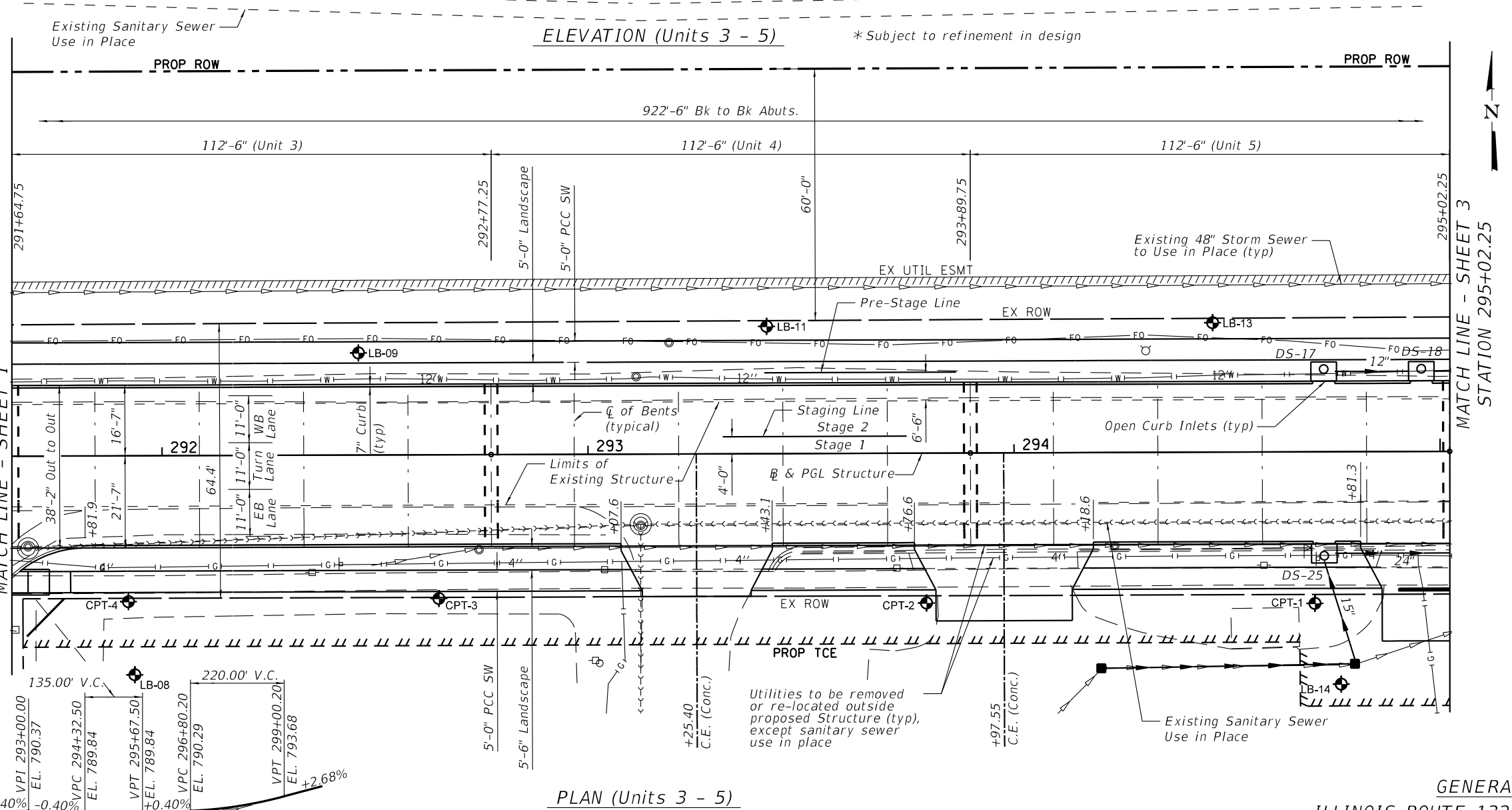
SCALE:	SHEET	OF	SHEETS	STA. 289+20.25	TO STA. 291+64.75
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F.A.P. RTE. 541	SECTION WR(2)-R-1	COUNTY LAKE	TOTAL SHEETS 5	SHEET NO. 1
CONTRACT NO. 62A53				ILLINOIS FED. AID PROJECT

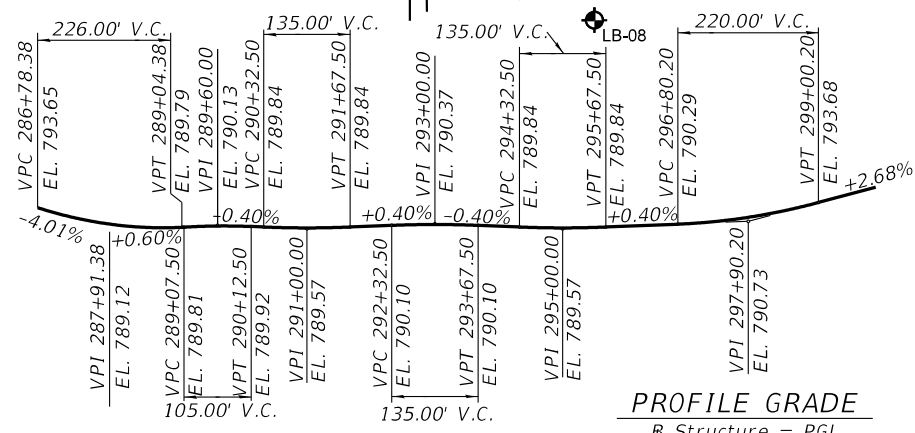


Bent Data Table

BENT NO.	BL / PGL STATION	BL / PGL ELEV.	BTM OF CAP ELEVATION
CL of 11	291+64.75	789.83	785.29
CL of 12	291+84.25	789.91	784.79
CL of 13	292+08.75	790.01	784.89
CL of 14	292+33.25	790.10	784.98
CL of 15	292+57.75	790.18	785.06
CL of 16	292+77.25	790.22	785.68
CL of 17	292+96.75	790.24	785.12
CL of 18	293+21.25	790.22	785.10
CL of 19	293+45.75	790.17	785.05
CL of 20	293+70.25	790.09	784.97
CL of 21	293+89.75	790.01	785.47
CL of 22	294+09.25	789.93	784.81
CL of 23	294+33.75	789.84	784.72
CL of 24	294+58.25	789.74	784.62
CL of 25	294+82.75	789.71	784.59
CL of 26	295+02.25	789.70	785.16



PLAN (Units 3 - 5)



PROFILE GRADE

NOTE:
 B of Structure and PGL is a Straight Line from the intersection of Proposed C West Abutment & C East Abutment and the Platted Proposed & Existing C IL 132.

GENERAL PLAN
 ILLINOIS ROUTE 132 DRY LAND BRIDGE,
 OAK LANE DR. TO MCKINLEY AVE.
 F.A.P. RTE. 541 - SEC. WR(2)-R-1
 LAKE COUNTY
 STATION 293+80.00
 STRUCTURE NO. 049-0690

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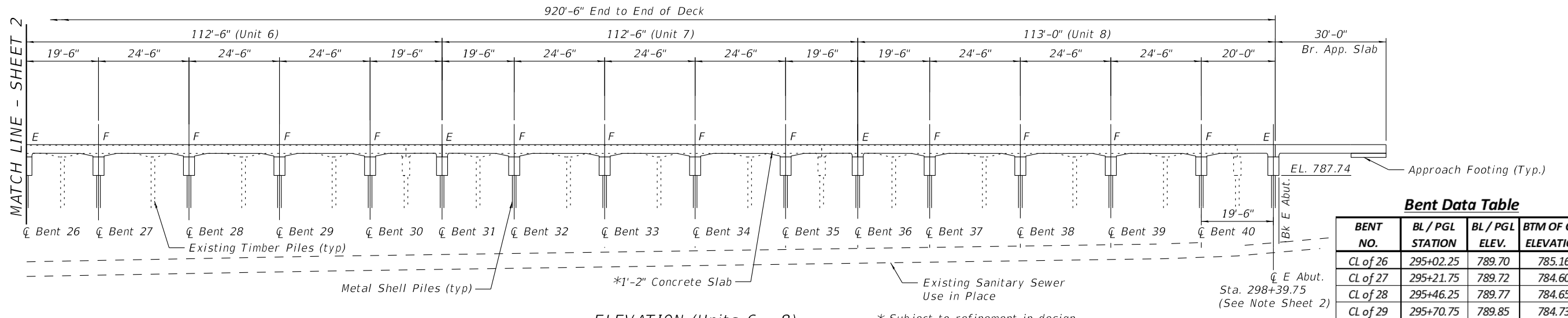
ABNA
 DESIGN FIRM REG. 184.002117
 9901 S. Western Ave.
 Chicago, IL 60643
 Ph. 773-881-4788
 F: 773.239.3728

DESIGNED - RJL	REVISED -
DRAWN - MBJ	REVISED -
CHECKED - RD	REVISED -
DATE - 8/6/2020	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

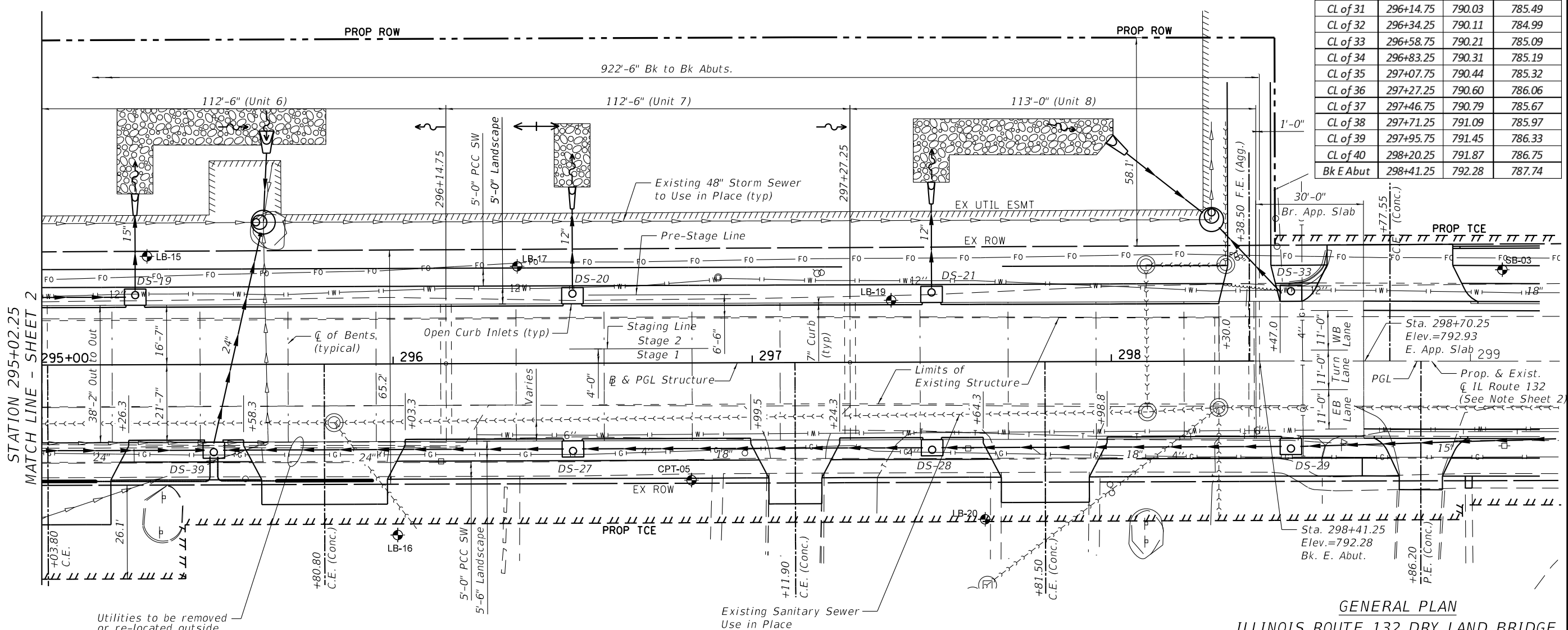
SCALE:	SHEET	OF	SHEETS	STA. 291+64.75	TO STA. 295+02.25
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F.A.P. RTE. 541	SECTION WR(2)-R-1	COUNTY LAKE	TOTAL SHEETS 5	SHEET NO. 2
CONTRACT NO. 62A53				
ILLINOIS FED. AID PROJECT				



Bent Data Table

BENT NO.	BL / PGL STATION	BL / PGL ELEV.	BTM OF CAP ELEVATION
CL of 26	295+02.25	789.70	785.16
CL of 27	295+21.75	789.72	784.60
CL of 28	295+46.25	789.77	784.65
CL of 29	295+70.75	789.85	784.73
CL of 30	295+95.25	789.95	784.83
CL of 31	296+14.75	790.03	785.49
CL of 32	296+34.25	790.11	784.99
CL of 33	296+58.75	790.21	785.09
CL of 34	296+83.25	790.31	785.19
CL of 35	297+07.75	790.44	785.32
CL of 36	297+27.25	790.60	786.06
CL of 37	297+46.75	790.79	785.67
CL of 38	297+71.25	791.09	785.97
CL of 39	297+95.75	791.45	786.33
CL of 40	298+20.25	791.87	786.75
Bk E Abut.	298+41.25	792.28	787.74



Utilities to be removed or re-located outside proposed Structure (typ), except sanitary sewer Use in Place

GENERAL PLAN
ILLINOIS ROUTE 132 DRY LAND BRIDGE,
OAK LANE DR. TO MCKINLEY AVE.,
F.A.P. RTE. 541 - SEC. WR(2)-R-1
LAKE COUNTY
STATION 293+80.00
STRUCTURE NO. 049-0690

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ABNA
DESIGN FIRM REG. 184.002117

9901 S. Western Ave.
Chicago, IL 60643
Ph. 773-881-4788
F: 773.239.3728

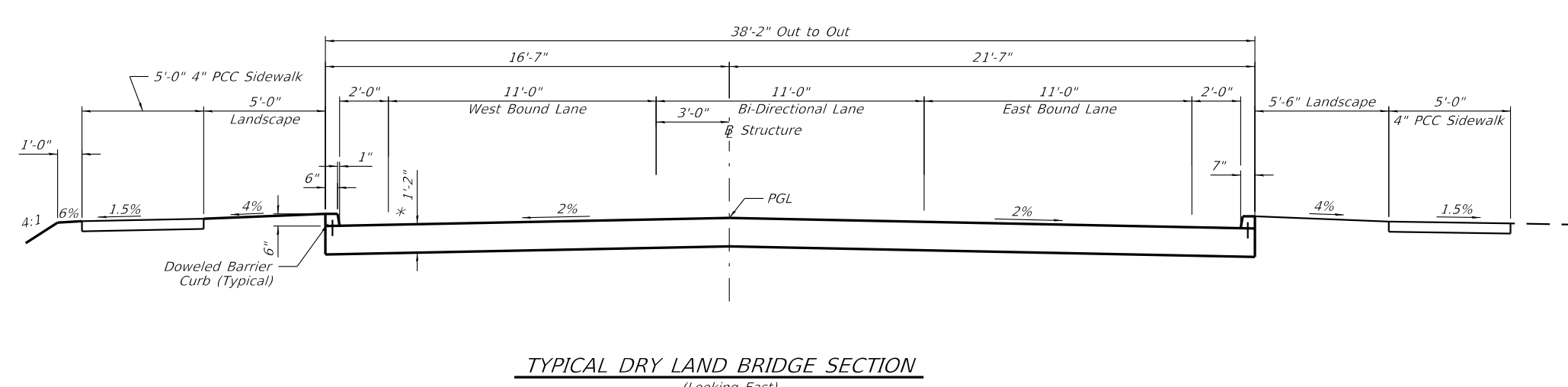
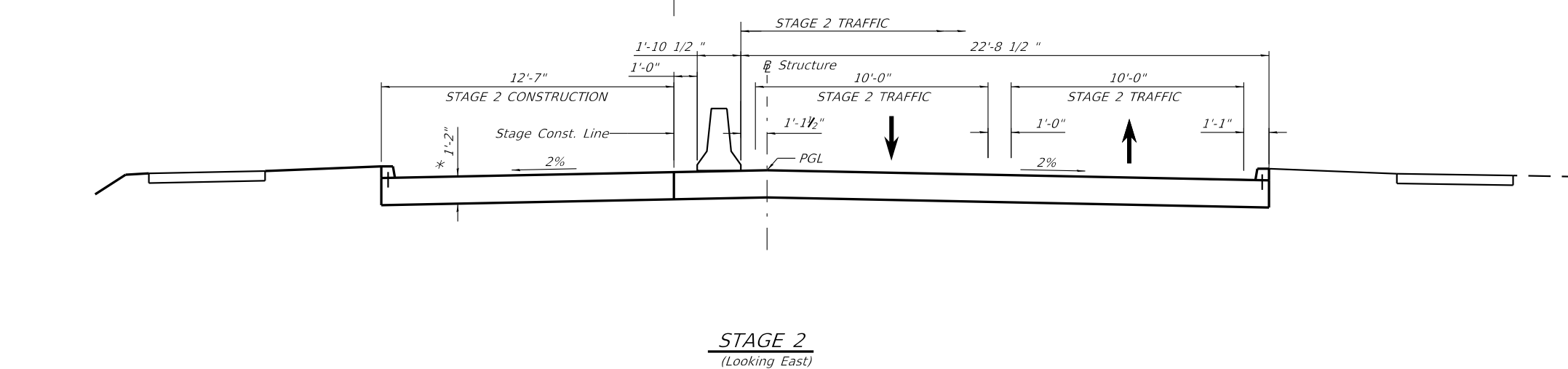
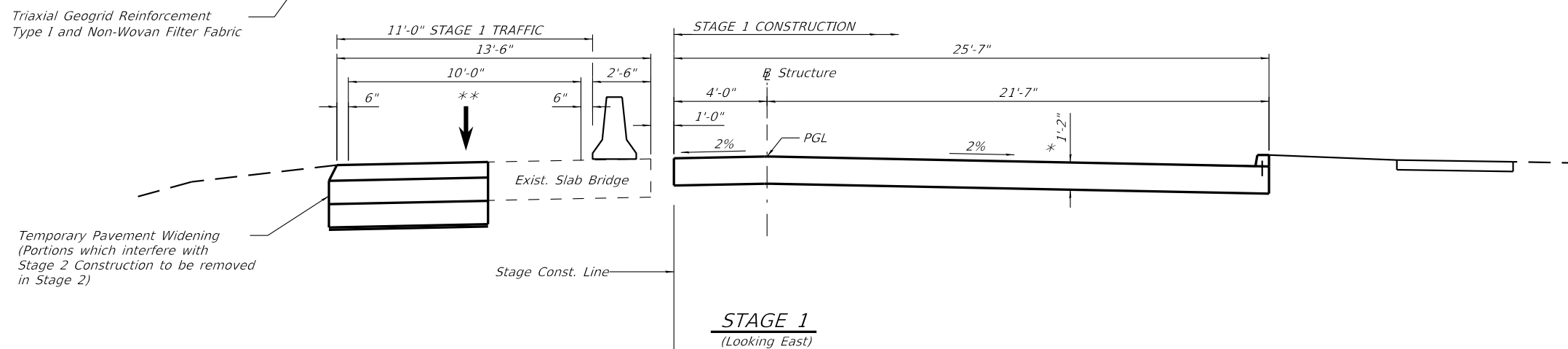
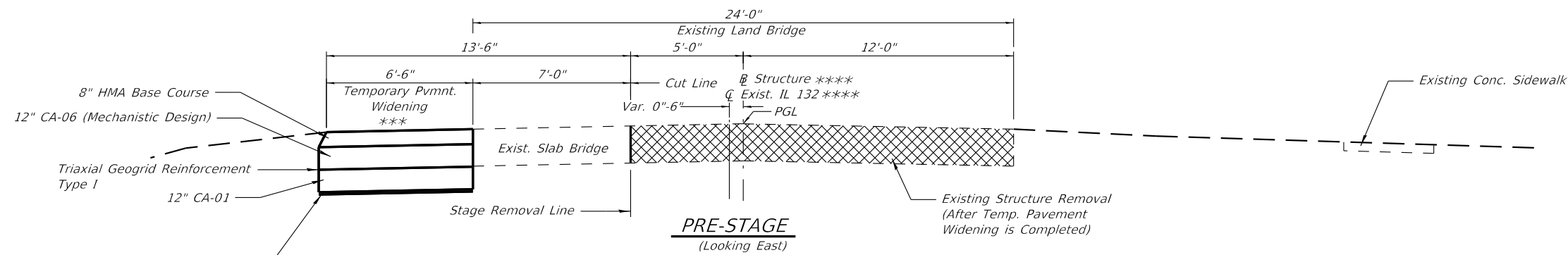
DESIGNED - RJL	REVISED -
DRAWN - MBJ	REVISED -
CHECKED - RD	REVISED -
DATE - 8/7/2020	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

SCALE:	SHEET	OF	SHEETS	STA. 295+02.25	TO STA. 298+39.75
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F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
541	WR(2)-R-1	LAKE	5	3
CONTRACT NO. 62A53				

ILLINOIS FED. AID PROJECT



* Subject to refinement in design

** During Pre-Stage & Stage 1, East Bound traffic shall be detoured. West Bound is one lane.

*** One lane West Bound Traffic will be shifted South sufficient to provide working areas and barriers for Temporary pavement construction. Barriers, Traffic Control devices and temporary pavement markings shall comply with I.D.O.T. Standards.

**** \bar{C} of Structure and PGL is a Straight Line from the intersection of Proposed \bar{C} West Abutment & \bar{C} East Abutment and the Platted Proposed & Existing \bar{C} IL 132. The Platted Proposed & Existing \bar{C} of IL 132 deflects from the Proposed \bar{C} of Structure North up to 6".

TYPICAL SECTIONS & STAGING
 ILLINOIS ROUTE 132 DRY LAND BRIDGE,
 OAK LANE DR. TO MCKINLEY AVE.
 F.A.P. RTE. 541 - SEC. WR(2)-R-1
 LAKE COUNTY
 STATION 293+80.00
 STRUCTURE NO. 049-0690

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ABNA
 DESIGN FIRM REG. 184.002117

9901 S. Western Ave.
 Chicago, IL 60643
 Ph. 773-881-4788
 F: 773.239.3728

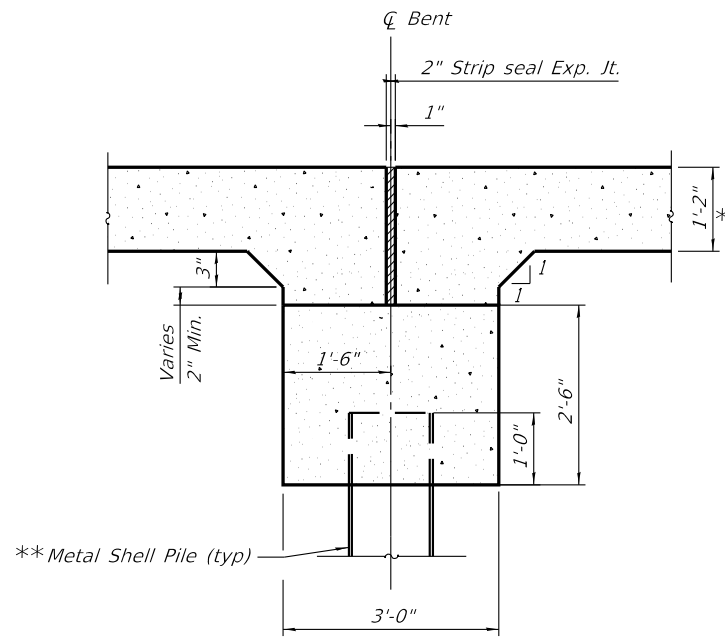
DESIGNED - RJL
 DRAWN - MBJ
 CHECKED - RD
 DATE - 8/7/2020

REVISED -
 REVISED -
 REVISED -
 REVISED -

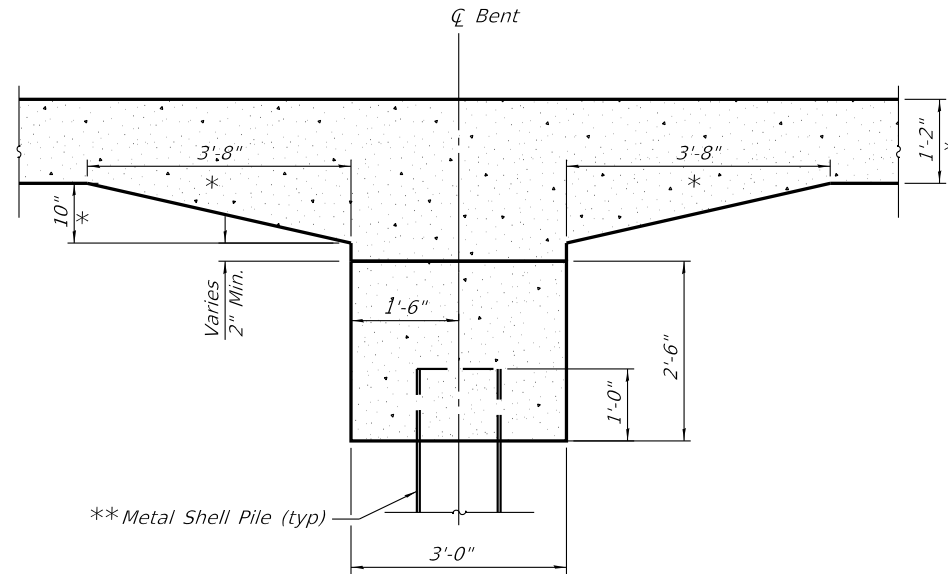
STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION

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

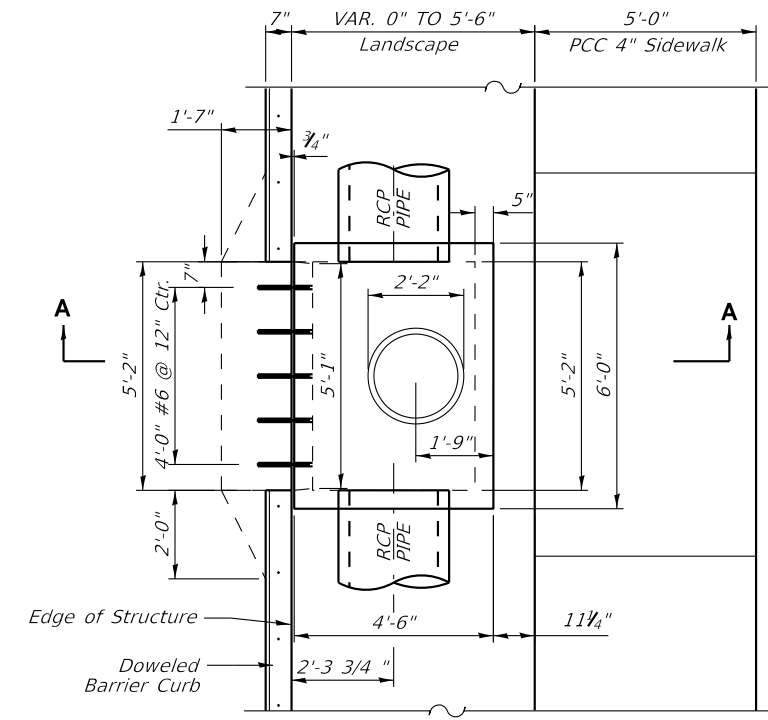
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
541	WR(2)-R-1	LAKE	5	4
CONTRACT NO. 62A53			ILLINOIS FED. AID PROJECT	



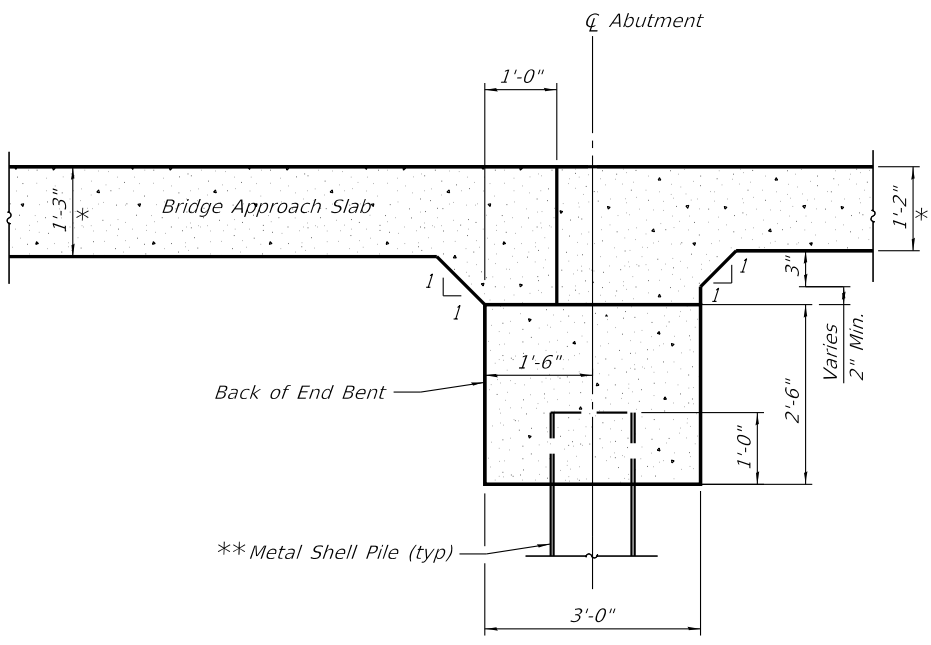
INTERIOR EXPANSION PILE BENT SECTION



INTERIOR FIXED PILE BENT SECTION



PLAN

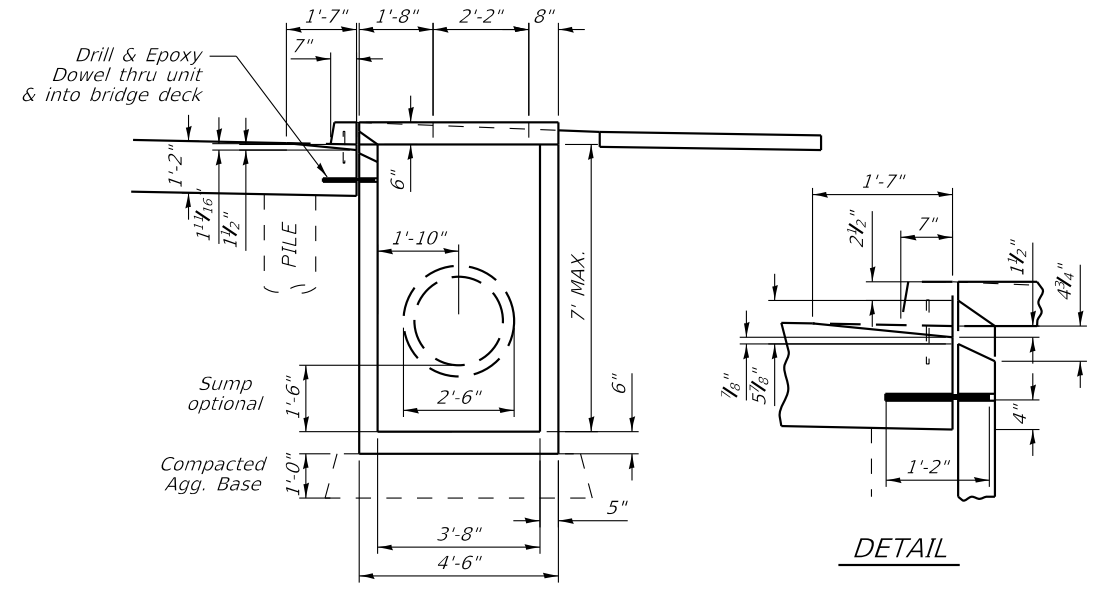


END PILE BENT SECTION
East & West Abutments

* Subject to refinement in design
 ** Pile spacing to be determined in final design to avoid sanitary sewer

Open Curb Inlet - Deck Locations

INLET ID	STRUCTURE DESCRIPTION	GUTTER F.L. STATION	GUTTER F.L. OFFSET	GUTTER FL. ELEV.
DS-14	Open Curb Inlet	290+71.75	-16.58	789.38
DS-15	Open Curb Inlet	291+00.00	-16.58	789.35
DS-16	Open Curb Inlet	291+28.25	-16.58	789.38
DS-17	Open Curb Inlet	294+72.75	-16.58	789.38
DS-18	Open Curb Inlet	294+95.67	-16.58	789.38
DS-19	Open Curb Inlet	295+28.25	-16.58	789.38
DS-20	Open Curb Inlet	296+50.00	-16.58	789.81
DS-21	Open Curb Inlet	297+50.00	-16.58	790.49
DS-22	Open Curb Inlet	290+71.75	21.58	789.28
DS-25	Open Curb Inlet	294+72.75	21.58	789.28
DS-27	Open Curb Inlet	296+50.00	21.58	789.71
DS-28	Open Curb Inlet	297+50.01	21.58	791.39
DS-29	Open Curb Inlet	298+50.00	21.54	792.03
DS-33	Open Curb Inlet	298+50.00	-16.63	792.13
DS-39	Open Curb Inlet	295+50.00	21.58	789.30



SECTION A-A

DETAIL

* TYPICAL OPEN CURB INLET

DETAILS
ILLINOIS ROUTE 132 DRY LAND BRIDGE,
OAK LANE DR. TO MCKINLEY AVE.
F.A.P. RTE. 541 - SEC. WR(2)-R-1
LAKE COUNTY
STATION 293+80.00
STRUCTURE NO. 049-0690

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ABNA
 DESIGN FIRM REG. 184.002117
 9901 S. Western Ave.
 Chicago, IL 60643
 Ph. 773-881-4788
 F: 773.239.3728

DESIGNED - RJL	REVISED -
DRAWN - MBJ	REVISED -
CHECKED - RD	REVISED -
DATE - 8/7/2020	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

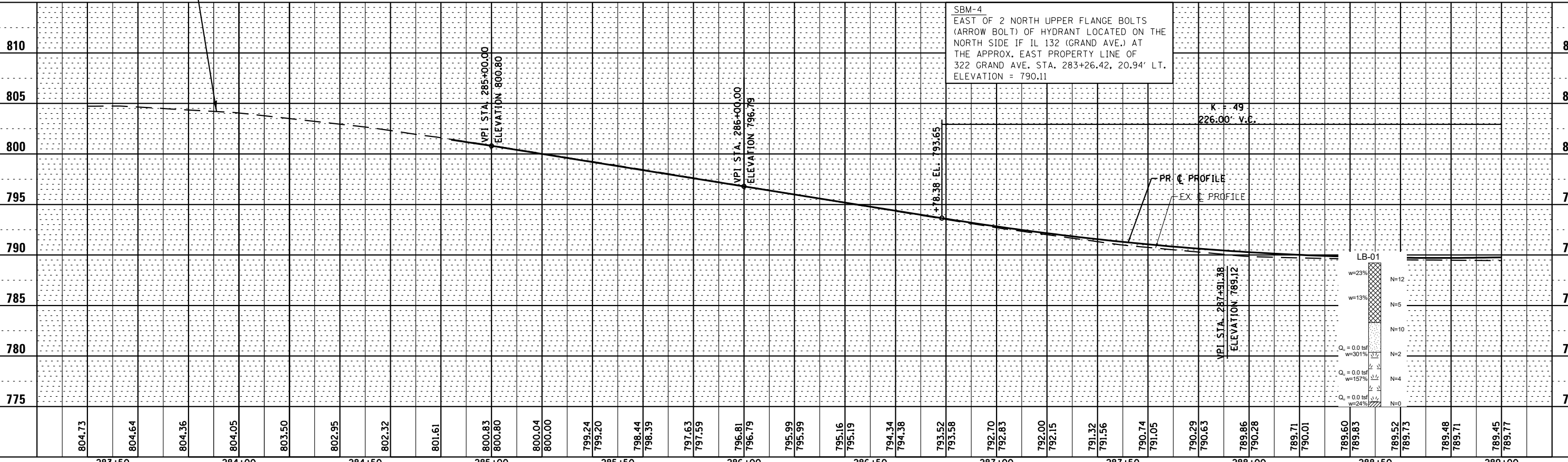
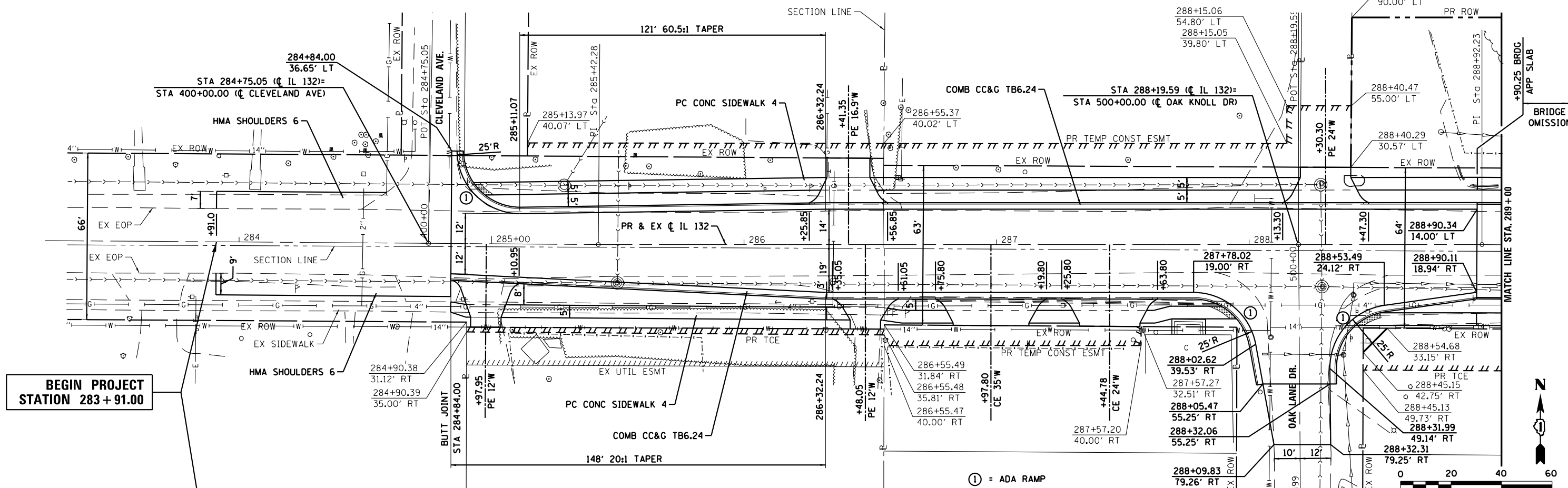
SCALE:	SHEET	OF	SHEETS	STA.	TO	STA.
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F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
541	WR(2)-R-1	LAKE	5	5
CONTRACT NO. 62A53				
ILLINOIS FED. AID PROJECT				

APPENDIX K – PLAN AND PROFILE WITH SUBSURFACE DATA PROFILE PLOT

PLAN	SUBMITTED	DATE
	PLOTTED	
	ALIGNED	
	CHECKED	
	NO. _____	
	CADD FILE NAME	

PROFILE	SUBMITTED	DATE
	PLOTTED	
	GRADES CHECKED	
	STRUCTURE	
	NOTATIONS	
	NO. _____	



804.73	804.64	804.36	804.05	803.50	802.95	802.32	801.61	800.83	800.80	800.04	800.00	799.24	799.20	798.44	798.39	797.63	797.59	796.81	796.79	795.99	795.99	795.16	795.19	794.34	794.38	793.52	793.58	792.70	792.83	792.00	792.15	791.32	791.56	790.74	791.05	790.29	790.63	789.86	790.28	789.71	790.01	789.60	789.83	789.52	789.73	789.48	789.71	789.45	789.77
283+50		284+00		284+50		285+00		285+50		286+00		286+50		287+00		287+50		288+00		288+50		289+00																											



USER NAME = untitled	DESIGNED - MBJ	REVISED -
	DRAWN - MBJ	REVISED -
PLOT SCALE = 48.0000' / in.	CHECKED - TPP	REVISED -
PLOT DATE = 6/26/2017	DATE - 6/26/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

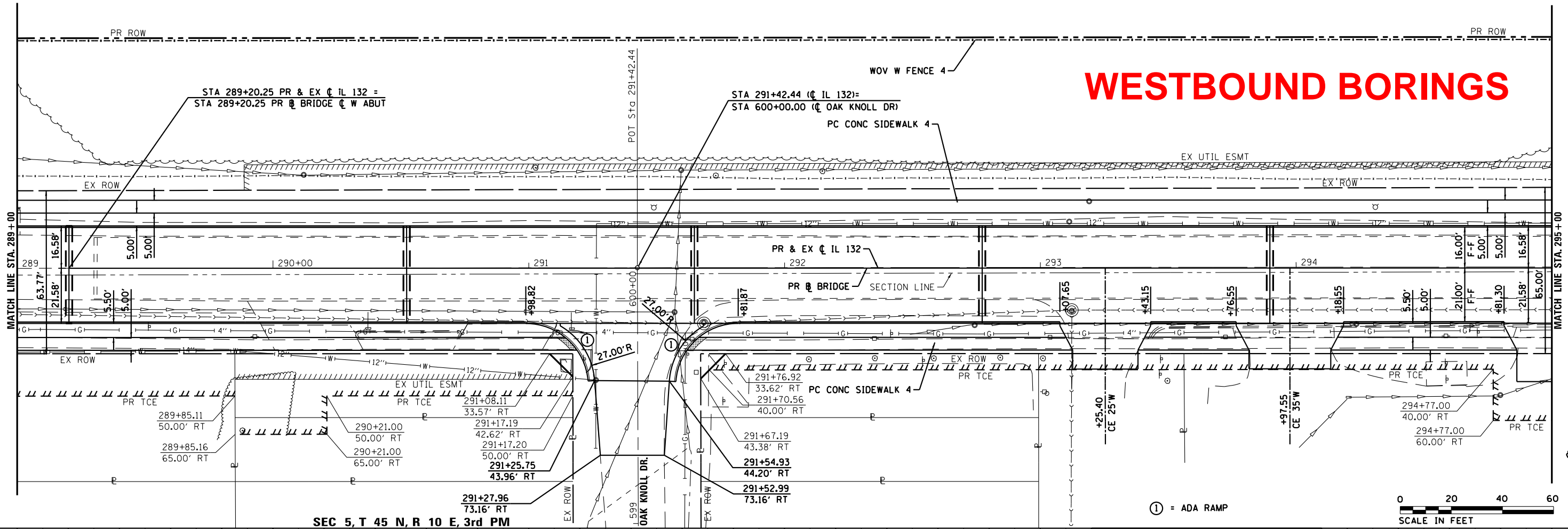
IL 132 (GRAND AVE.) - OAK LANE DR. to MCKINLEY DR.
ROADWAY PLAN AND PROFILE
SCALE: 1" = 20' SHEET 1 OF 5 SHEETS STA. 283+50.00 TO STA. 289+00.00

F.A.P. RTE. 541	SECTION WR21-R-1	COUNTY LAKE	TOTAL SHEETS 67	SHEET NO. 16
CONTRACT NO. 62A53			ILLINOIS FED. AID PROJECT	

WESTBOUND BORINGS

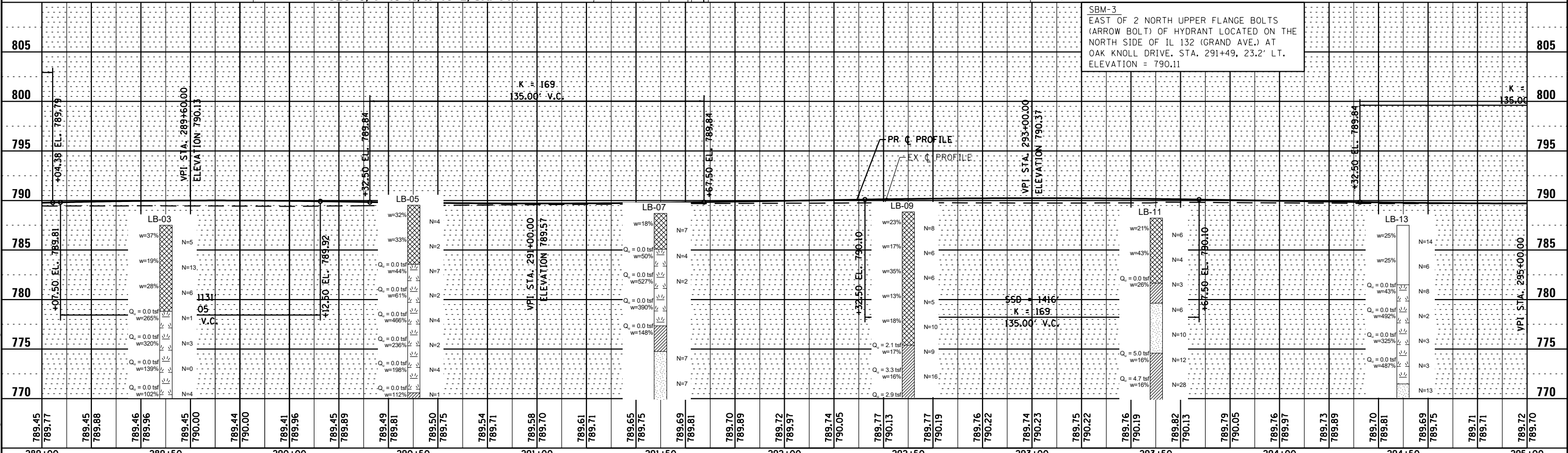
DATE	
BY	
PLAN	SUBMITTED
	NOTED
	ALIGNED
	CHECKED
	FILED
	NO.

DATE	
BY	
PROFILE	SUBMITTED
	NOTED
	GRADES
	CHECKED
	STRUCTURE
	NOTATIONS
	CHKD
	NO.



SEC 5, T 45 N, R 10 E, 3rd PM

① = ADA RAMP



SBM-3
EAST OF 2 NORTH UPPER FLANGE BOLTS
(ARROW BOLT) OF HYDRANT LOCATED ON THE
NORTH SIDE OF IL 132 (GRAND AVE.) AT
OAK KNOLL DRIVE, STA. 291+49, 23.2' LT.
ELEVATION = 790.11

789.45 289+00	789.77 289+00	789.45 289+00	789.88 289+00	789.46 289+00	789.96 289+00	789.45 289+50	790.00 289+50	789.44 290+00	790.00 290+00	789.41 290+00	789.96 290+00	789.45 290+50	789.89 290+50	789.49 290+50	789.81 290+50	789.50 290+50	789.75 290+50	789.54 291+00	789.71 291+00	789.58 291+00	789.70 291+00	789.61 291+00	789.71 291+00	789.65 291+50	789.75 291+50	789.69 291+50	789.81 291+50	789.70 292+00	789.89 292+00	789.72 292+00	789.97 292+00	789.74 292+00	790.05 292+00	789.77 292+00	790.13 292+00	789.77 292+00	790.19 292+00	789.76 293+00	790.22 293+00	789.74 293+00	790.23 293+00	789.75 293+00	790.22 293+00	789.76 293+00	790.19 293+00	789.82 293+00	790.13 293+00	789.79 294+00	790.05 294+00	789.76 294+00	789.97 294+00	789.73 294+00	789.89 294+00	789.70 294+00	789.81 294+00	789.69 294+00	789.75 294+00	789.71 294+00	789.71 294+00	789.72 295+00	789.70 295+00
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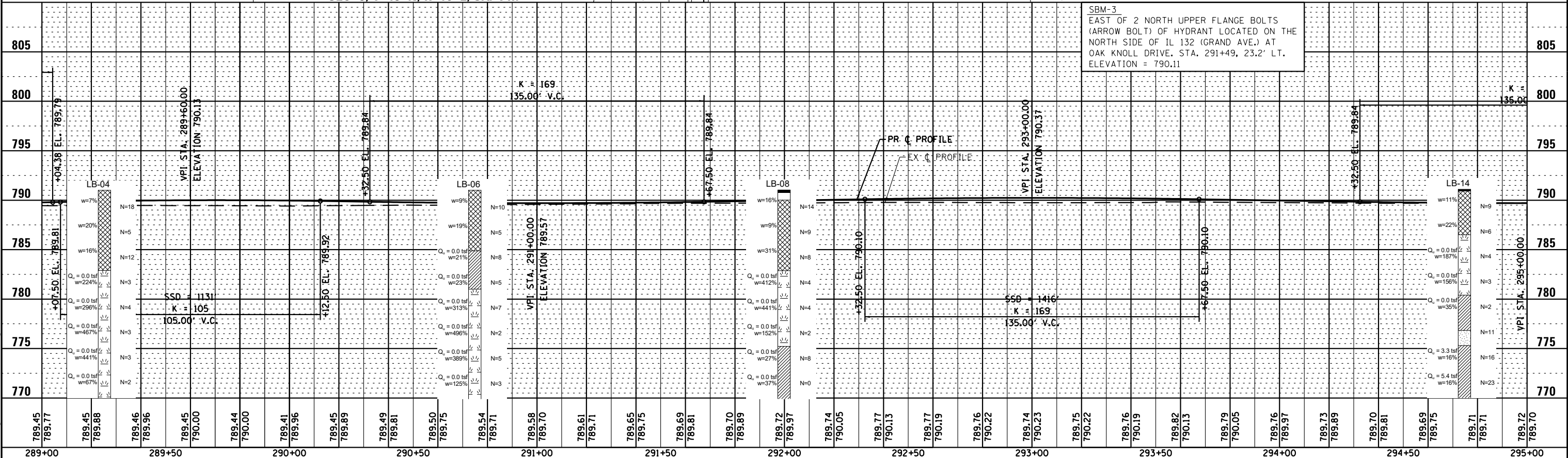
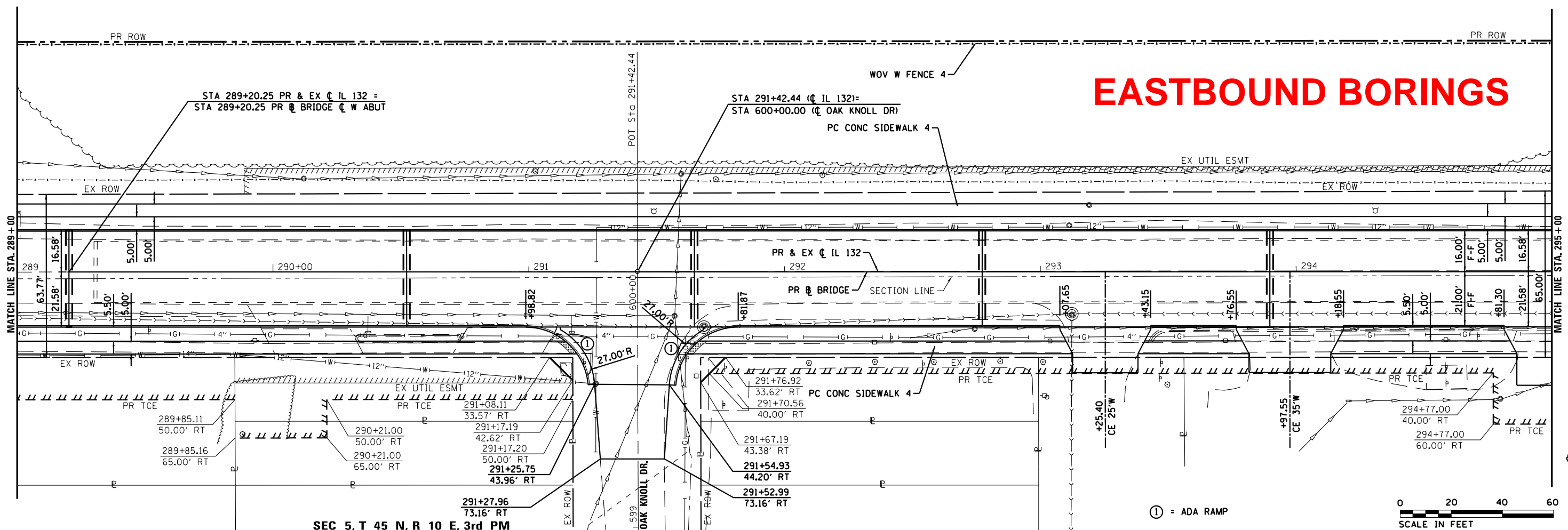
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PLOT DATE = 6/26/2017	CHECKED - TPP	REVISED -
	DATE - 6/26/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL 132 (GRAND AVE.) - OAK LANE DR. to MCKINLEY DR.	
ROADWAY PLAN AND PROFILE	
SCALE: 1" = 20'	SHEET 2 OF 5 SHEETS
STA. 289+00.00	TO STA. 295+00.00

F.A.P. RTE. 541	SECTION WR21-R-1	COUNTY LAKE	TOTAL SHEETS 67	SHEET NO. 17
CONTRACT NO. 62A53			ILLINOIS FED. AID PROJECT	

EASTBOUND BORINGS



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PLAN	SUBMITTED	DATE
	PLOTTED	
	ALIGNED	
	CHECKED	
	CADD FILE NAME	

PROFILE	SUBMITTED	DATE
	PLOTTED	
	GRADES CHECKED	
	STRUCTURE	
	NOTATIONS CHKO	



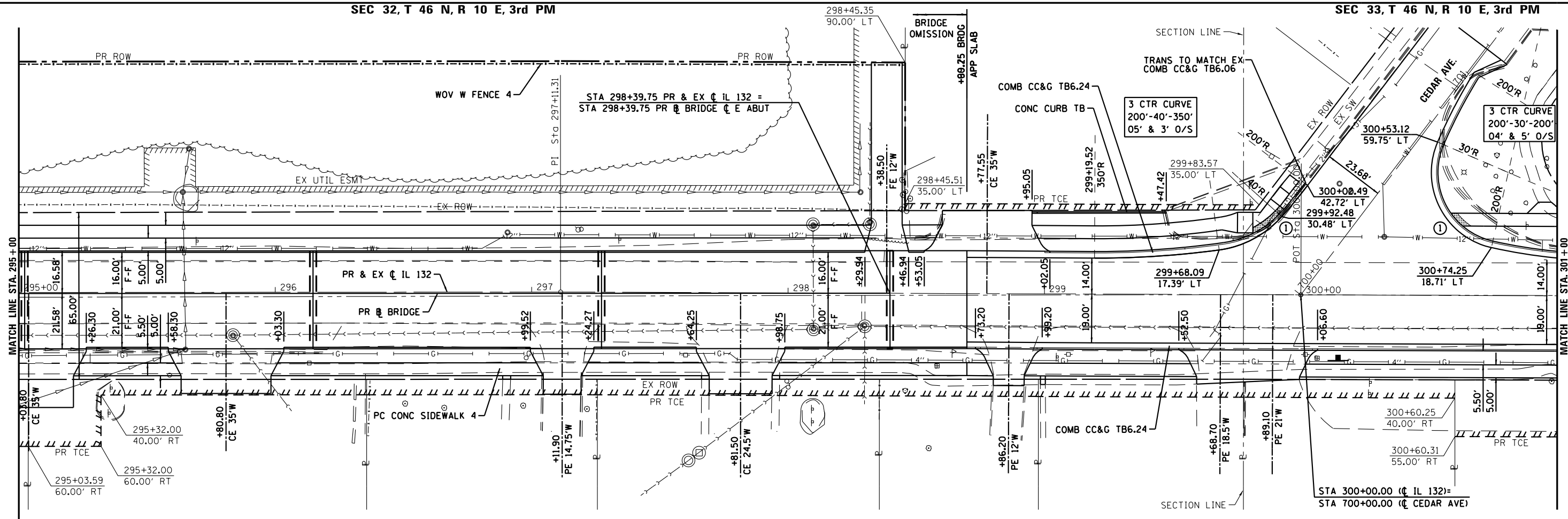
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PLOT DATE = 6/26/2017	DATE - 6/26/2017	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

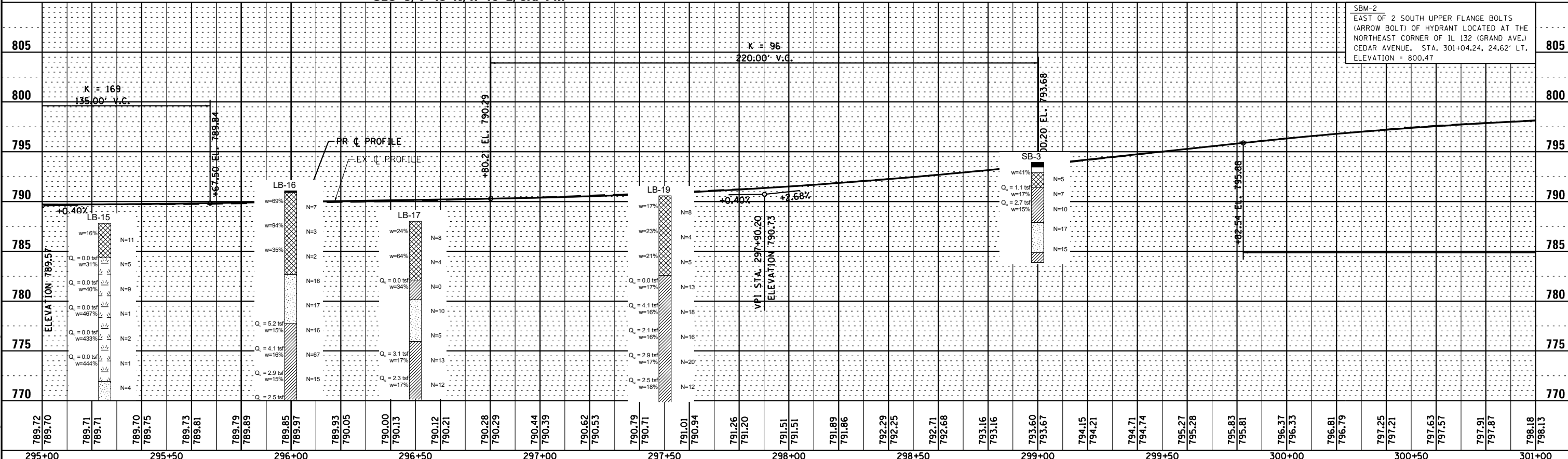
IL 132 (GRAND AVE.) - OAK LANE DR. to MCKINLEY DR.
ROADWAY PLAN AND PROFILE
SCALE: 1" = 20' SHEET 2 OF 5 SHEETS STA. 289+00.00 TO STA. 295+00.00

F.A.P. RTE. 541	SECTION WR21-R-1	COUNTY LAKE	TOTAL SHEETS 67	SHEET NO. 17
CONTRACT NO. 62A53				ILLINOIS FED. AID PROJECT

PLAN	DATE
SUBMITTED	
PLOTTED	
ALIGNED	
CHECKED	
NO.	



PROFILE	DATE
SUBMITTED	
PLOTTED	
GRADES CHECKED	
NO.	



SBM-2
EAST OF 2 SOUTH UPPER FLANGE BOLTS
(ARROW BOLT) OF HYDRANT LOCATED AT THE
NORTHEAST CORNER OF IL 132 (GRAND AVE.)
CEDAR AVENUE. STA. 301+04.24, 24.62' LT.
ELEVATION = 800.47

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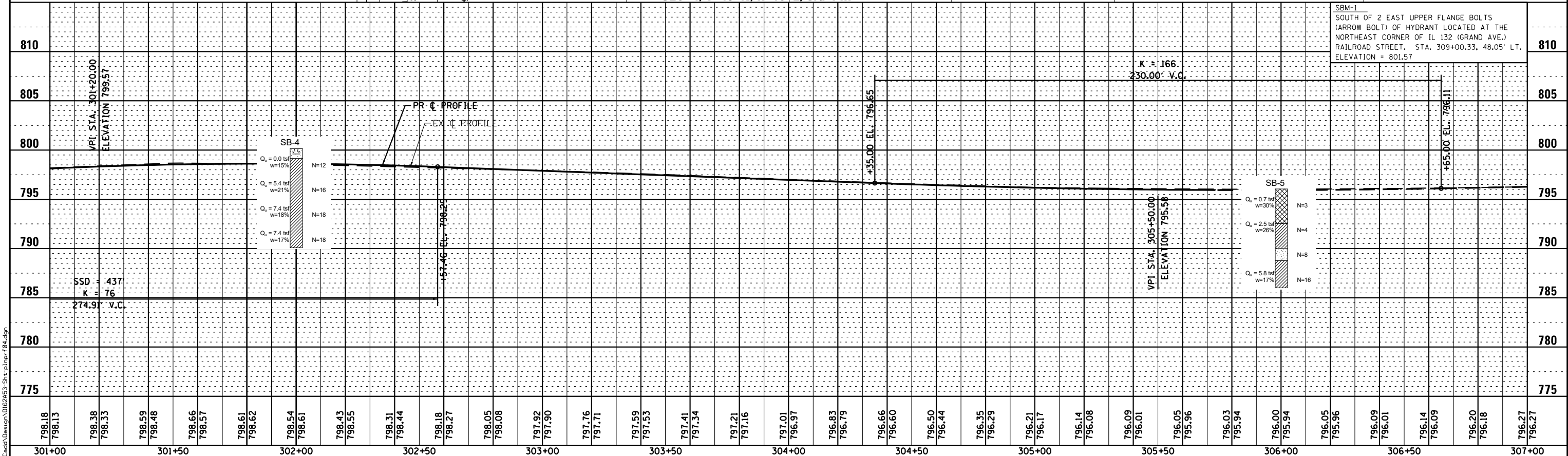
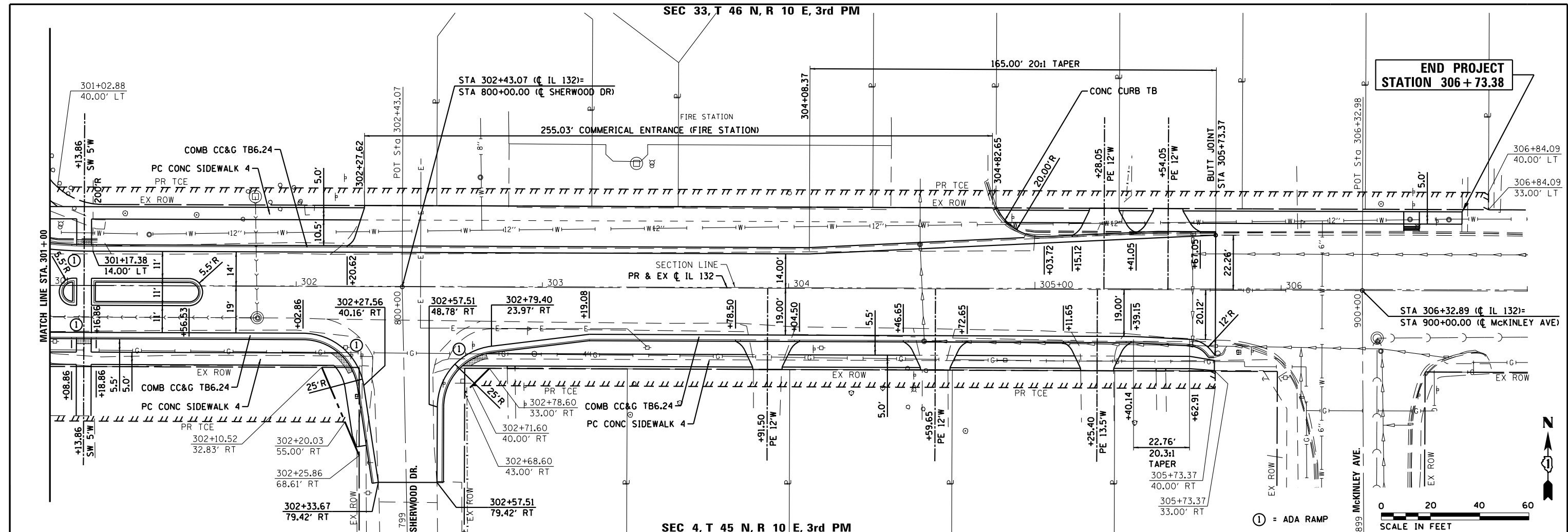
SEC 33, T 46 N, R 10 E, 3rd PM

SEC 4, T 45 N, R 10 E, 3rd PM

END PROJECT
STATION 306 + 73.38

PLAN	SUBMITTED	DATE
	PLOTTED	
	ALIGNED	
	CHECKED	
	CAD FILE NAME	
	NO.	

PROFILE	SUBMITTED	DATE
	PLOTTED	
	GRADES CHECKED	
	STRUCTURE NOTATIONS CHKD	
	NO.	



798.18	798.13	798.38	798.33	798.59	798.48	798.66	798.57	798.61	798.62	798.54	798.61	798.43	798.55	798.31	798.44	798.18	798.27	798.05	798.08	797.92	797.90	797.76	797.71	797.59	797.53	797.41	797.34	797.21	797.16	797.01	796.97	796.83	796.79	796.66	796.60	796.50	796.44	796.35	796.29	796.21	796.17	796.14	796.08	796.09	796.01	796.05	795.96	796.03	795.94	796.00	795.94	796.05	795.96	796.09	796.01	796.14	796.09	796.20	796.18	796.27	796.27
301+00	301+50	302+00	302+50	303+00	303+50	304+00	304+50	305+00	305+50	306+00	306+50	307+00	USER NAME = untitled		DESIGNED - MBJ	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		IL 132 (GRAND AVE.) - OAK LANE DR. to MCKINLEY DR.		F.A.P. RTE. 541	SECTION WR21-R-1	COUNTY LAKE	TOTAL SHEETS 67	SHEET NO. 19																																				
PLOT SCALE = 40.0000' / in.												CHECKED - TPP	REVISED -	ROADWAY PLAN AND PROFILE		SCALE: 1" = 20'		SHEET 4 OF 5 SHEETS	STA. 301+00.00 TO STA. 306+73.38	CONTRACT NO. 62A53		ILLINOIS FED. AID PROJECT																																							
PLOT DATE = 6/26/2017												DATE - 6/26/2017	REVISED -																																																

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