SOIL AND MATERIAL CONSULTANTS, INC.

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September 1, 2020
File No. 24919
UPDATED

Mr. Duane O'Laughlin, P.E.
Ciorba Group
8725 W. Higgins Road, Suite 600
Chicago, IL 60631

Re: Phase II Roadway Geotechnical Report
Clavey Road Reconstruction
US 41 to Green Bay Road
FAU Route 1265
Section No. 15-00125-00-PV
Highland Park, Illinois

Dear Mr. O'Laughlin:

This is an updated report to reflect changes to the project limits and incorporate IDOT review comments. The following is our report for the pavement investigation and soil survey completed along approximately 5,745 feet of Clavey Road between US 41 and Green Bay Road in the City of Highland Park, located within Cook County, Illinois.

The investigation was requested to determine current subsurface soil and water conditions at all boring locations. Additionally, a core was performed to determine the pavement section at a location on Green Bay Road. The findings of the field investigation and the results of laboratory testing are intended to assist in the planning, design and construction of proposed roadway improvements. We understand it is proposed to reconstruct Clavey Road from Sta. 25+90 to Sta. 32+00.

SCOPE OF THE INVESTIGATION

Our investigation included a total of 18 soil borings and 1 pavement core at various locations shown on the attached sketches. Additionally, Geocon Professional Services obtained 6 borings in April of 2017 east and west of the Clavey Road Bridge over the Skokie River which are included for reference in this report. The borings were auger drilled and sampled to a depth of 10.0 feet. Soil samples were obtained using a split barrel sampler advanced utilizing an automatic SPT hammer.

All pavement materials and soil samples obtained during the field investigation were returned to our laboratory for testing. The soil samples were group classified and soil moisture contents determined. Additional testing included determination of dry unit weight, unconfined compressive strength (by a calibrated RIMAC compression tester), organic content, grain-size distribution, Atterberg limits, Illinois Bearing Ratio, and related testing. The results of all field and laboratory testing are included in summary with this report.

SITE GEOLOGY/USDA SOIL TYPING

Enclosed is a map indicating the pedological characteristics of the site as determined by the USDA Soil Conservation Service. The soils indicated are a generalization of soil types and conditions anticipated to exist at or near existing surface elevations. Typically, these maps were developed without benefit of a direct on-site soil investigation. The soil typing map is presented for general information only.

Symbol	Soil Types
153A	Pella Silty Clay Loam – 0 to 2 percent slopes
153A+	Pella Silt Loam – 0 to 2 percent slopes, overwash
192A	Del Ray Silt Loam – 0 to 2 percent slopes
320A	Frankfort Silt Loam – 0 to 2 percent slopes
330A	Peotone Silt Clay Loam – 0 to 2 percent slopes
530B	Ozaukee Silt Loam – 2 to 4 percent slopes
530D	Ozaukee Silt Loam – 6 to 12 percent slopes
802B	Orthents, loamy, undulating
805B	Orthents, clayey, undulating
1330A	Peotone Silty Clay Loam – undrained, 0 to 2 percent slopes

CLIMATIC CONDITIONS

Climatic conditions for the period prior to obtaining site soil borings include the following information recorded at O'Hare International Airport in Chicago, Illinois:

Month		Total Precipitation	Departure From Normal	Average Temperature	Departure From Normal
October	2019	6.76 in.	+3.61 in.	50.9° F.	-1.6° F.
November	2019	1.87 in.	-1.28 in.	34.8° F.	-5.5° F.
December	2019	1.55 in.	-0.70 in.	34.0° F.	+6.3° F.
January	2020	2.80 in.	+1.07 in.	30.1 ° F.	+6.3° F.

The above information has been considered in our analysis of the site soil conditions.

EXISTING CONDITIONS

The existing pavement on Clavey Road is composed of 2 lanes with concrete curb and gutter. Adjacent land uses consist of both commercial and residential properties. Visual inspection of the existing pavement surface show areas of distress including meandering cracking, cold joint cracking, alligatoring, potholes, and previously patched areas.

The pavement core was performed on Green Bay Road just north of Clavey Road to determine the existing pavement section. The summary table below indicates pavement materials and thicknesses encountered at the core location. Please refer to the individual core log for more detailed information.

Core	HMA Surface (in.)	Portland Cement Concrete (in.)	Total Pavement (in.)
C-201	4.5	**8.75**	13.25

***BOLD** indicates a failure in that layer of material*

We performed a total of 18 borings along Clavey Road from Sta. 113+05 to Sta. 170+50. The pavement section from B-101 to B-117 consisted of 5.0 inches to 9.0 inches of concrete over 3.5 inches to 20.0 inches of granular base. The pavement section at B-118 consisted of 3.0 inches of bituminous concrete over 6.0 inches of concrete. The granular base for the pavement section at B-118 was 4.0 inches thick. The total pavement sections ranged from 9.5 inches to 30.0 inches.

Fill soil conditions were encountered underlying the pavement materials at borings B-102 to B-107. Composition of the fill includes the presence of silt/clay, clay/silt and silt/clay/sand mixtures extending to depths of 3.5 feet to 5.0 feet at these boring locations. The limits of fill placement were not determined within the scope of this investigation.

Underlying natural soil conditions include the presence of cohesive soils. These are classified as stiff to very hard clay/silt mixtures with lesser portions of sand and gravel. Non-cohesive soils were also encountered as indicated. These include very loose to medium dense silt/clay/sand, silt/sand, silt/clay, silt, and sand mixtures often found in a damp to very damp condition. Cobbles and boulders may be present within the site soils at any elevation, although none were encountered while drilling.

An organic silt deposit was encountered at borings B-102 to B-107. The deposit was present within 3.5 feet to 5.0 feet of the surface and ranged in thickness from 1.0 feet to 2.5 feet. These soils have extremely high moisture contents and low strengths.

SUBGRADE PREPARATION

Generally, normal subgrade preparation is anticipated for the reconstruction of Clavey Road. This would include the complete removal of the existing pavement section along with unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils and other deleterious conditions which may be encountered. Any unsuitable soils should be removed to a distance of at least 1.0 foot behind the proposed new curb. Additional over-digging equal to the depth of fill required below the curb should be considered. An increased width of soil removal may be necessary when subgrade supported improvements such as sidewalks, drives or paved shoulders are planned. The soils in cut areas should be excavated to establish design subgrade elevations. After removal has been completed the soils should be compacted to a minimum of 95% compaction based on the standard proctor, AASHTO T-99 or ASTM D-698, within 1.0 foot of the surface. The exposed subgrade soils should then be proof-rolled or observed by the Soil Engineer if the width is too narrow for a proof-roll.

If proof-rolling reveals unstable soil conditions due to high moisture contents, these soils should be aerated or removed. Discing and aeration of the soil can be effective to depths of up to 1.0 foot depending upon the equipment used. If the high moisture content condition extends to depths greater than the effective depth of discing, removal of the unstable soils will be necessary.

Based on the condition of the existing roadway we do not believe full depth removal of the organic silt is necessary. The soils should be evaluated in the field to determine if an undercut is necessary. If the exposed subgrade soils appear to have high moisture contents, they should be disked and dried, then reevaluated prior to performing an undercut.

We recommend including a plan quantity of Aggregate Subgrade Improvement (CY) equal to at least 25% of the planned full depth pavement area, assuming a thickness of 12 inches. This material should be used to replace any unsuitable soils encountered below the bottom of the improved subgrade layer that are encountered in the field during construction. The actual need for removal and replacement with Aggregate Subgrade Improvement should be determined in the field at the time of construction by the Geotechnical Engineer or soils inspector. All potentially unstable soils should be tested with a cone penetrometer and treated in accordance with Article 301.04 of the Standard Specifications for Road and Bridge Construction and the undercut guidelines in the IDOT Subgrade Stability Manual. Any material not needed for undercut replacement at the time of construction should be deleted from the contract with no extra compensation to the contractor.

Based on the above recommendation, there will be a need for two separate Aggregate Subgrade Improvement line items in the Schedule of Quantities (SOQ) included in the design plans:

• **Aggregate Subgrade Improvement 12" (SQ YD)** – This will be used for the 12 inch aggregate subgrade improvement below new pavement sections and widening pavement sections.

• **Aggregate Subgrade Improvement (CU YD)** – This will be used in locations where there are undercuts (below the 12 inch improved subgrade layer) where poor soils were removed.

Both of these line items reference back to the District One Aggregate Subgrade Improvement Special Provision.

We also recommend including a plan quantity of Geotechnical Fabric for Ground Stabilization (SQ YD) equal to at least 25% of the planned pavement area. We recommend placing geotextile fabric at the base of undercut areas where low strength subgrade soils are encountered. The 12 inches of improved subgrade is not considered an undercut, and we do not recommend placing the fabric at the base of the proposed 12 inch improved subgrade layer unless it is determined to be necessary to achieve stability by the Geotechnical Engineer or soils inspector at the time of construction. Fabric should meet the requirements of Article 210, Fabric for Ground Stabilization, of the SSRBC. Any material not needed at time of construction should be deleted from the contract with no extra compensation to the contractor.

Based on the project scope of work borings were not performed outside of the existing roadway. If work is planned outside of the existing pavement, we would estimate a 12" topsoil thickness. The actual need for topsoil removal should be decided in the field. We also recommend that the removed topsoil should be stockpiled, sorted, and reused for the proposed landscaping improvements.

Areas where fill is required to establish the design subgrade elevation should be prepared as indicated above. Properly prepared areas can then be filled using suitable onsite soils or an approved offsite source. Fill soil should be placed in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed the minimum compaction requirement prior to placement of the next lift. If high soil moisture content prevents achieving minimum compaction requirements then it will be necessary to disc and aerate the soil prior to final compaction. Compaction requirements also apply to backfill placement around structures and within trench excavations located beneath pavement areas.

The new pavement section should include the 12 inches of the District One Aggregate Subgrade Improvement Special Provision (April 1, 2016) in the design. For further reference, IDOT specifications for subgrade preparation are given in Section 301 of the Standard Specifications

FILL SOURCES

Material to be used as fill should meet the requirements of the District One Embankment I Special Provision. The onsite non-organic soils are generally suitable for use as backfill in undercuts where the use of select borrow is indicated. Offsite sources may also be used provided they are approved by the Soil Engineer. For road improvements constructed under the provisions of the Illinois Department of Transportation, soils are deemed unsuitable if the organic content is greater than 10.0% when tested in accordance with AASHTO T-194 and when the maximum density is less than 90 lbs./cu.ft. based on the standard proctor test, AASHTO T-99 or ASTM D-698. Aeration by discing or other mechanical means may be necessary to reduce the moisture content of the soil prior to compaction. This will most likely be necessary when the soil is borrowed from near the surface where seasonal fluctuations in soil moisture contents occur. The moisture content of fill soils should be within approximately 3.0% of optimum moisture content as determined by the standard proctor test in order for the soils to meet or exceed minimum compaction requirements. We would recommend a shrinkage factor of 15% be used for earthwork calculations.

UNDERDRAINS

The presence of saturated conditions within the frost zone may deteriorate supporting soils. This results in inadequate support of the pavement section. To provide drainage for the proposed pavement areas, we recommend installing transverse pipe underdrains below the pavement in areas where the road will be completely reconstructed. Underdrains should be installed per Section 601 in the SSRBC and consist of Type 2 underdrains. Areas where there will be full width reconstruction should have longitudinal underdrains as well as transverse underdrains. The spacing of the transverse underdrains should be 300 feet and at all low points,

including pavement areas. In areas where the existing roadway section will be widened, longitudinal underdrains should be used. The underdrains should tie into the proposed stormwater drainage system.

PAVEMENT DESIGN

A representative subgrade soil sample from B-1 was obtained to determine an Illinois Bearing Ratio. The soil was classified as clay, A-4(13), and the IBR value was determined to be 3.0. If the Mechanistic Pavement Design will be used for these improvements, based on the test results a Subgrade Support Rating (SSR) of POOR is representative of the average condition.

SUBSURFACE WATER

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can likely be removed to depths of several feet by standard sump and pump operations. If the soils exposed at undercut elevations are permitted to become saturated, loss of bearing strength and instability may occur, requiring additional soil excavation.

It should be noted that fill soils, organic soils, non-cohesive soils, and others can be quite unstable when saturated. These soils tend to cave or run when submerged or disturbed. Also, slope stability is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary particularly when excavations extend below anticipated water levels and below saturated soils.

The contractor should be made responsible for designing and constructing stable temporary excavations. Also, the contractor should shore, slope, bench or restrain the sides of the excavations as required to maintain stability of both the excavation sides and bottom. In no case, should the slope, slope heights, or excavation depth exceed those in the local, state, and federal safety regulations.

CONCLUSION

This report has been prepared to assist in initial determination of anticipated soil support conditions and needed subgrade treatments. Variations in existing pavement sections, soil conditions and ground water conditions may be present between these test locations.

An inspection by a Soil Engineer is recommended during subgrade soil preparation, particularly in the noted problem areas. A period of dry weather prior to the beginning of the earthwork may result in improved soil moisture content conditions near the surface and decreased subgrade soil preparation costs. A period of wet weather may create the need for increased discing and drying efforts. Problem soil conditions should be reviewed at the time of subgrade preparation to verify that planned treatments will be effective for the actual soil conditions encountered.

Any questions concerning this report should be directed to our office.

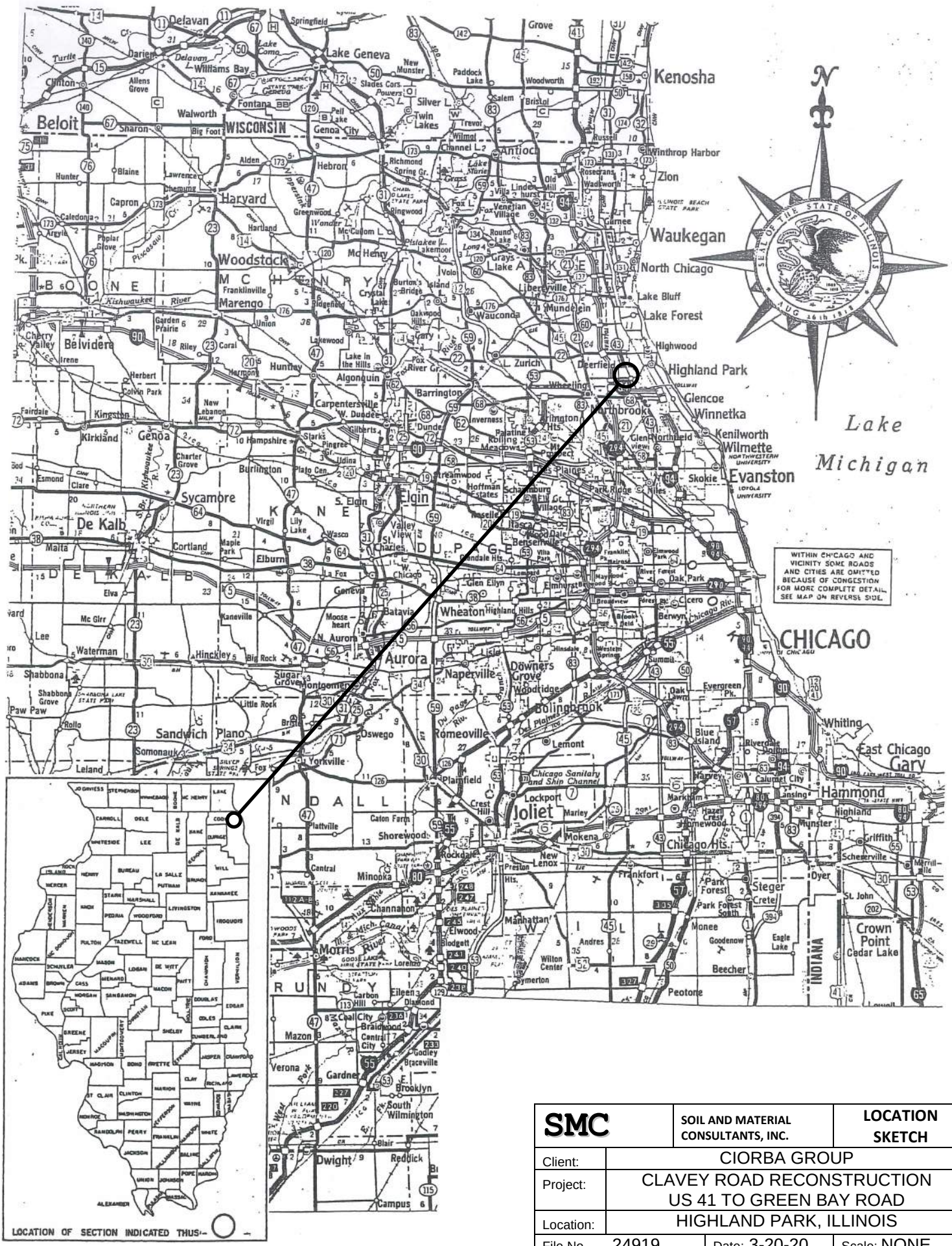
Very truly yours,

SOIL AND MATERIAL CONSULTANTS, INC.

Justin Seligson, E.I.T.
Project Engineer

Thomas P. Johnson, P.E.
President

JMS:TPJ
Enc.



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Project:	CLAVEY ROAD RECONSTRUCTION US 41 TO GREEN BAY ROAD	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 24919	Date: 3-20-20	Scale: NONE

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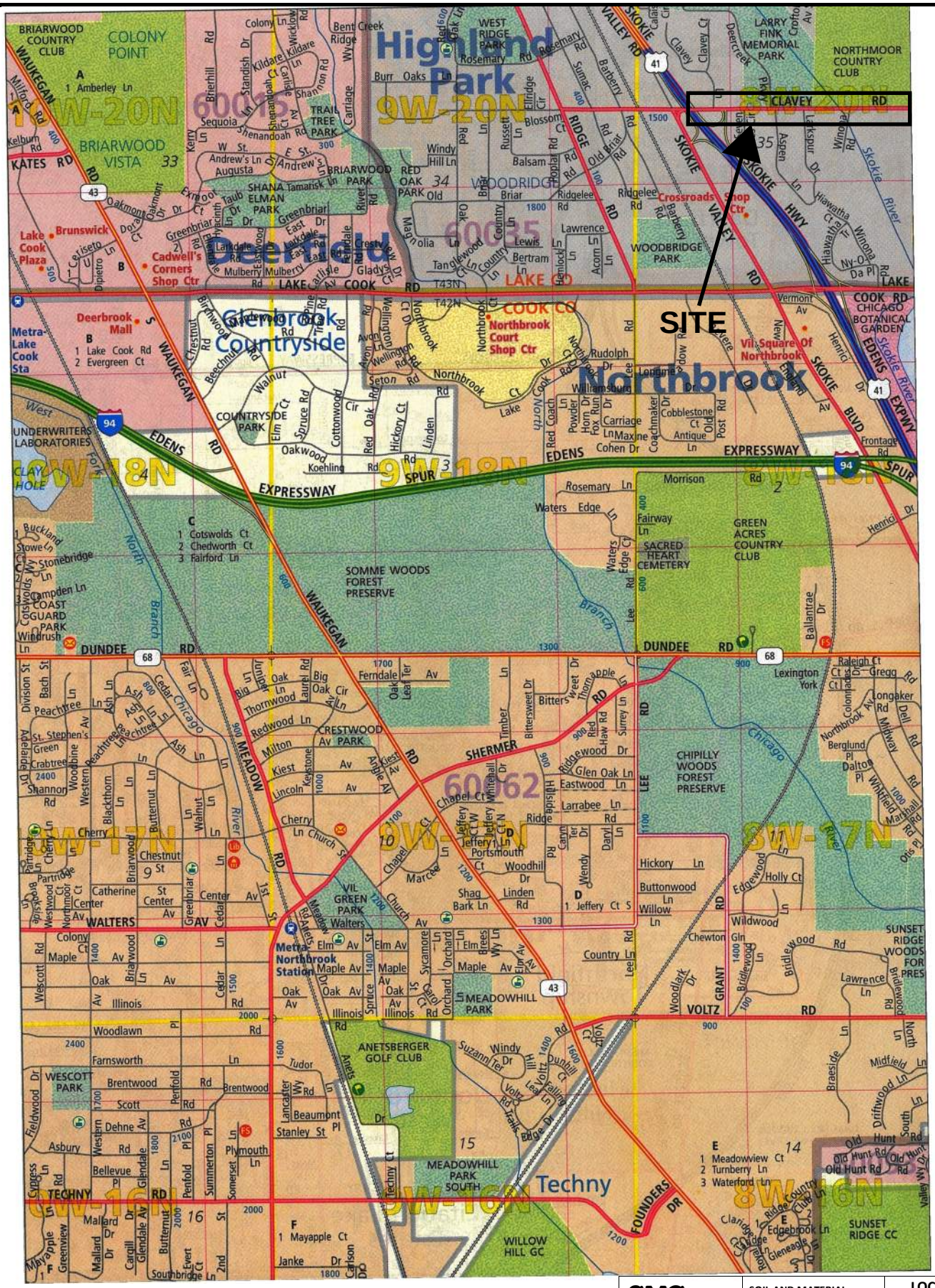
Project:	CLAVEY ROAD RECONSTRUCTION US 41 TO GREEN BAY ROAD	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 24919	Date: 3-20-20	Scale: 1" ≈ 1000'



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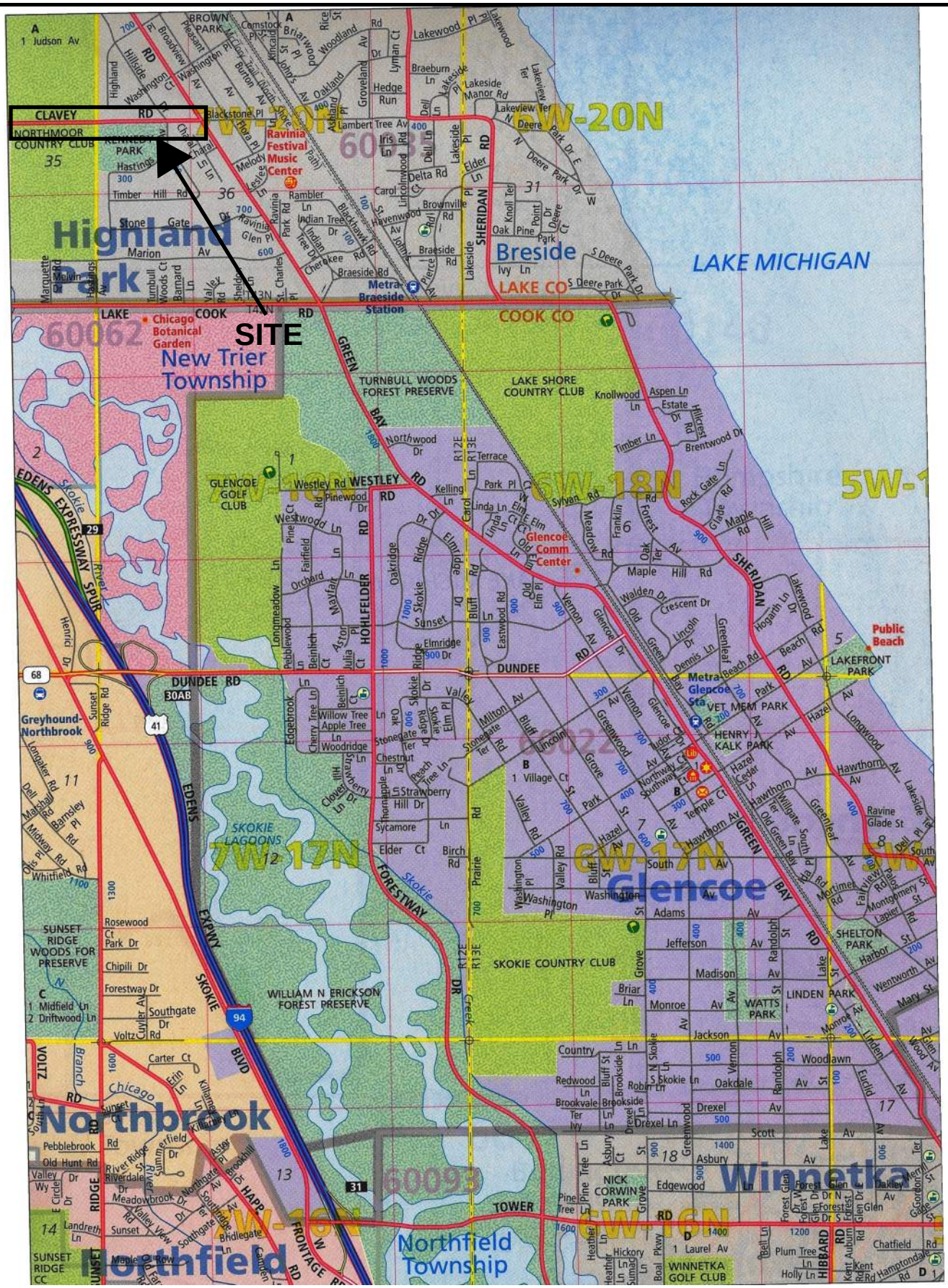
Location:	HIGHLAND PARK, ILLINOIS	
File No. 24919	Date: 3-20-20	Scale: 1" ≈ 2000'



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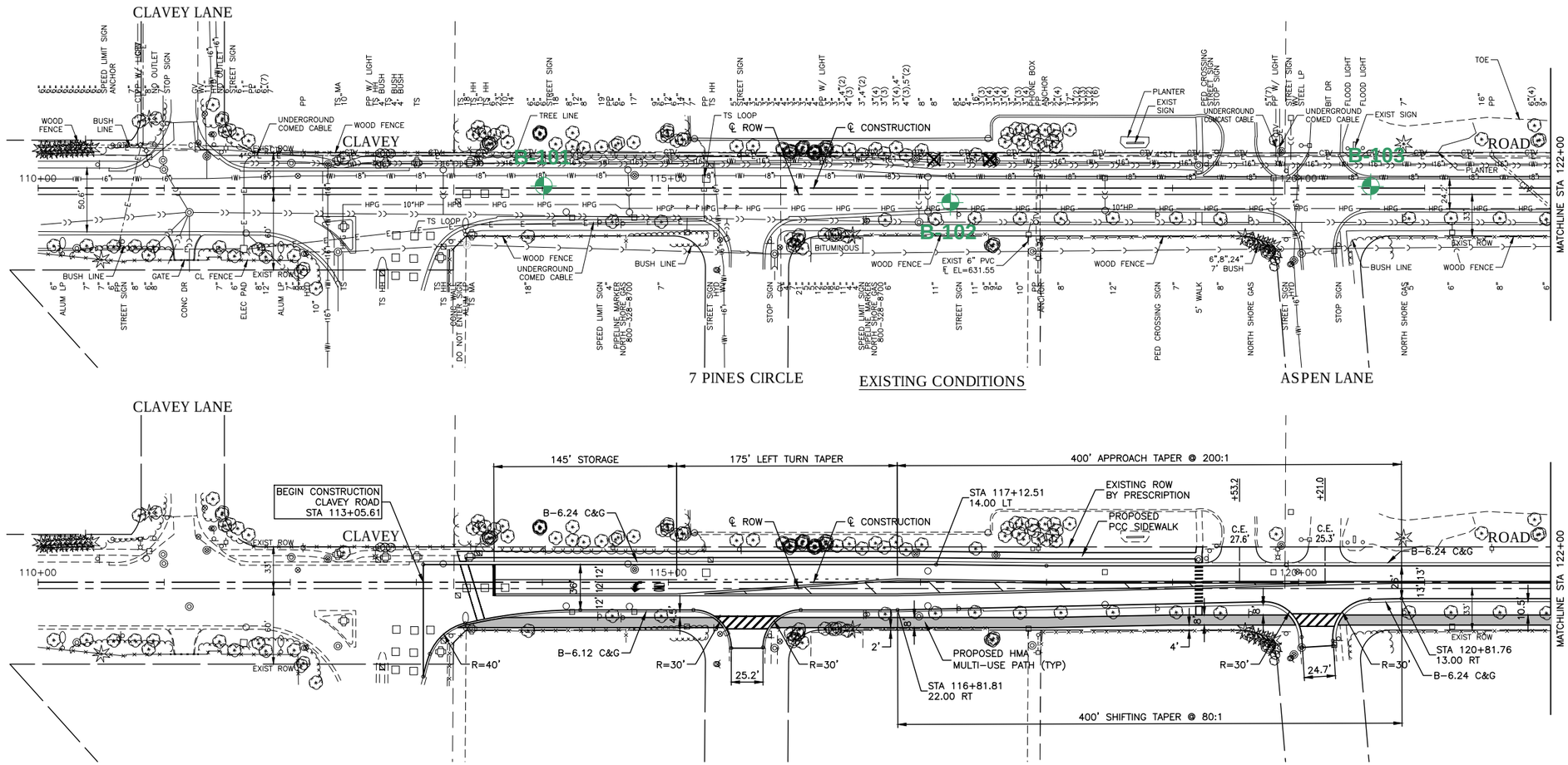

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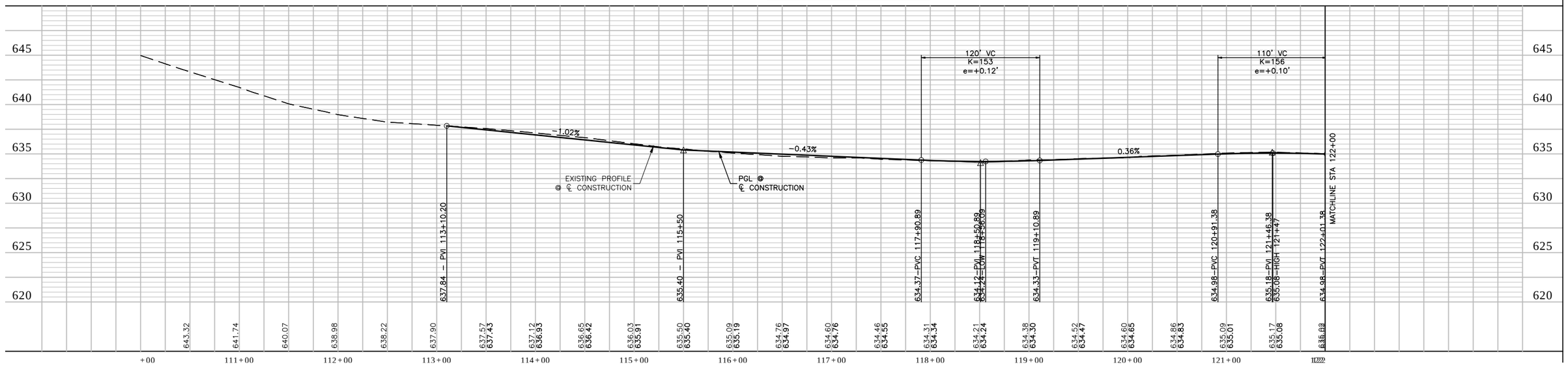
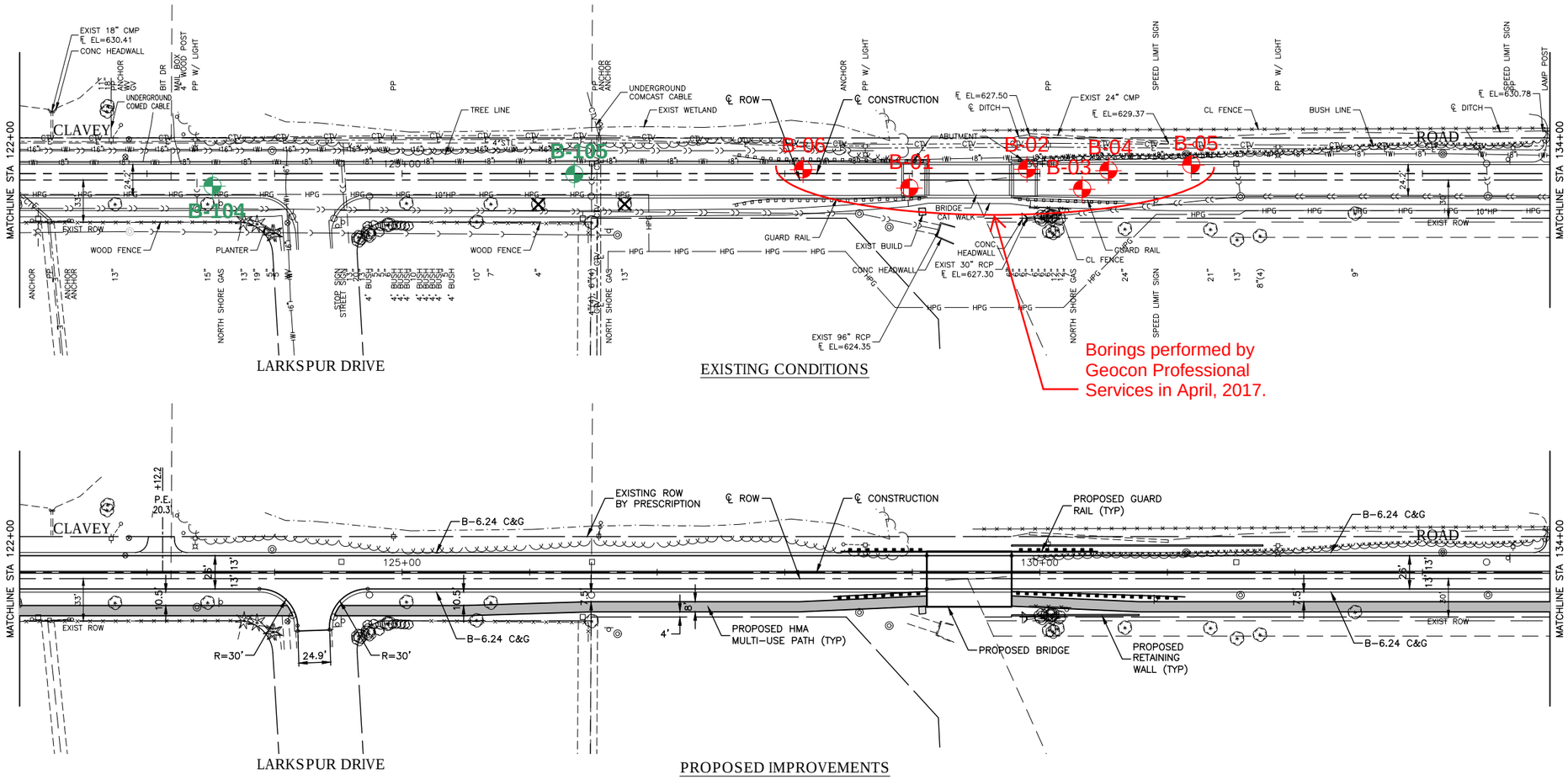
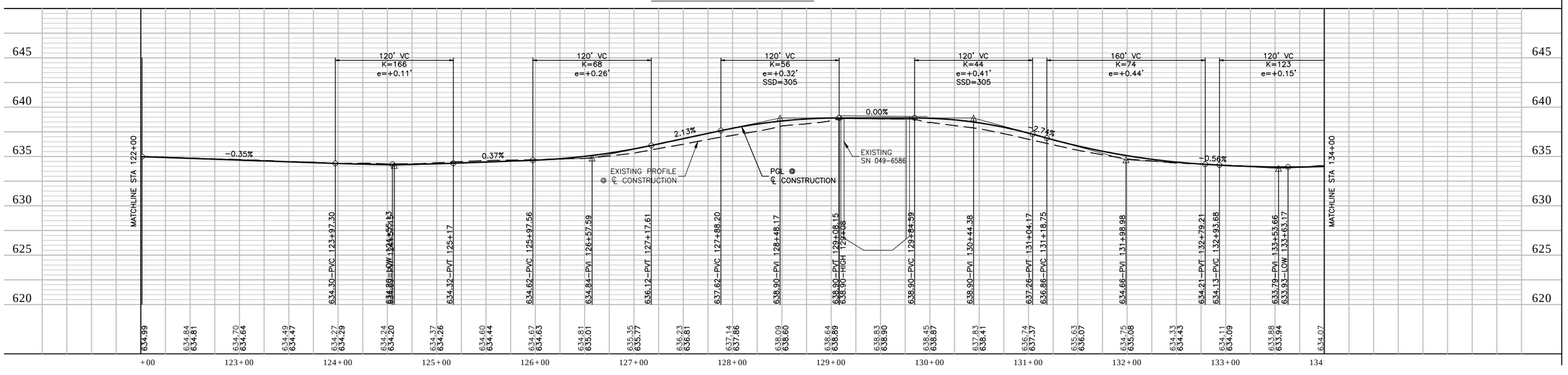
Scale: 1" = 100'

DRIVEWAY LEGEND
C.E. = COMMERCIAL ENTRANCE
P.E. = PRIVATE ENTRANCE




EXIST 18" CMP
℄ EL=630.41
CONC HEADWALL
UNDERGROUND COMED CABLE
TREE LINE
UNDERGROUND COMCAST CABLE
EXIST WETLAND
℄ ROW
℄ CONSTRUCTION
℄ EL=627.50
℄ DITCH
EXIST 24" CMP
℄ EL=629.37
CL FENCE
BUSH LINE
℄ EL=630.78
CLAVEY
ROAD
MATCHLINE STA 122+00
MATCHLINE STA 134+00
125+00
130+00
B-105
B-104
B-06
B-01
B-02
B-03
B-04
B-05
ABUTMENT
BRIDGE
CAT WALK
GUARD RAIL
EXIST BUILD
CONC HEADWALL
EXIST 30" RCP
℄ EL=627.30
EXIST 96" RCP
℄ EL=624.35
WOOD FENCE
PLANTER
EXIST ROW
LARKSPUR DRIVE
EXISTING CONDITIONS
Borings performed by Geocon Professional Services in April, 2017.
EXISTING ROW BY PRESCRIPTION
B-6.24 C&G
PROPOSED GUARD RAIL (TYP)
PROPOSED HMA MULTI-USE PATH (TYP)
PROPOSED BRIDGE
PROPOSED RETAINING WALL (TYP)
R=30'
24.9'
PROPOSED IMPROVEMENTS


120' VC K=166 e=+0.11'
120' VC K=68 e=+0.26'
120' VC K=56 e=+0.32' SSD=305
120' VC K=44 e=+0.41' SSD=305
160' VC K=74 e=+0.44'
120' VC K=123 e=+0.15'
-0.35%
0.37%
2.13%
0.00%
-2.74%
-0.56%
EXISTING PROFILE @ ℄ CONSTRUCTION
PGL @ ℄ CONSTRUCTION
EXISTING SN 049-6586
MATCHLINE STA 122+00
MATCHLINE STA 134+00
645
640
635
630
625
620
+00
123+00
124+00
125+00
126+00
127+00
128+00
129+00
130+00
131+00
132+00
133+00
134

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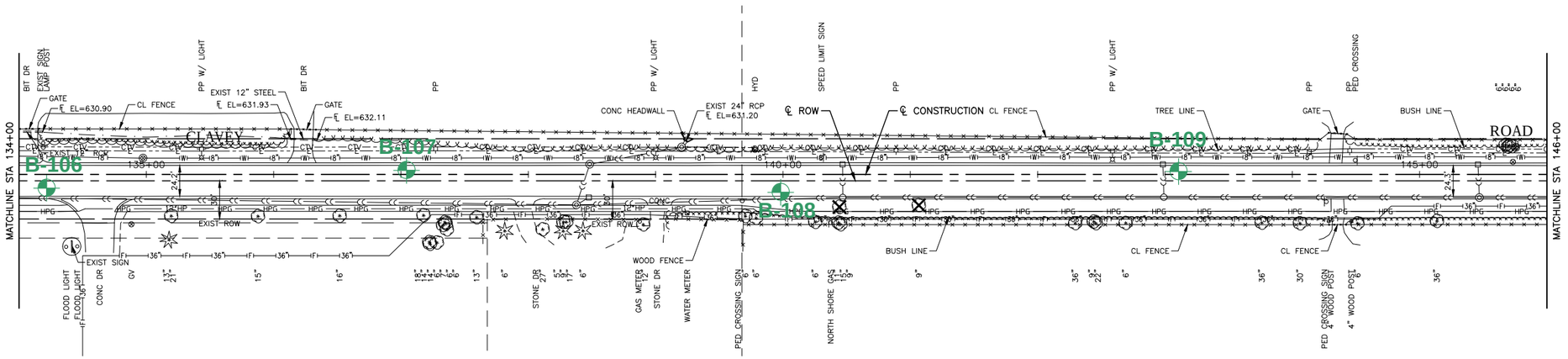
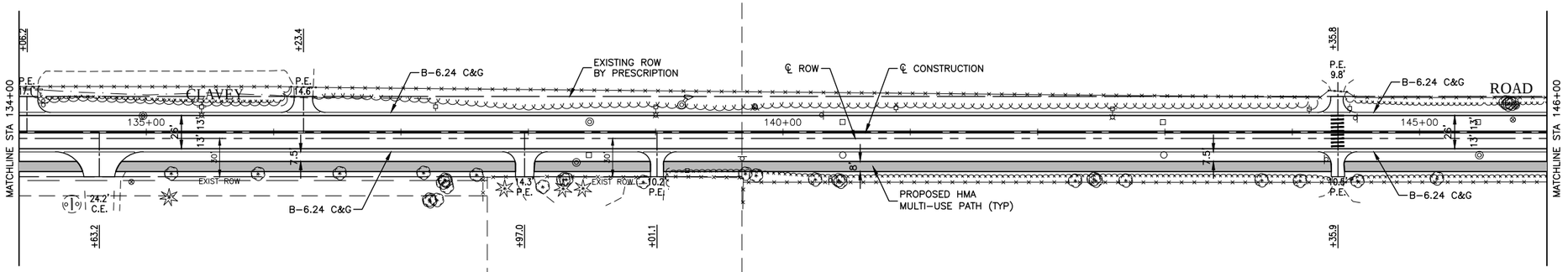
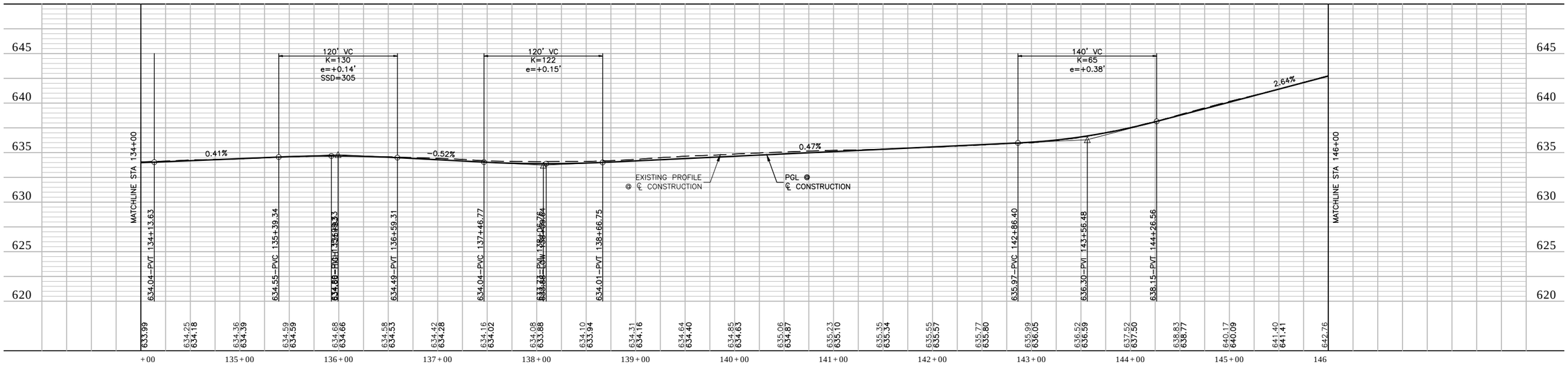
Scale: 1" = 100'

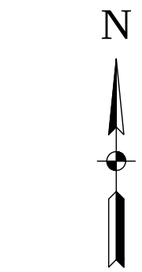


EXISTING CONDITIONS



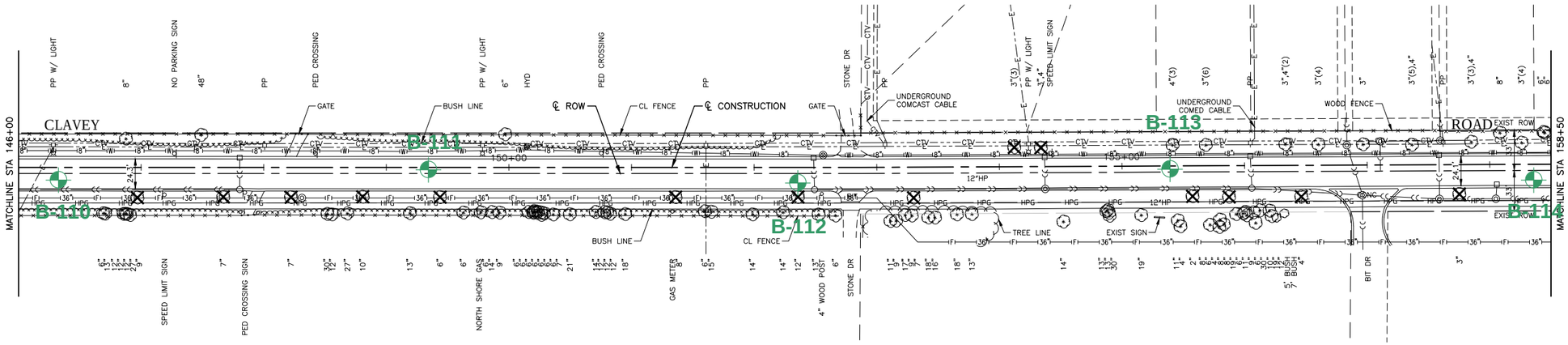
PROPOSED IMPROVEMENTS



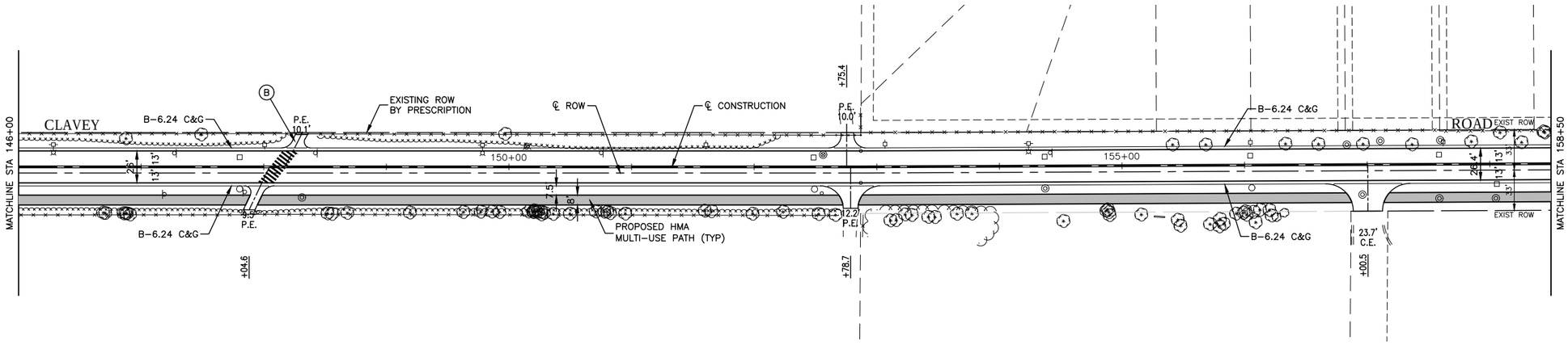


Scale: 1" = 100'

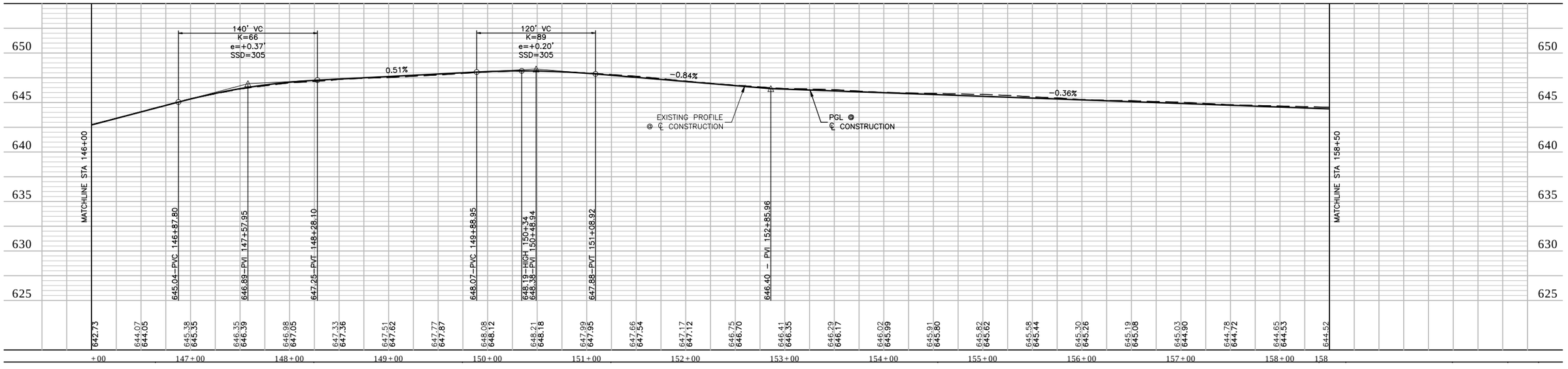
SECTION 35, TOWNSHIP 43, RANGE 12



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS



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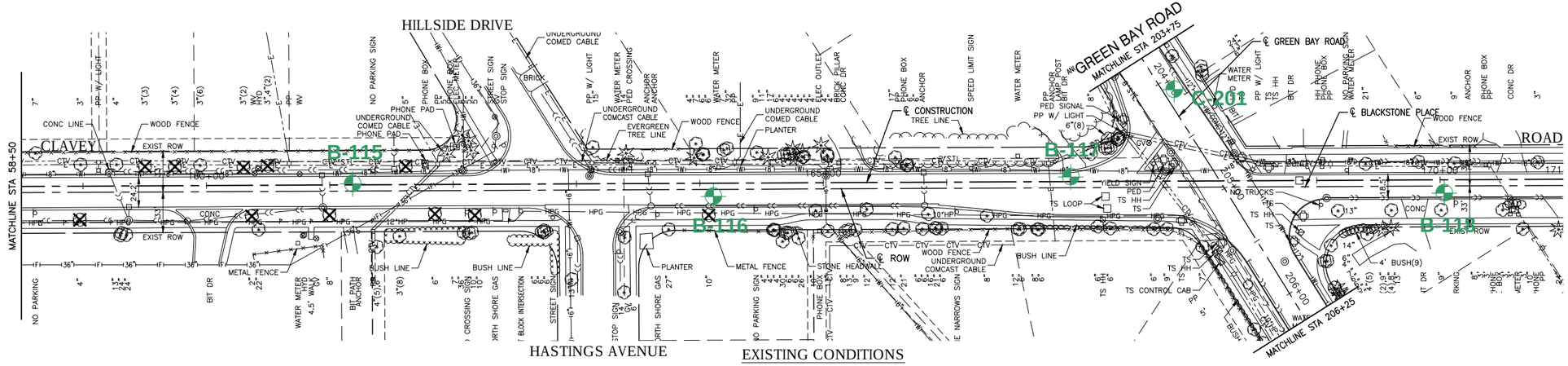

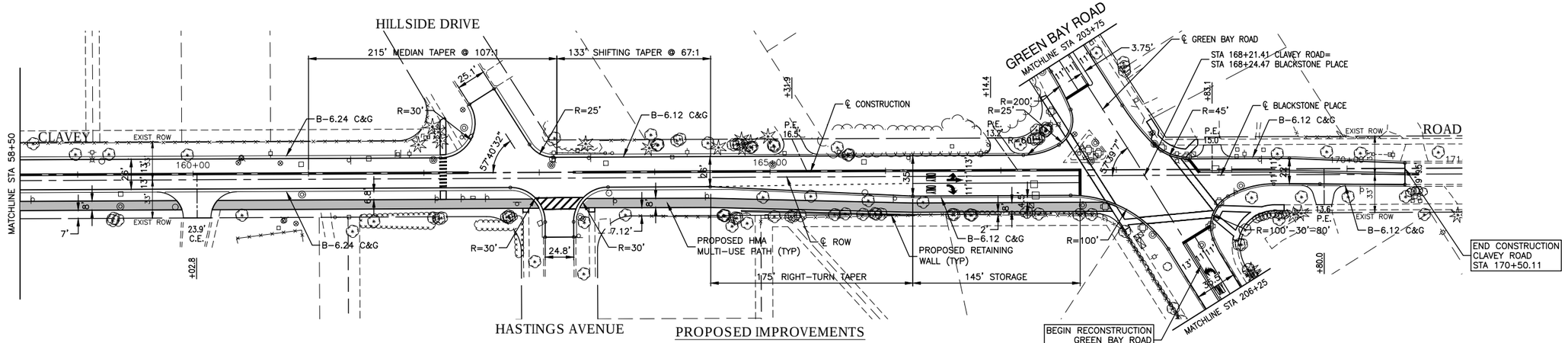

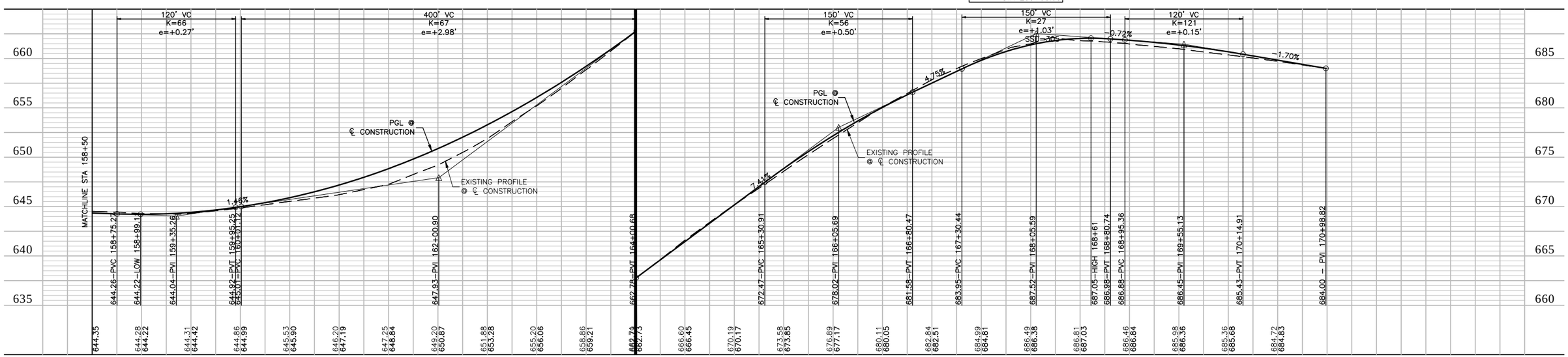

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Scale: 1" = 100'

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 101

Client Ciorba Group

Sheet 1 of 1

Comments Station 114 + 00

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 637.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
Concrete - 8.0"										
636.3'										
Crushed limestone,damp,dense - 20.0"					14					
					17					
634.7'		1	SS	18"	17	34		4.8		
Brown-gray to brown clay,some silt, trace sand & gravel,damp,hard										
					5					
					8					
	5	2	SS	18"	10	18	4.5+	17.8	112.9	6.3
					4					
					6					
		3	SS	18"	7	13	4.5+	15.3	119.7	4.8
628.0'										
					5					
Brown silt,some clay & sand,trace					6					
627.0' gravel,damp-very damp,medium dense	10	4	SS	18"	8	14	4.5+	13.3		
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 102

Client Ciorba Group

Sheet 1 of 1

Comments Station 117 + 20

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 634.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
633.9' Concrete - 7.0"										
Brown sand & gravel, damp, medium dense - 14.0"		1			9 4			6.9		
632.8' Dark brown-black silt, some clay, trace sand & gravel, damp, loose - Fill		2	SS	0	4	8		22.6		
631.5' Gray-brown silt, some clay & sand, trace gravel, damp, very loose - Fill					2 2					
629.5'	5	3	SS	18"	2	4		20.8		
Black organic silt, damp										
628.5'		4	J					64.1		
Dark brown-dark gray to brown-gray clay, some silt, trace sand & gravel, damp, stiff					2 2					
		5	SS	18"	2	4	1.5	30.8	89.8	1.2
					2 4					
624.5'	10	6	SS	18"	6	10	1.75	19.2	110.0	1.8
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 103

Client Ciorba Group

Sheet 1 of 1

Comments Station 119 + 10

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 634.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
~~633.8'~~ Concrete - 8.0"	0									
Brown sand & gravel,damp,dense					33					
632.5'		1			11			4.2		
Gray-brown clay & silt,trace sand & gravel,damp,stiff - Fill		2	SS	15"	7	18		12.4		
630.0'					3					
		3			3		2.0	22.3	106.0	1.8
Black organic silt,damp,loose	5	4	SS	18"	3	6		125.3		
628.5'										
Dark gray to gray-brown silt, some fine sand,trace clay & organic matter,very damp,very loose		5	SS	18"	1	1		30.5		
626.0'										
Gray-brown clay,some silt,trace sand & gravel,damp,very stiff					2					
624.5'	10	6	SS	18"	3 5	8	2.0	17.8	117.2	2.5
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 104

Client Ciorba Group

Sheet 1 of 1

Comments Station 123 + 50

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 634.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
Concrete - 8.0"										
633.8' Sand & gravel - 9.0"										
Brown to gray-brown silt,some clay & sand,trace gravel,damp,loose - Fill		1	SS	15"	7 4 5	9		17.8		
631.0'										
Black-dark brown organic silt,damp, very loose	5	2	SS	18"	2 2 2	4		140.1		
629.0'										
Gray silt & fine sand,trace clay, very damp,very loose ▽		3	SS	18"	1	1		23.2		
626.5'										
Gray silt,some clay,trace sand & gravel,damp,loose					2 3					
624.5'	10	4	SS	18"	5	8		16.9		
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	7.0	627.5'
- after drilling:	8.5	626.0'
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 105

Client Ciorba Group

Sheet 1 of 1

Comments Station 126 + 30

Project Clavey Road Reconstruction

Date 2/18/20

US 41 to Green Bay Road

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 635.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
Concrete - 9.0"	0									
634.3'										
Sand & gravel, some crushed limestone					19					
damp, dense		1			11			4.5		
633.0'		2	SS	18"	5	16		18.8		
Gray-dark brown silt, some clay & sand, trace gravel, damp, medium dense - Fill										
631.0'					2					
					3					
Black-dark brown organic silt, damp loose	5	3	SS	18"	3	6		128.6		
628.5'										
Dark gray to gray silt, some fine sand & clay, very damp, very loose		4	SS	18"	1	1		33.0		
▽ 627.0'										
Brown-gray clay, some silt, trace sand & gravel, damp, medium stiff to very stiff		5			1		0.75	26.1	95.0	0.9
625.0'	10	6	SS	18"	2	3	2.5	18.2	117.8	2.5
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	7.5	627.5'
- after drilling:	8.0	627.0'
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 106

Client Ciorba Group

Sheet 1 of 1

Comments Station 134 + 20

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 634.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
633.3' Concrete - 8.0"										
Sand, gravel & crushed limestone, damp, medium dense					11					
632.0'		1			10			5.6		
Gray brown silt, some clay & fine sand, trace medium-coarse sand, damp		2	SS	15"	5	15		20.0		
630.5' medium dense - Fill										
Black-dark brown organic silt, damp, very loose					2					
	5	3	SS	18"	2	4		126.8		
628.0'										
Gray silt, some clay & fine sand, very damp, very loose										
		4	SS	18"	1	1		29.6		
▼ 625.5'										
Gray silt, trace fine sand, very damp, very loose					2					
624.0'	10	5	SS	18"	1	3		23.7		
End of Boring										
	15									
	20									

Water Level —

	depth, ft.	elev., ft.
- while drilling:	8.0	626.0'
- after drilling:	8.0	626.0'
- hrs. after drilling:		

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 107

Client Ciorba Group

Sheet 1 of 1

Comments Station 137 + 00

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/18/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft.	Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
633.8'	Concrete - 8.0"	0									
633.0'	Sand & gravel, damp, medium dense					13					
	Brown-gray clay & silt, trace sand & gravel, damp, stiff - Fill		1 2	SS	10"	5 5	10		6.2 18.5		
631.0'											
	Black-dark brown organic silt, damp very loose					2 1					
629.5'		5	3	SS	18"	2	3		143.1		
	Dark gray to gray silt, some clay, trace fine sand & organic matter, very damp, very loose ▽										
			4	SS	18"	1	1		28.3		
625.5'											
	Brown-gray clay, some silt, trace fine					1 2					
624.5'	sand, damp, stiff	10	5	SS	18"	3	5	1.0	28.1	102.9	1.5
	End of Boring										
		15									
		20									

Water Level —

	depth, ft.	elev., ft.
- while drilling:	6.5	628.0'
- after drilling:	8.5	626.0'
- hrs. after drilling:		

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 108

Client Ciorba Group

Sheet 1 of 1

Comments Station 140 + 00

Project Clavey Road Reconstruction

Date 2/18/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 634.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
633.9' Concrete - 7.0"										
633.5' Brown sand & gravel, damp - 5.0"										
Brown-gray silt, some clay, trace sand & gravel, damp, medium dense					6					
632.0'		1	SS	18"	5 6	11		16.3		
Brown-gray to brown clay, some silt trace sand & gravel, damp, hard										
					5					
	5	2	SS	18"	7 9	16	4.5+	15.5	117.3	7.8
					6					
		3	SS	18"	9 12	21	4.5+	17.0	113.3	7.8
					6					
624.5'	10	4	SS	18	8 9	17	4.5+	15.7	115.8	5.9
End of Boring										
	15									
	20									

Water Level —

	depth, ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 109

Client Ciorba Group

Sheet 1 of 1

Comments Station 143 + 10

Project Clavey Road Reconstruction

Date 2/18/20

US 41 to Green Bay Road

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 636.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
635.4' Concrete - 7.0"										
634.9' Brown sand & gravel, damp - 6.0"										
Brown-gray to brown clay, some silt, trace sand & gravel, damp, hard		1	SS	12"	5 5 5	10	4.0	17.7	102.0	5.4
	5	2	SS	18"	5 7 10	17	4.5+	17.0	117.3	4.8
629.5'										
Gray clay, some silt, trace sand & gravel, damp, hard		3	SS	18"	7 8 10	18	3.5	14.3	121.1	4.6
628.0'										
Gray silt, some clay, trace sand & gravel, damp, medium dense										
626.0'	10	4	SS	18"	7 8 8	16		12.2		
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —

	depth, ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

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SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 110

Client Ciorba Group

Sheet 1 of 1

Comments Station 146 + 30

Project Clavey Road Reconstruction

Date 2/18/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 643.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
642.9' Concrete - 7.0"	0									
▽ (a) see below					4					
Brown-gray to brown clay, some silt, trace sand & gravel, damp, hard					4					
		1	SS	14"	4	8	4.5+	18.6	108.7	4.8
					5					
					7					
	5	2	SS	18"	10	17	4.5+	20.4	109.6	5.2
					5					
					6					
636.0'		3	SS	18"	10	16	4.0	16.8	114.4	4.3
Gray clay, some silt, trace sand & gravel, damp, very stiff										
					4					
634.0'		4			6		2.5	19.5	108.6	3.1
6335.' (b) see below	10	5	SS	18"	7	13		8.2		
End of Boring										
(a) Brown sand & gravel, damp-very damp-7.0"										
(b) Gray silt, some sand & clay, trace gravel, damp, medium dense										
	15									
	20									

Water Level —

	depth, ft.	elev., ft.
- while drilling:	1.0	642.5'
- after drilling:	9.0	634.5'
- hrs. after drilling:		

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 111

Client Ciorba Group

Sheet 1 of 1

Comments Station 149 + 40

Project Clavey Road Reconstruction

Date 2/18/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 648.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
647.4' Concrete - 7.5"	0									
Brown sand & gravel, damp-very damp										
646.7' -8.5"					5					
Brown-gray silt, some clay, trace sand					4					
645.5' & gravel, damp, loose		1	SS	18"	5	9		13.0		
Brown-gray to brown clay & silt, trace sand & gravel, damp, hard										
					4					
					6					
	5	2	SS	18"	9	15	3.75	17.9	117.2	4.4
642.0' ▼										
Brown-gray to brown clay & silt,					3					
					4					
640.5' trace sand & gravel, damp, very stiff		3	SS	18"	5	9	2.25	18.9	111.0	3.1
Brown to gray fine sand & silt, saturated, loose										
					6					
					5					
638.0'	10	4	SS	12"	4	9		19.3		
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	6.0	642.0'
- after drilling:	6.0	642.0'
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 112

Client Ciorba Group

Sheet 1 of 1

Comments Station 152 + 40

Project Clavey Road Reconstruction

Date 2/18/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 647.0' Description Depth, ft. 0	S	T	R	B	N	Pen.	W	Uw	Qu
646.6' Concrete - 5.0"									
Brown sand & gravel,damp - 11.0"									
645.7'				6					
Brown-gray to brown clay,some silt,				3					
trace sand & gravel,damp,very stiff	1	SS	14"	4	7	3.25	23.8	99.8	3.3
to hard									
				4					
				5					
5	2	SS	18"	6	11	3.5	18.3	110.5	4.5
641.5'									
▽ Brown silt,some fine sand,trace clay									
very damp,loose	3			3			18.6		
640.5'				1					
Brown fine sand,saturated,very	4			1	2		33.0		
loose									
637.0' 10	5	SS	12"	1	1		29.0		
End of Boring									
15									
20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	6.0	641.0'
- after drilling:	6.5	640.5'
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 113

Client Ciorba Group

Sheet 1 of 1

Comments Station 155 + 40

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/19/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 645.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
(a & b) see below	0									
644.6' Brown-gray silt,some clay,trace sand & gravel,damp,loose		1			4 5			14.1		
Brown-gray clay,some silt,trace sand & gravel,damp,very stiff		2	SS	12"	6	11	3.0	18.2		
642.0' Brown-gray silt,some clay,trace sand & gravel,damp,medium dense	5	3	SS	18"	5 6 8	14		19.4		
640.0' Brown-gray to gray clay,some silt, trace sand & gravel,damp,hard (small saturated fine sand seam between 7.5'-8.0') ▽		4	SS	18"	5 7 9	16	4.5+	19.6	112.0	4.9
637.0' Brown-gray to gray clay,some silt, trace sand & gravel,damp,very stiff	10	5	SS	18"	4 5 6	11	3.25	19.8	113.7	2.0
635.5' End of Boring										
(a) Concrete - 7.5"										
(b) Brown sand & gravel-2.5"										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	7.5	638.0'
- after drilling:	8.5	637.0'
- hrs. after drilling:		

F-111b-1

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 114

Client Ciorba Group

Sheet 1 of 1

Comments Station 158 + 40

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/19/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft.	Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
	(a & b) see below	0									
643.7'											
	Brown clay, some silt, trace sand & gravel, damp, very stiff					2					
647.5'			1			4		3.0	21.9	104.3	3.8
	Brown-gray to gray-brown silt, some clay, trace sand & gravel, damp, medium dense		2	SS	18"	5	9		19.5		
640.5'			3			5			15.1		
	Brown gray to brown clay, some silt, trace sand & gravel, damp, hard					7					
		5	4	SS	18"	9	16	4.5+	19.7	110.9	7.3
						5					
						8					
			5	SS	18"	12	20	4.5+	19.0	110.8	6.5
▽											
						9					
						11					
634.5'		10	6	SS	18"	12	23	4.5+	18.0	111.3	7.0
	End of Boring										
	(a) Concrete - 5.5"										
	(b) Brown sand & gravel, very damp-saturated - 4.0"										
		15									
		20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	8.0	636.5'
- after drilling:	dry	
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 115

Client Ciorba Group

Sheet 1 of 1

Comments Station 161 + 20

Project Clavey Road Reconstruction

Date 2/19/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 646.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
645.6' (a & b) see below	0									
Brown-gray to brown clay, some silt, trace sand & gravel, damp, hard to very hard		1	SS	12"	3 5 6	11	4.0	20.2	108.3	4.6
	5	2	SS	12"	7 10 14	24	4.5+	20.1	109.0	8.5
		3	SS	18"	5 9 12	21	4.5+	17.4	117.8	8.8
638.0'										
Brown-gray to brown clay, some silt, trace sand & gravel, damp, hard					7					
636.5'	10	4	SS	18"	9 12	21	4.5+	23.1	103.6	6.7
End of Boring										
(a) Concrete - 7.5"										
(b) Brown sand & gravel, damp - 3.5"										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 116

Client Ciorba Group

Sheet 1 of 1

Comments Station 164 + 10

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/19/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 663.5' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
Concrete - 8.5"										
662.8' Brown sand & gravel, damp - 7.5"					7					
Brown silt, some clay, trace sand & gravel, damp, medium dense		1	SS	15"	5 6	11		14.8		
660.0'										
Brown-gray clay & silt, trace sand & gravel, damp, hard					4 6					
	5	2	SS	18"	8	14	4.5+	16.7	116.8	5.3
657.5'										
Brown-gray clay & silt, trace sand & gravel, damp, very stiff to hard					4 7					
		3	SS	18"	9	16	3.25	16.7	112.6	3.7
					6 8					
653.5'	10	4	SS	18"	10	18	3.75	16.8	116.0	4.5
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth,ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 117

Client Ciorba Group

Sheet 1 of 1

Comments Station 167 + 00

Project Clavey Road Reconstruction

Date 2/19/20

Location US 41 to Green Bay Road Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By CS

Elev., ft. 683.0' Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
Concrete - 8.0"										
Brown sand, gravel & crushed limestone					7					
680.5'		1	SS	18"	9 7	16		8.7		
Brown-gray to brown clay & silt, trace sand & gravel, damp, hard					5					
	5	2	SS	18"	6 7	13	4.25	15.4	120.1	6.0
					7					
		3	SS	18"	8 10	18	3.75	15.1	121.0	5.3
675.0' ▽										
Gray clay, some silt, trace sand & gravel, damp, stiff					3					
673.0'	10	4	SS	18"	4 6	10	1.5	15.7	122.0	1.9
End of Boring										
	15									
	20									

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.

B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %

N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"

Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.

Qu - unconfined compressive strength, tons/sq. ft.

Water Level —	depth, ft.	elev., ft.
- while drilling:	8.0	675.0'
- after drilling:	8.5	674.5'
- hrs. after drilling:		

SOIL AND MATERIAL CONSULTANTS, INC.

File No. 24919

BORING LOG 118

Client Ciorba Group

Sheet 1 of 1

Comments Station 170 + 00

Project Clavey Road Reconstruction
US 41 to Green Bay Road

Date 2/19/20

Location Highland Park, IL

Drilled By AC

Equipment ☒CME 45B ☐H.A. ☐Other

Logged By OS

Elev., ft.	Description	Depth, ft.	S	T	R	B	N	Pen.	W	Uw	Qu
685.5'		0									
684.8'	(a & b) see below										
684.4'	Brown sand & gravel, damp - 4.0"					3					
	Brown-gray silt, some clay, trace sand & gravel, damp, medium dense		1	SS	15"	6 8	14		14.4		
681.5'											
	Brown-gray to brown clay & silt, trace sand & gravel, damp, hard	5	2	SS	18"	6 9 11	20	4.0	15.1	124.2	6.6
			3	SS	18"	6 10 13	23	4.5+	16.0	119.2	6.7
677.5'											
	Gray clay, some silt, trace sand & gravel, damp, very stiff					5 6					
675.5'		10	4	SS	18"	7	13	2.0	15.4	120.8	2.9
	End of Boring										
	(a) Bituminous concrete - 3.0"										
	(b) Concrete - 6.0"										
		15									
		20									

Water Level —

	depth, ft.	elev., ft.
- while drilling:	dry	
- after drilling:	dry	
- hrs. after drilling:		

S - sample T - type: J(Jar), SS(split-spoon), ST(shelby tube) R - recovery length, in.
B - Standard Penetration Test(SPT), blows/ 6" interval W - water content, %
N - SPT, blows/foot to drive 2" O.D. split-spoon sampler with 140 lb. hammer falling 30"
Pen. - pocket penetrometer reading, tons/sq. ft. Uw - dry unit weight of soil, lbs/cu. ft.
Qu - unconfined compressive strength, tons/sq. ft.

SOIL AND MATERIAL CONSULTANTS, INC.

General Notes IDOT

SAMPLE CLASSIFICATION

Soil sample classification is based on the Unified Soil Classification System, the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D-2488, the Standard Test Method for Classification of Soils for Engineering Purposes, ASTM D-2487(when applicable), and the modifiers noted below.

CONSISTENCY OF COHESIVE SOILS

Term	Qu -tons/sq. ft.	N (unreliable)
Very Soft	0.00 - 0.25	0 - 2
Soft	0.26 - 0.49	3 - 4
Medium Stiff	0.50 - 0.99	5 - 8
Stiff	1.00 - 1.99	9 - 15
Very Stiff	2.00 - 3.99	16 - 30
Hard	4.00 - 7.99	30 +
Very Hard	8.00 +	

RELATIVE DENSITY OF GRANULAR SOILS

Term	N - blows/foot
Very Loose	0 - 4
Loose	5 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50 +

IDENTIFICATION AND TERMINOLOGY

Term		Size Range
Boulder		over 8 in.
Cobble		3 in. to 8 in.
Gravel	-coarse	1 in. to 3 in.
	-medium	3/8 in. to 1 in.
	-fine	#4 sieve to 3/8 in.
Sand	-coarse	#10 sieve to #4 sieve
	-medium	#40 sieve to #10 sieve
	-fine	#200 sieve to #40 sieve
Silt		0.002 mm to #200 sieve
Clay		smaller than 0.002 mm

Modifying Term	Percent by Weight
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

Moisture Condition

Dry
Damp
Very Damp
Saturated

DRILLING, SAMPLING & SOIL PROPERTY SYMBOLS

CF - Continuous Flight Auger
HS - Hollow Stem Auger
HA - Hand Auger
RD - Rotary Drilling
AX - Rock Core, 1-3/16 in. diameter
BX - Rock Core, 1-5/8 in. diameter
NX - Rock Core, 2-1/8 in. diameter
S - Sample Number
T - Type of Sample
J - Jar
AS - Auger Sample
SS - Split-spoon (2 in. O.D. with 1-3/8 in. I.D.)
ST - Shelby Tube (2 in. O.D. with 1-7/8 in. I.D.)
R - Recovery Length, in.
B - Blows/ 6 in. interval, Standard Penetration Test (SPT)
N - Blows/ foot to drive 2 in. O.D. split-spoon sampler with 140 lb. hammer falling 30 in., (STP)
Pen. - Pocket Penetrometer reading, tons/ sq. ft.
W - Water Content, % of dry weight
Uw - Dry Unit Weight of soil, lbs./ cu. ft.
Qu - Unconfined Compressive Strength, tons/ sq. ft.
Str - % Strain at Qu.
WL - Water Level
WD - While Drilling
AD - After Drilling
DCI - Dry Cave-in
WCI - Wet Cave-in
LL - Liquid Limit, %
PL - Plastic limit, %
PI - Plasticity Index (LL-PL)
LI - Liquidity Index [(W-PL)/PI]

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

Date: 2/19/20

File No.: 24919

CORE LOG

Client: Ciorba Group

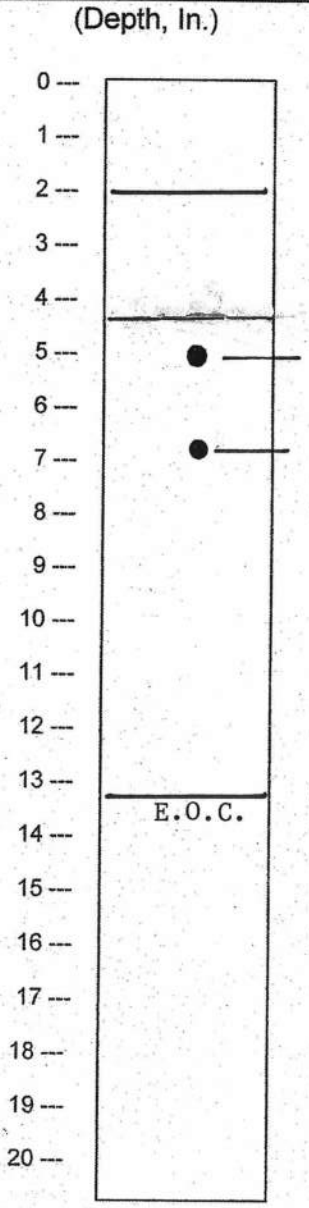
Reference: Clavey Road Reconstruction
US 41 to Green Bay Road
Highland Park, IL

Core No: 201

Work Done By: AC & CS

Location of Core: Green Bay Road Station 204 + 10, 7' left of CL

Comments:



Type of Material	Recovery
2-0" Bituminous concrete - surface	Full
2-1/2" Bituminous concrete - surface	Full
wire mesh at 5-0"	
wire mesh at 7-0"	
8-3/4" Concrete (failed) (delamination in top 2-0")	Partial
Total 13-1/4"	

G-333


Westcott
C-201

SOIL AND MATERIAL CONSULTANTS, INC.

8 WEST COLLEGE DRIVE OFFICE: (847) 870-0544
ARLINGTON HEIGHTS, IL 60004 FAX: (847) 870-0661

File No. 24919

SOIL TEST DATA

CLIENT: Ciorba Group Inc.

PROJECT: Clavey Road Reconstruction, US 41 to Green Bay Road, Highland Park, Illinois

BORING NO.	B-101	B-105	B-106
SAMPLE NO.	S-2	S-2	S-4
DEPTH	3.5' – 5.0'	2.0' – 2.5'	6.0' – 7.5'
ELEVATION	633.5' – 632.0'	628.0' – 626.5'	627.5' – 626.0'
USDA SOIL CLASSIFICATION	Clay	Silty Clay Loam	Clay Loam
AASHTO CLASSIFICATION	A-4(13)	A-4(5)	A-6(8)
GRADATION-PASSING 1" SIEVE %	100	100	100
" 3/4" " %	100	100	100
" 1/2" " %	100	1000	100
" 3/8" " %	100	100	100
" No. 4 " %	100	99	100
" No. 10 " %	98	97	99
" No. 40 " %	96	94	97
" No. 100 " %	91	87	82
" No. 200 " %	89	82	65
GRAVEL %	0	1	0
SAND %	10	17	35
SILT %	50	54	42
CLAY %	40	28	23
LIQUID LIMIT %	34	26	34
PLASTICITY INDEX %	15	8	15

REMARKS:

SOIL AND MATERIAL CONSULTANTS, INC.

8 WEST COLLEGE DRIVE OFFICE: (847) 870-0544
ARLINGTON HEIGHTS, IL 60004 FAX: (847) 870-0661

File No. 24919

SOIL TEST DATA

CLIENT: Ciorba Group Inc.

PROJECT: Clavey Road Reconstruction, US 41 to Green Bay Road, Highland Park, Illinois

BORING NO.	B-108	B-112	B-113
SAMPLE NO.	S-1	S-3	S-3
DEPTH	1.0' – 2.5'	6.0' – 6.5'	3.5' – 5.0'
ELEVATION	633.5' – 632.0'	641.0' – 640.5'	642.0' – 640.5'
USDA SOIL CLASSIFICATION	Silty Clay Loam	Clay Loam	Silty Clay Loam
AASHTO CLASSIFICATION	A-4(5)	A-4(3)	A-4(3)
GRADATION-PASSING 1" SIEVE %	100	100	100
" 3/4" " %	100	100	100
" 1/2" " %	100	1000	100
" 3/8" " %	100	100	100
" No. 4 " %	100	100	100
" No. 10 " %	99	99	100
" No. 40 " %	98	98	100
" No. 100 " %	89	73	100
" No. 200 " %	79	67	95
GRAVEL %	0	0	0
SAND %	21	34	5
SILT %	51	44	69
CLAY %	28	22	26
LIQUID LIMIT %	24	23	21
PLASTICITY INDEX %	9	8	6

REMARKS:

Ciorba Group
Re: Clavey Road Reconstruction US 41 to Green Bay Rd., Highland Park, Illinois

March 20, 2020
File No. 24919

ORGANIC CONTENT

BORING NO.	SAMPLE NO.	DEPTH, FT.	% ORGANIC CONTENT
102	4	5.5’ to 6.0’	13.1
103	4	4.5’ to 5.0’	41.3
104	2	3.5’ to 5.0’	29.8
105	3	4.0’ to 5.0’	29.6
106	3	3.5’ to 5.0’	66.4
107	3	3.5’ to 5.0’	27.3

Illinois Department of Transportation

Summary Report on Pavement, Base and Subbase Design

State Job Number: C-91-117-17 Project: 025R(982) Route: FAU 1265

Section: 15-00125-00-PV City or County: City of Highland Park Date: 03/19/2020

ADT: 11,000 Year: 2040 Design Period: 20 Class Highway: Major Collector

Passenger Cars Per Day: 10,670 Trucks S.U. Per Day: 165 Trucks M.U. Per Day: 165

Pavement Structure: HMA

Type Surface Course: HMA SURFACE COURSE, MIX "D", N70 Thickness: 2"

Type Base Course: HMA BINDER COURSE Thickness: 6"

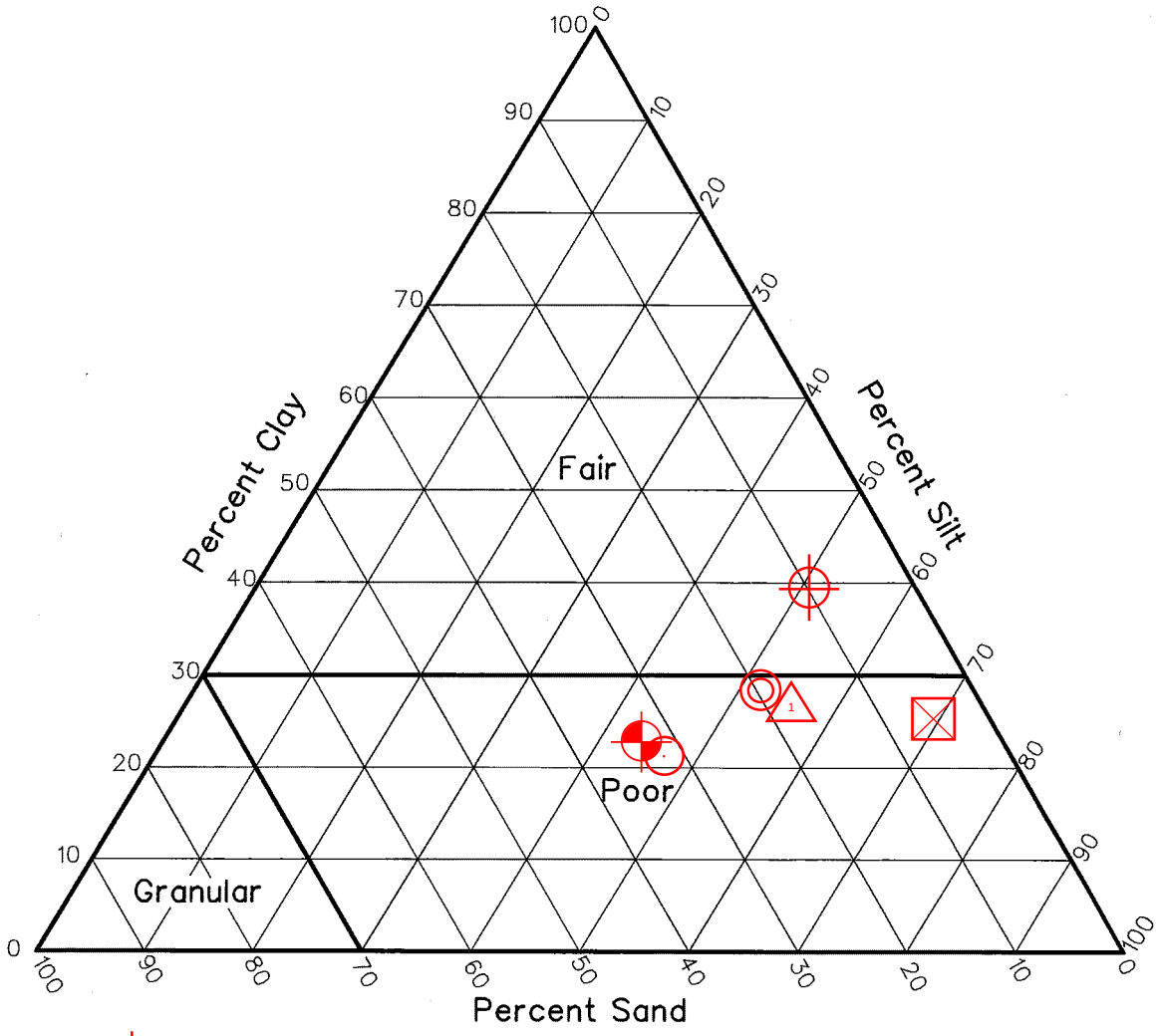
Type Subbase Material: Subgrade Aggregate Improvement Thickness: 12"

Sta. to Sta.	112+50 to 115+60	124+90 to 127+20	138+50 to 141+50	153+90 to 156+90
*Sta. of Test	114+00	126+30	140+00	155+40
*Drainage Class	Fair	Poor	Poor	Poor
*Ave. Frost Penetration	42"	42"	42"	42"
Illinois Textural Classification	Clay	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam
Classification and Group Index (AASHTO M 145)	A-4(13)	A-4(5)	A-4(5)	A-4(3)
*Percent Silt (AASHTO T 88)	50%	54%	51%	69%
*Illinois Bearing Ratio (%)	3.0			
Std. Dry Density (IL Mod. AASHTO T 99)	118.7			
Optimum Moisture (IL Mod AASHTO T 99)	13.1%			

* Indicates worst condition within the above station limits.

Remarks:

Subgrade Support Rating

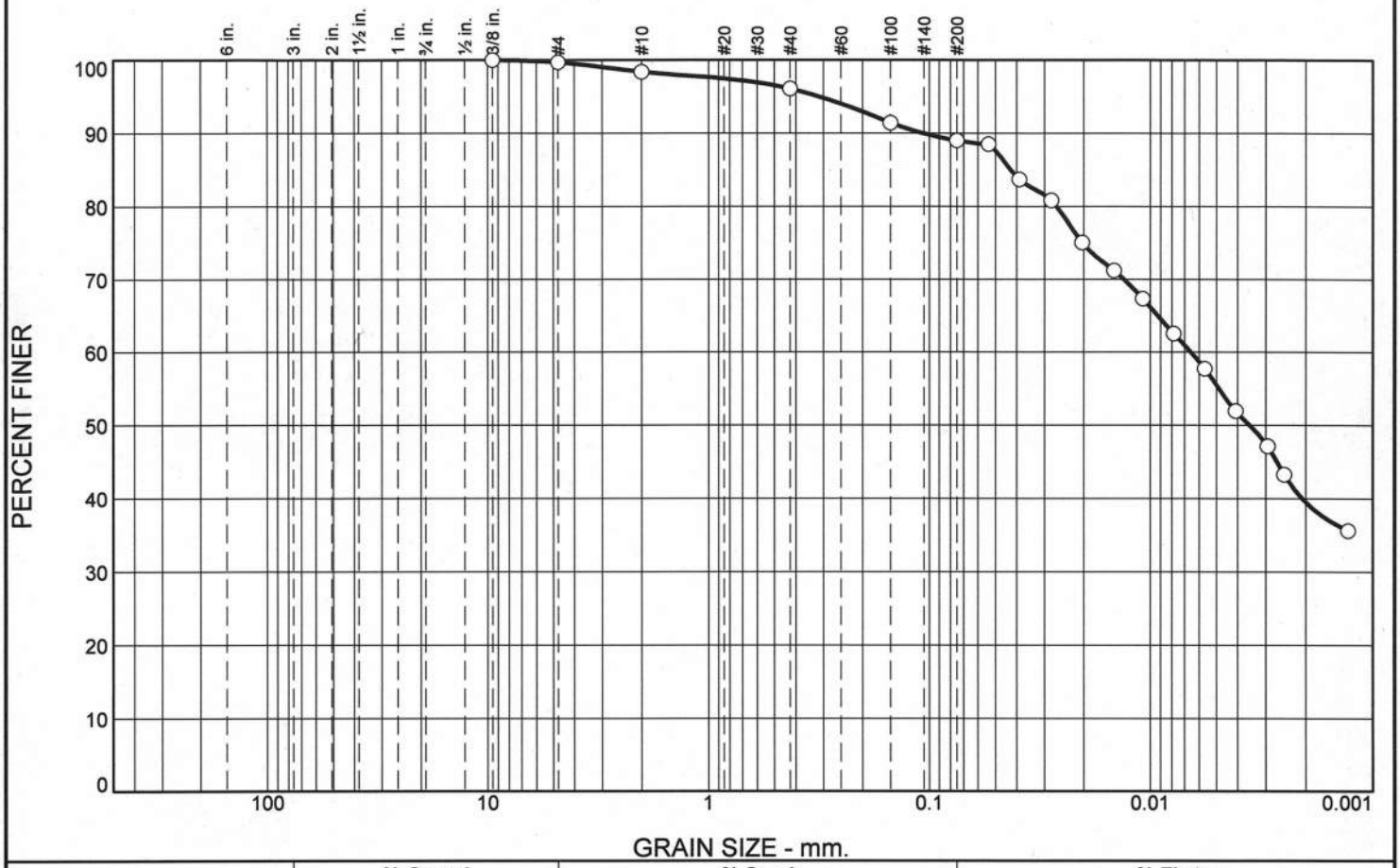


⊕	B-101	A-6(13)	CLAY	3.5' - 5.0'
△1	B-105	A-4(5)	SILTY CLAY LOAM	2.0' - 2.5'
◕	B-106	A-6(8)	CLAY LOAM	6.0' - 7.5'
◎	B-108	A-4(5)	SILTY CLAY LOAM	1.0' - 2.5'
⊙	B-112	A-4(3)	CLAY LOAM	6.0' - 6.5'
⊠	B-113	A-4(3)	SILTY CLAY LOAM	3.5' - 5.0'

N

SMC	**SOIL AND MATERIAL CONSULTANTS, INC.**		**LOCATION SKETCH**
Client:	CIORBA GROUP		
Project:	CLAVEY ROAD RECONSTRUCTION US 41 TO GREEN BAY ROAD		
Location:	HIGHLAND PARK, ILLINOIS		
File No. 24919		Date: 3-20-20	Scale: NONE

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.3	2.3	7.1	49.5	39.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.7		
#10	98.4		
#40	96.1		
#100	91.4		
#200	89.0		

* (no specification provided)

Material Description

Clay

Atterberg Limits

PL= 19 LL= 34 PI= 15

Coefficients

D_{90}= 0.1070 D_{85}= 0.0426 D_{60}= 0.0065
D_{50}= 0.0035 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

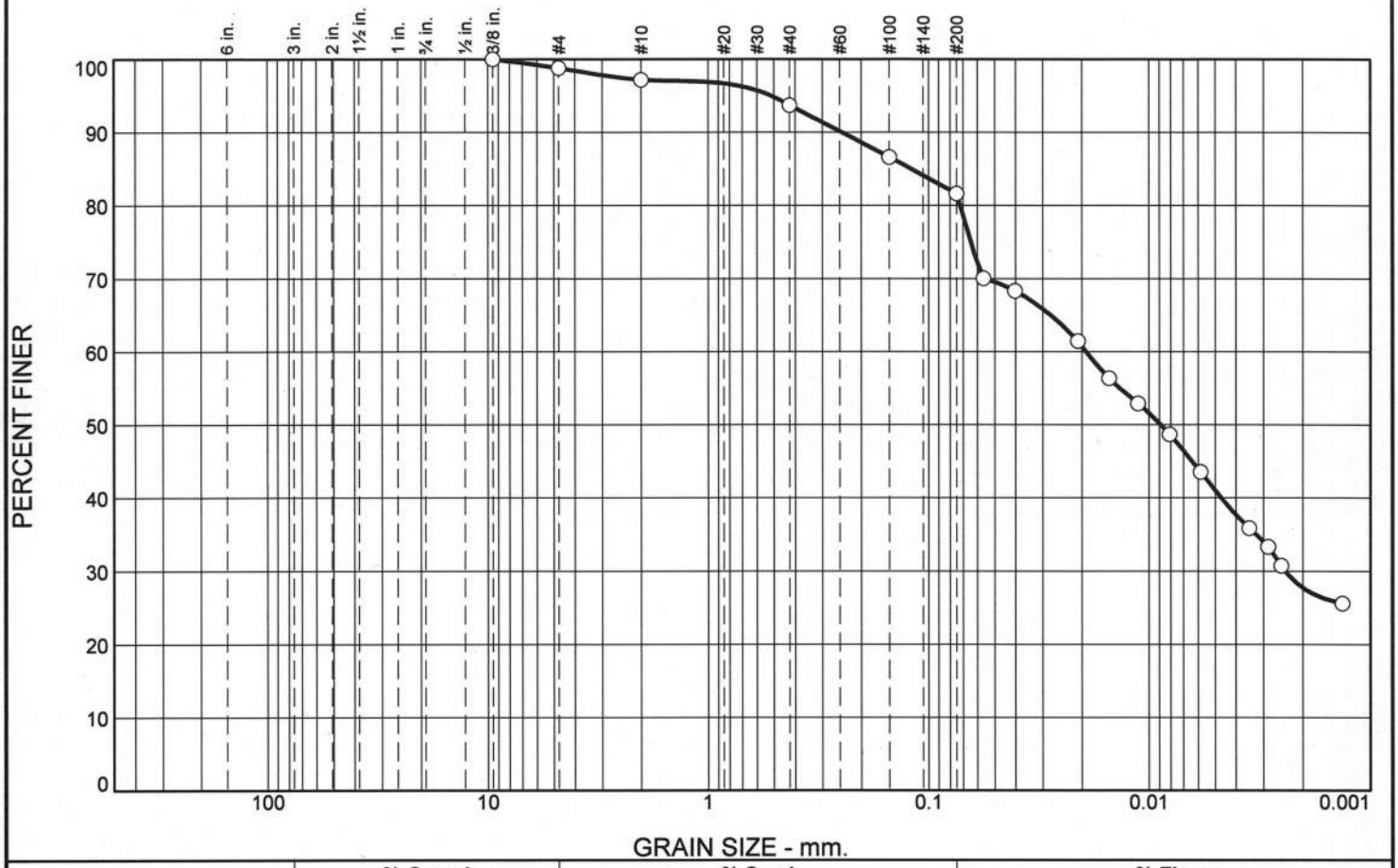
Remarks

Location: B-101
Sample Number: 2 **Depth:** 3.5' - 5.0' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.6	3.5	12.1	53.9	27.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.8		
#10	97.2		
#40	93.7		
#100	86.6		
#200	81.6		

* (no specification provided)

Material Description

Silty Clay Loam

Atterberg Limits

PL= 18 LL= 26 PI= 8

Coefficients

D_{90}= 0.2448 D_{85}= 0.1198 D_{60}= 0.0191
D_{50}= 0.0089 D_{30}= 0.0024 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

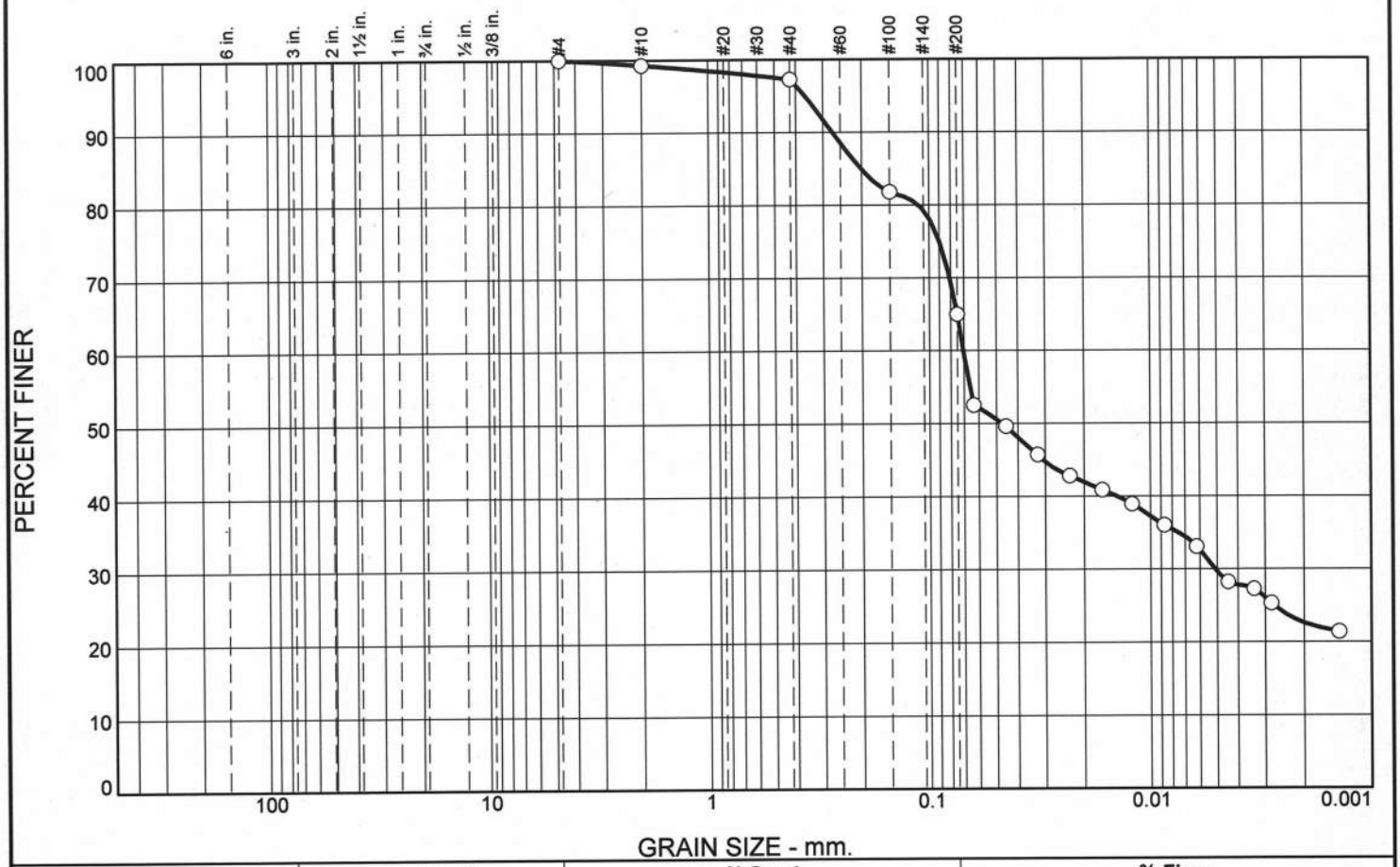
Remarks

Location: B-105
Sample Number: 2 **Depth:** 2.0' - 2.5' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	2.0	32.3	42.4	22.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.3		
#40	97.3		
#100	81.8		
#200	65.0		

* (no specification provided)

Material Description

Clay Loam

Atterberg Limits

PL= 19 LL= 34 PI= 15

Coefficients

D_{90}= 0.2716 D_{85}= 0.2017 D_{60}= 0.0704
D_{50}= 0.0470 D_{30}= 0.0051 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

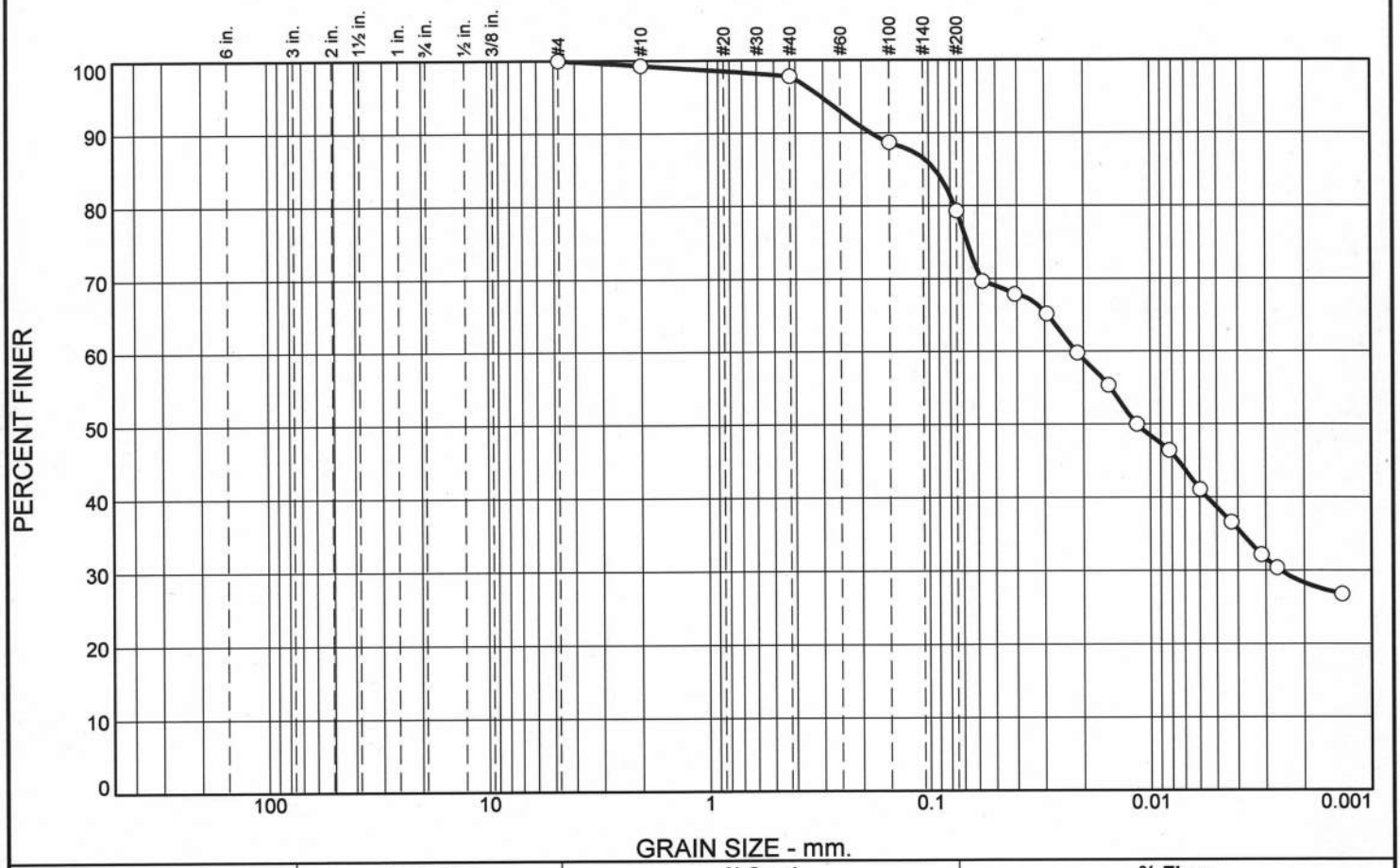
Remarks

Location: B-106
Sample Number: 4 **Depth:** 6.0' - 7.5' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	1.5	18.5	51.0	28.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.3		
#40	97.8		
#100	88.7		
#200	79.3		

* (no specification provided)

Material Description

Silty Clay Loam

Atterberg Limits

PL= 15 LL= 24 PI= 9

Coefficients

D_{90}= 0.1816 D_{85}= 0.0939 D_{60}= 0.0215
D_{50}= 0.0115 D_{30}= 0.0026 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

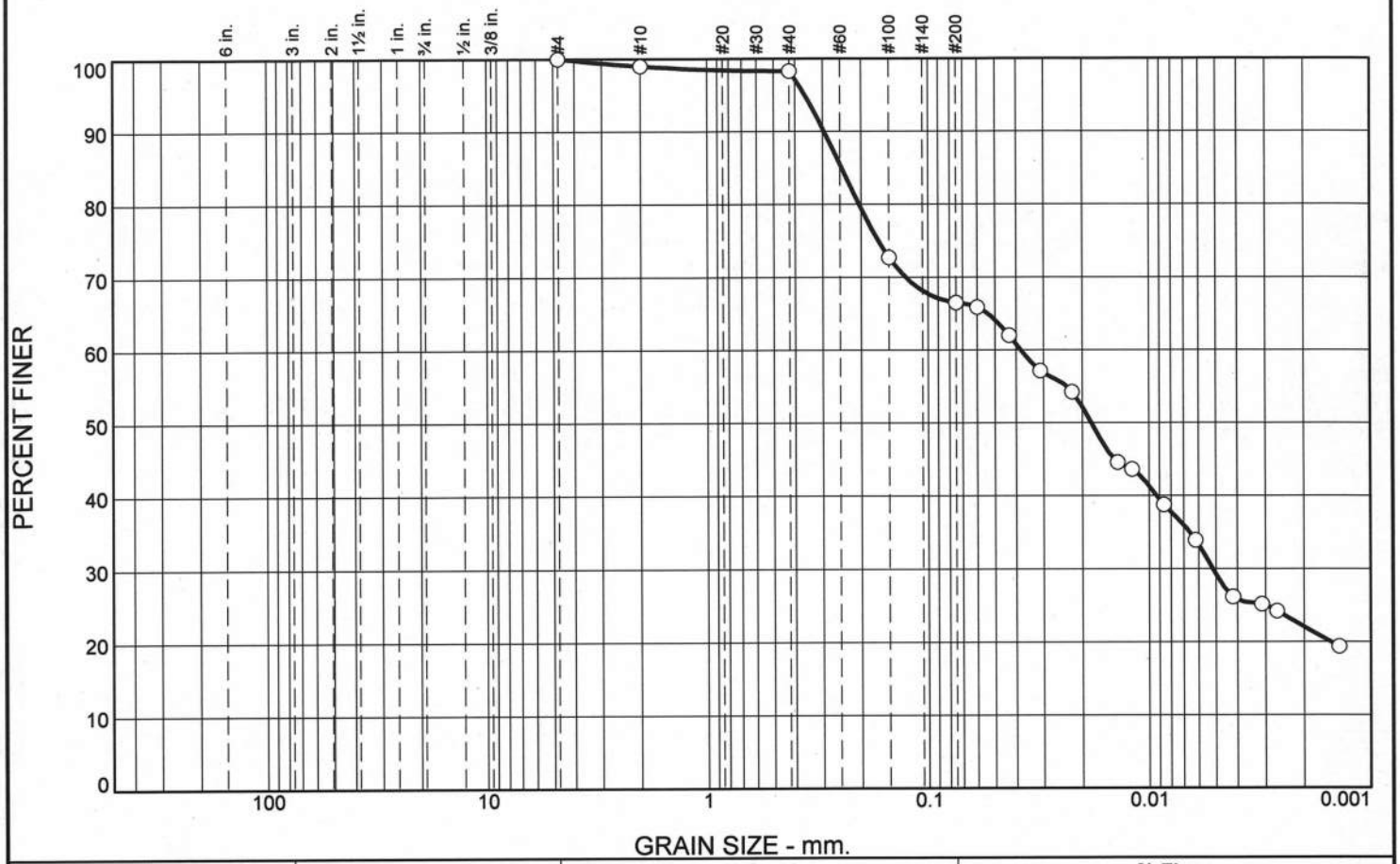
Remarks

Location: B-108
Sample Number: 1 **Depth:** 1.0' - 2.5' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	0.7	31.8	44.4	22.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.0		
#40	98.3		
#100	72.7		
#200	66.5		

* (no specification provided)

Material Description

Clay Loam

Atterberg Limits

PL= 15 LL= 23 PI= 8

Coefficients

D_{90}= 0.2954 D_{85}= 0.2463 D_{60}= 0.0382
D_{50}= 0.0182 D_{30}= 0.0052 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

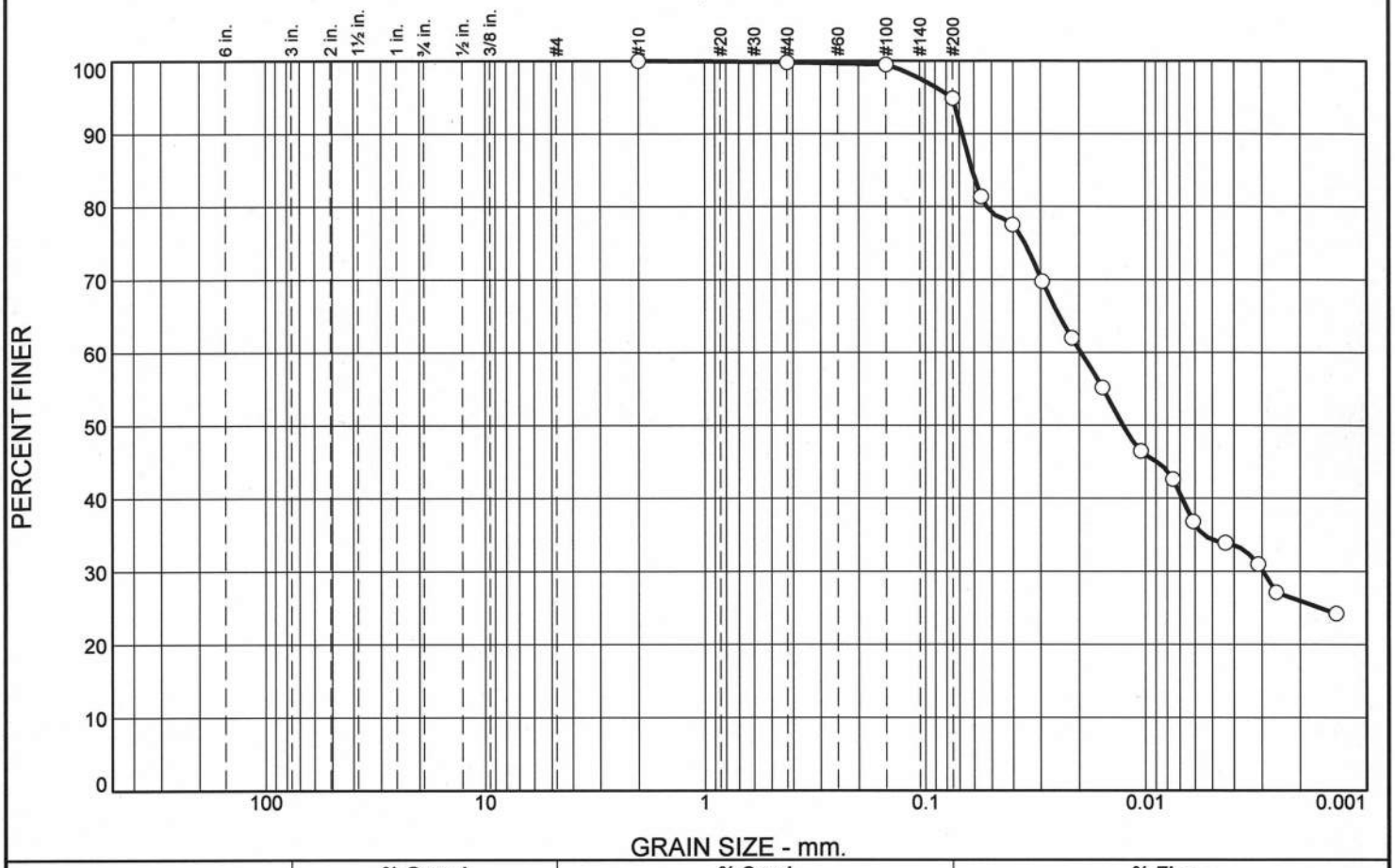
Remarks

Location: B-112
Sample Number: 3 **Depth:** 6.0' - 6.5' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	4.9	68.9	26.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#100	99.5		
#200	94.9		

* (no specification provided)

Material Description

Silty Clay Loam

Atterberg Limits

PL= 15 LL= 21 PI= 6

Coefficients

D_{90}= 0.0677 D_{85}= 0.0612 D_{60}= 0.0196
D_{50}= 0.0126 D_{30}= 0.0030 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(3)

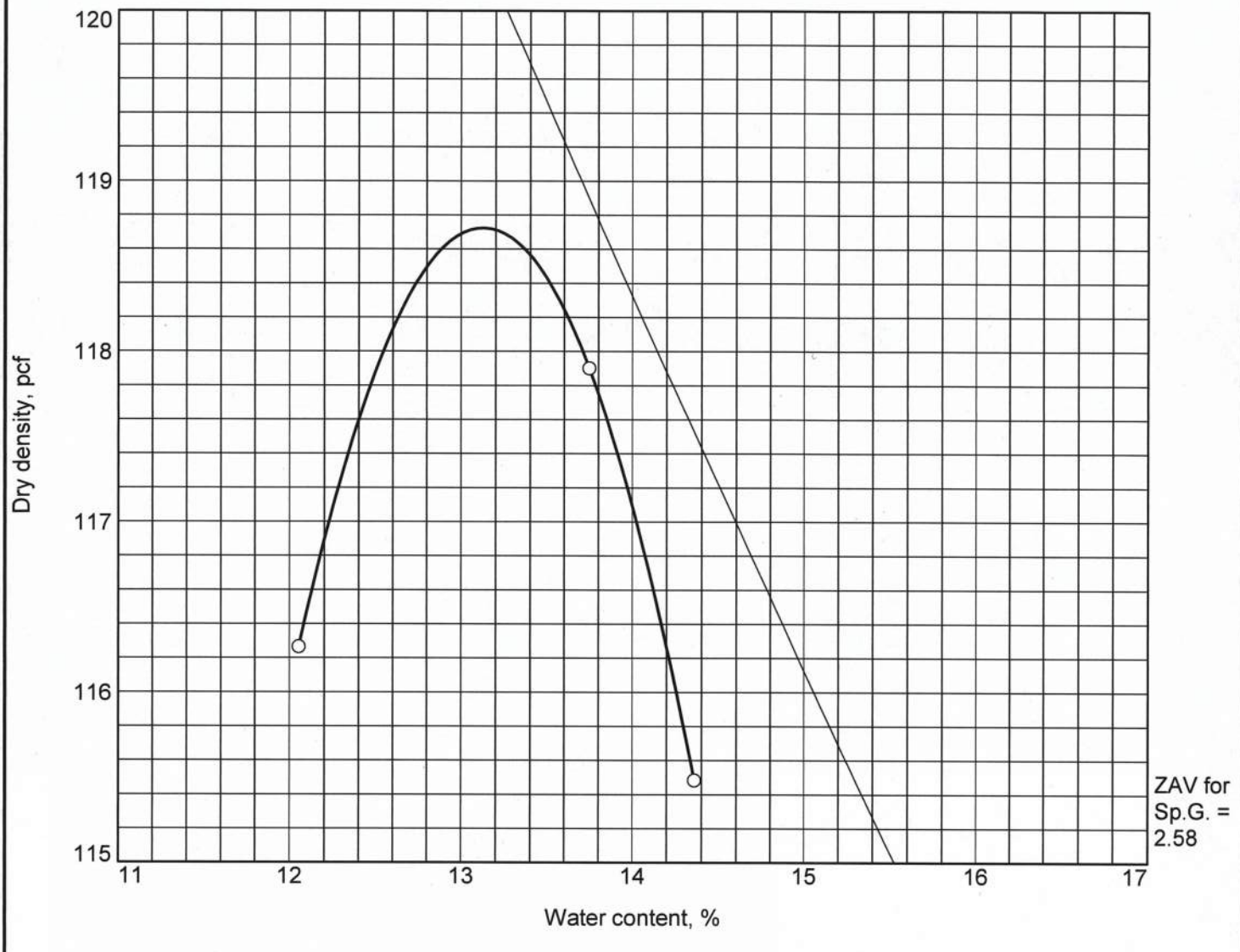
Remarks

Location: B-113
Sample Number: 3 **Depth:** 3.5' - 5.0' **Date:** 2-25-20

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL
Project No: 24919 **Figure**

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1.5' - 3.5'								

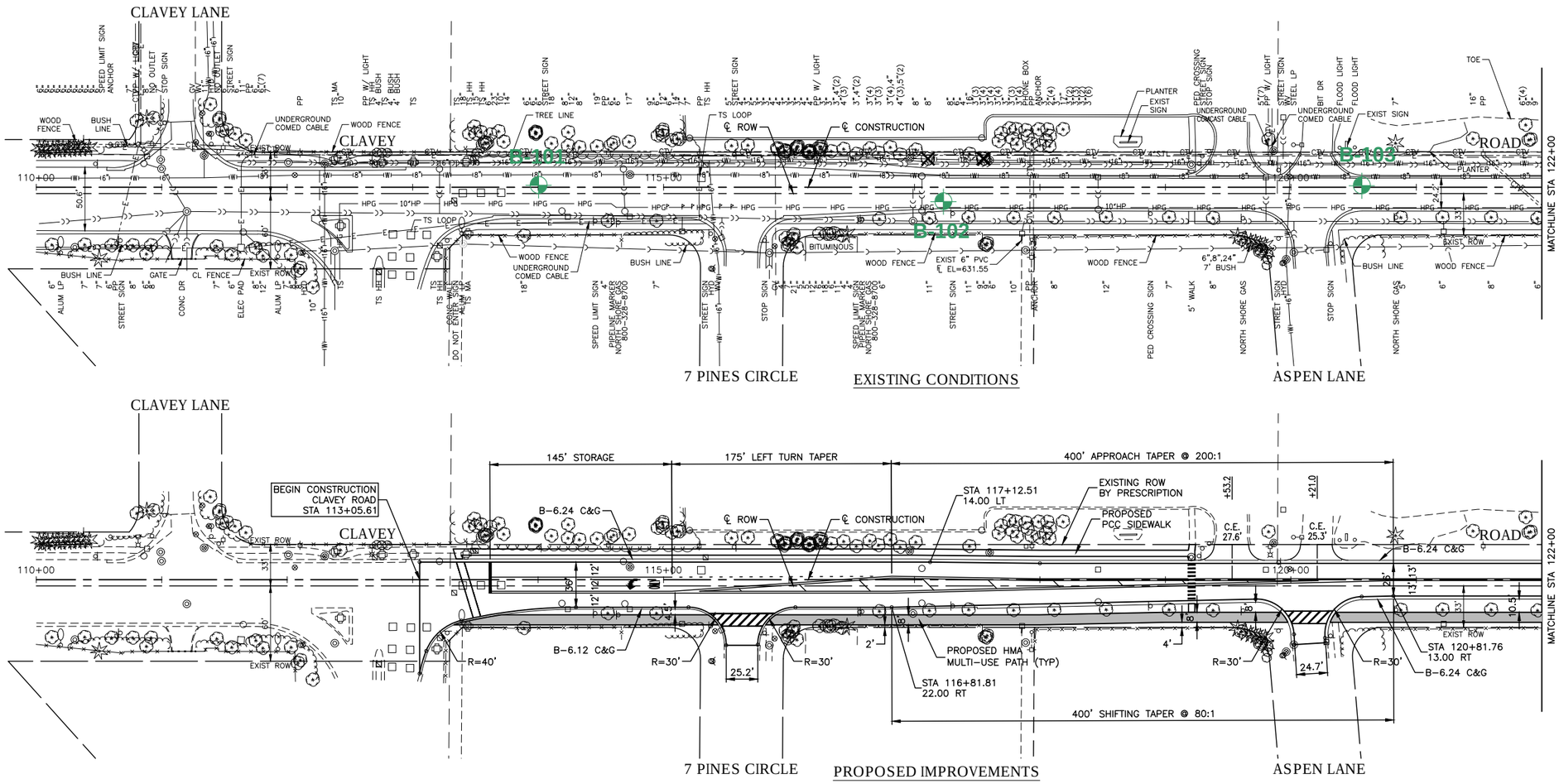
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.7 pcf Optimum moisture = 13.1 %	Brown clay, some silt, trace sand & gravel

Project No. 24919 **Client:** Ciorba Group
Project: Clavey Road Reconstruction
US 41 to Green Bay Rd., Highland Park, IL **Date:**
○ **Location:** B-1 **Sample Number:** S-1

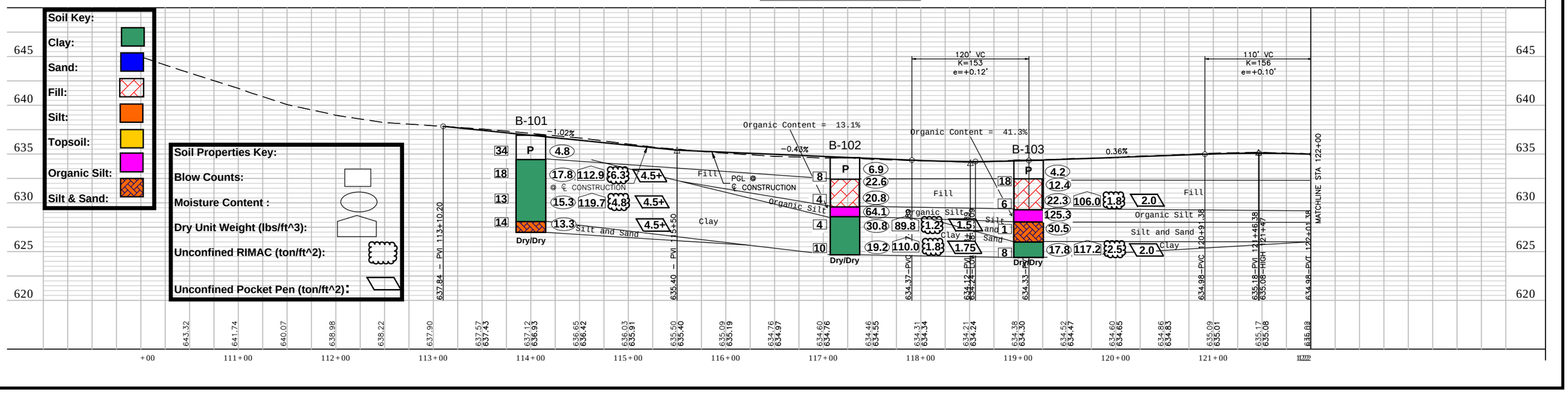
Remarks:

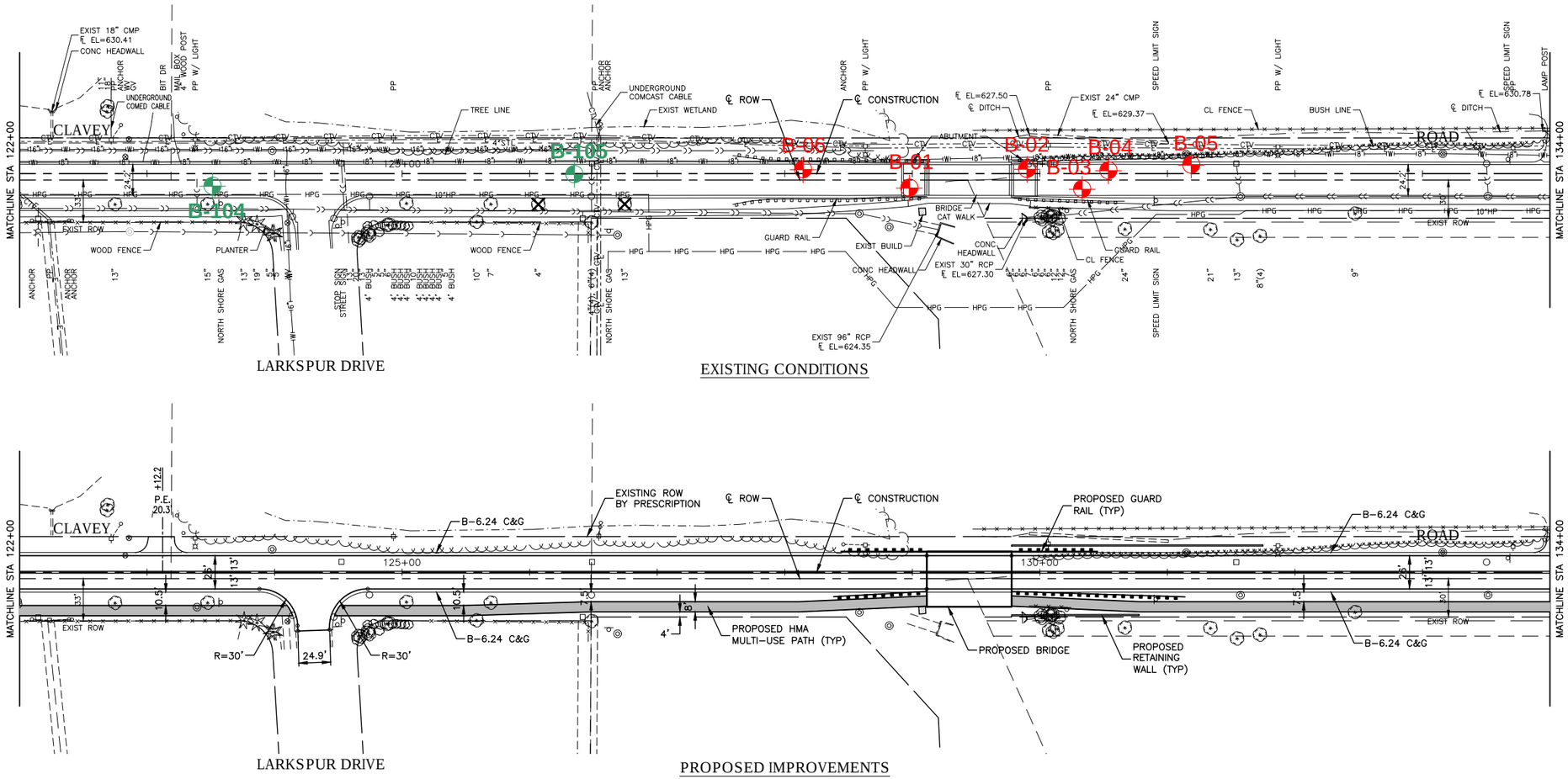
SOIL AND MATERIAL CONSULTANTS, INC.
office: 1-847-870-0544
fax:1-847-870-0661
www.soilandmaterialconsultants.com
us@soilandmaterialconsultants.com

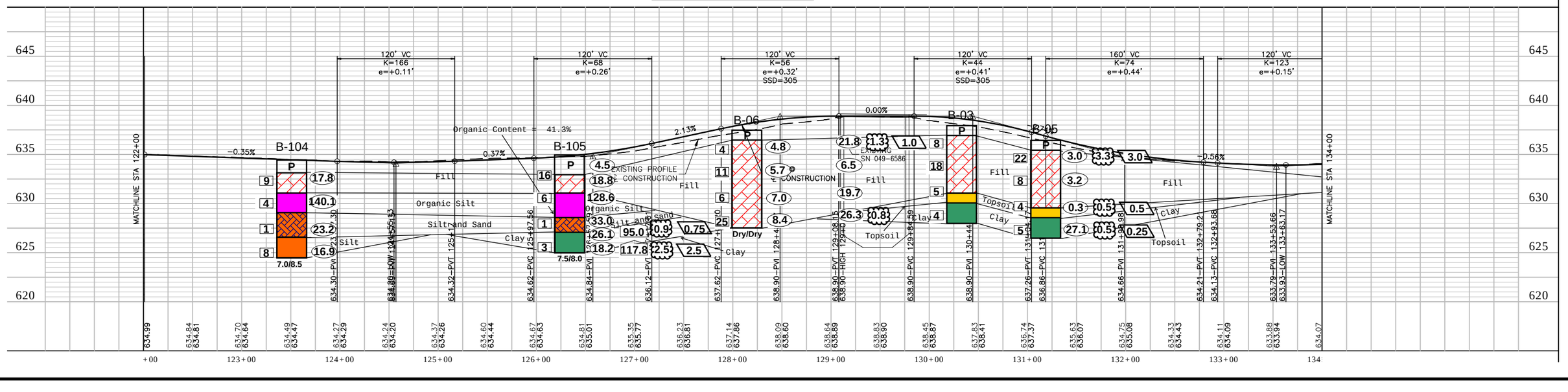
Figure

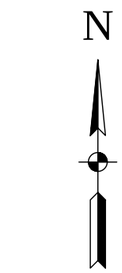

CLAVEY LANE
CLAVEY ROAD
7 PINES CIRCLE
ASPEN LANE
EXISTING CONDITIONS
B-101
B-102
B-103
110+00
115+00
120+00
MATCHLINE STA 122+00
TREE LINE
TS LOOP
℄ ROW
℄ CONSTRUCTION
WOOD FENCE
BUSH LINE
UNDERGROUND COMED CABLE
UNDERGROUND COMCAST CABLE
EXIST SIGN
PLANTER
EXIST ROW
BITUMINOUS
EXIST 6" PVC
℄ EL=631.55
6",8",24"
7' BUSH
TOE
16" PP
6"(4)
N
Scale: 1" = 100'

CLAVEY LANE
CLAVEY ROAD
7 PINES CIRCLE
ASPEN LANE
PROPOSED IMPROVEMENTS
BEGIN CONSTRUCTION
CLAVEY ROAD
STA 113+05.61
145' STORAGE
175' LEFT TURN TAPER
400' APPROACH TAPER @ 200:1
400' SHIFTING TAPER @ 80:1
B-6.24 C&G
B-6.12 C&G
EXISTING ROW
BY PRESCRIPTION
PROPOSED
PCC SIDEWALK
STA 117+12.51
14.00 LT
STA 116+81.81
22.00 RT
PROPOSED HMA
MULTI-USE PATH (TYP)
STA 120+81.76
13.00 RT
C.E.
27.6'
C.E.
25.3'
+53.2
+21.0
R=40'
R=30'
25.2'
24.7'
110+00
115+00
120+00
MATCHLINE STA 122+00
EXIST ROW
DRIVEWAY LEGEND
C.E. = COMMERCIAL ENTRANCE
P.E. = PRIVATE ENTRANCE

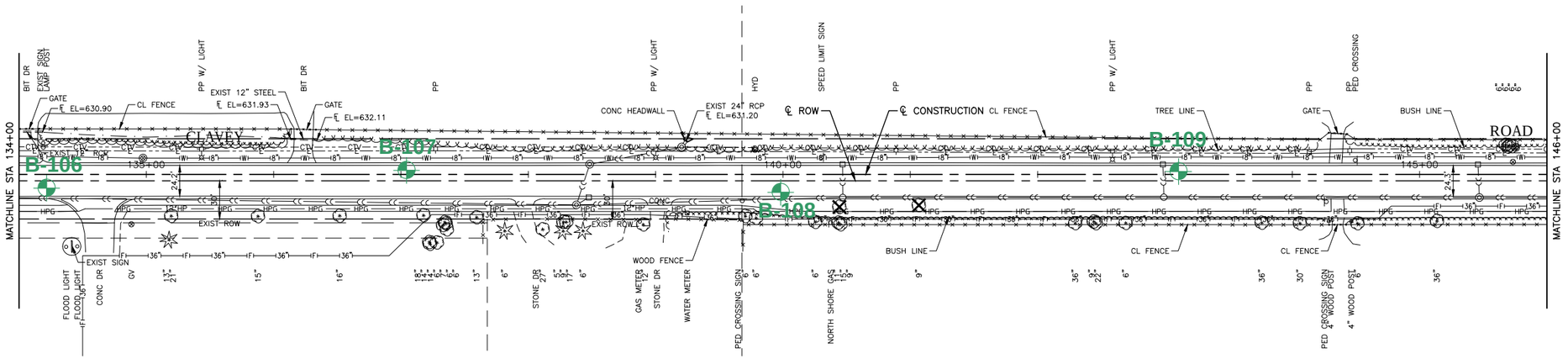

Soil Key:
Clay:
Sand:
Fill:
Silt:
Topsoil:
Organic Silt:
Silt & Sand:
Soil Properties Key:
Blow Counts:
Moisture Content :
Dry Unit Weight (lbs/ft^3):
Unconfined RIMAC (ton/ft^2):
Unconfined Pocket Pen (ton/ft^2):
B-101
B-102
B-103
-1.02%
-0.43%
0.36%
Organic Content = 13.1%
Organic Content = 41.3%
120' VC
K=153
e=+0.12'
110' VC
K=156
e=+0.10'
Fill
PGL @ ℄ CONSTRUCTION
Organic Silt
Clay
Silt and Sand
Dry/Dry
637.84 – PVI 113+10.20
635.40 – PVI 115+50
634.37–PVC
634.12–PVI
634.24–PVT
634.33–PVC
634.98–PVC 120+9.38
635.18–PVI 121+46.38
635.08–HIGH 121+47
634.98–PVT 122+01.38
MATCHLINE STA 122+00
645
640
635
630
625
620
+00
111+00
112+00
113+00
114+00
115+00
116+00
117+00
118+00
119+00
120+00
121+00
122


EXIST 18" CMP
℄ EL=630.41
CONC HEADWALL
UNDERGROUND COMED CABLE
TREE LINE
UNDERGROUND COMCAST CABLE
EXIST WETLAND
℄ ROW
℄ CONSTRUCTION
EXIST 24" CMP
℄ EL=629.37
℄ EL=627.50
℄ DITCH
CL FENCE
BUSH LINE
℄ EL=630.78
CLAVEY
ROAD
MATCHLINE STA 122+00
MATCHLINE STA 134+00
125+00
B-104
B-105
B-06
B-01
B-02
B-03
B-04
B-05
WOOD FENCE
PLANTER
GUARD RAIL
BRIDGE CAT WALK
EXIST BUILD
CONC HEADWALL
EXIST 30" RCP
℄ EL=627.30
EXIST 96" RCP
℄ EL=624.35
NORTH SHORE GAS
STOP SIGN
STREET SIGN
SPEED LIMIT SIGN
LAMP POST
LARKSPUR DRIVE
EXISTING CONDITIONS
EXISTING ROW BY PRESCRIPTION
B-6.24 C&G
PROPOSED GUARD RAIL (TYP)
PROPOSED HMA MULTI-USE PATH (TYP)
PROPOSED BRIDGE
PROPOSED RETAINING WALL (TYP)
R=30'
24.9'
EXIST ROW
LARKSPUR DRIVE
PROPOSED IMPROVEMENTS

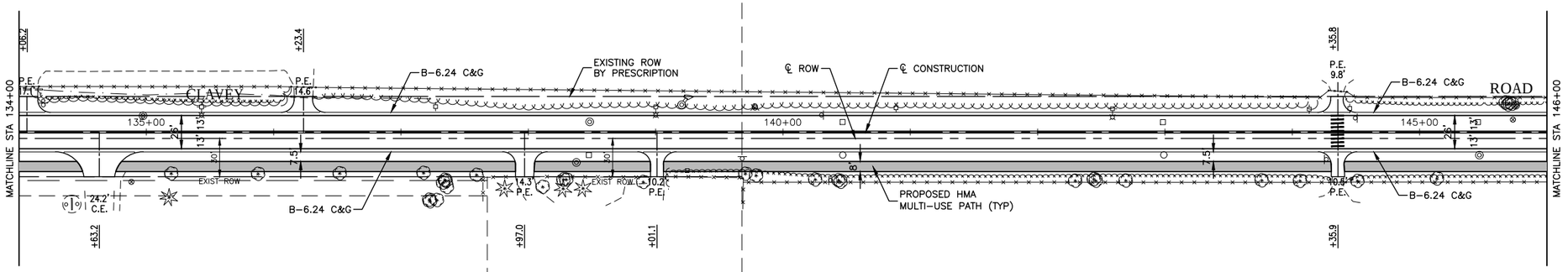

120' VC K=166 e=+0.11'
120' VC K=68 e=+0.26'
120' VC K=56 e=+0.32' SSD=305
120' VC K=44 e=+0.41' SSD=305
160' VC K=74 e=+0.44'
120' VC K=123 e=+0.15'
B-104
B-105
B-06
B-03
B-05
Organic Content = 41.3%
-0.35%
0.37%
2.13%
0.00%
-0.56%
EXISTING PROFILE
℄ CONSTRUCTION
Fill
Organic Silt
Silt and Sand
Clay
Topsoil
Dry/Dry
EXISTING SN 049-6586
7.0/8.5
7.5/8.0
MATCHLINE STA 122+00
MATCHLINE STA 134+00
645
640
635
630
625
620
+00
123+00
124+00
125+00
126+00
127+00
128+00
129+00
130+00
131+00
132+00
133+00
134


N

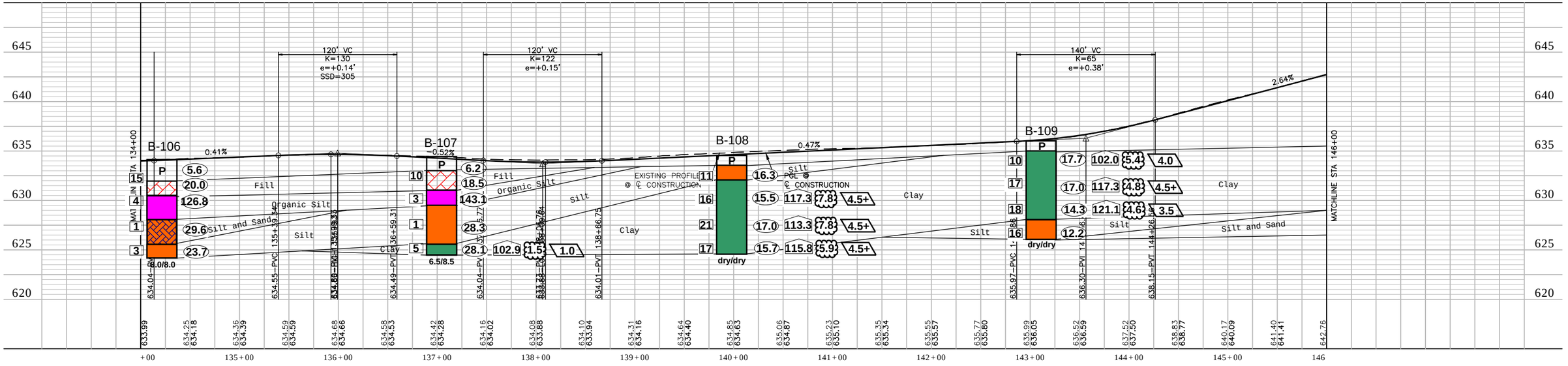
Scale: 1" = 100'



EXISTING CONDITIONS

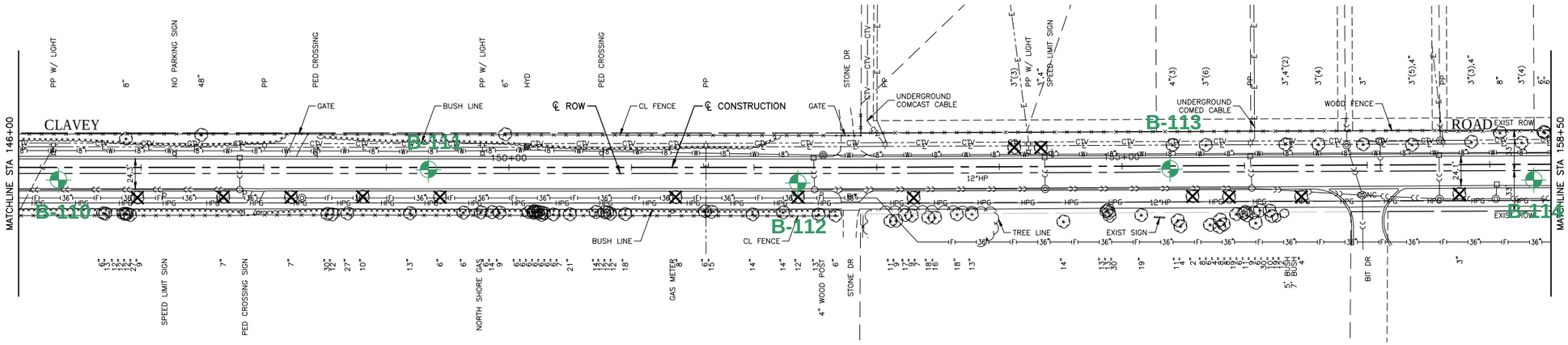


PROPOSED IMPROVEMENTS



Scale: 1" = 100'

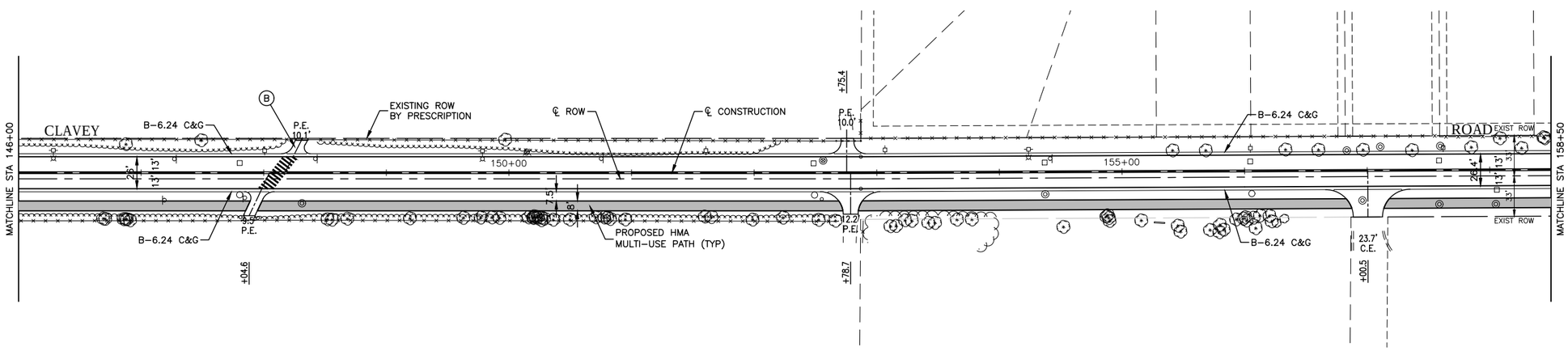
SECTION 35, TOWNSHIP 43, RANGE 12



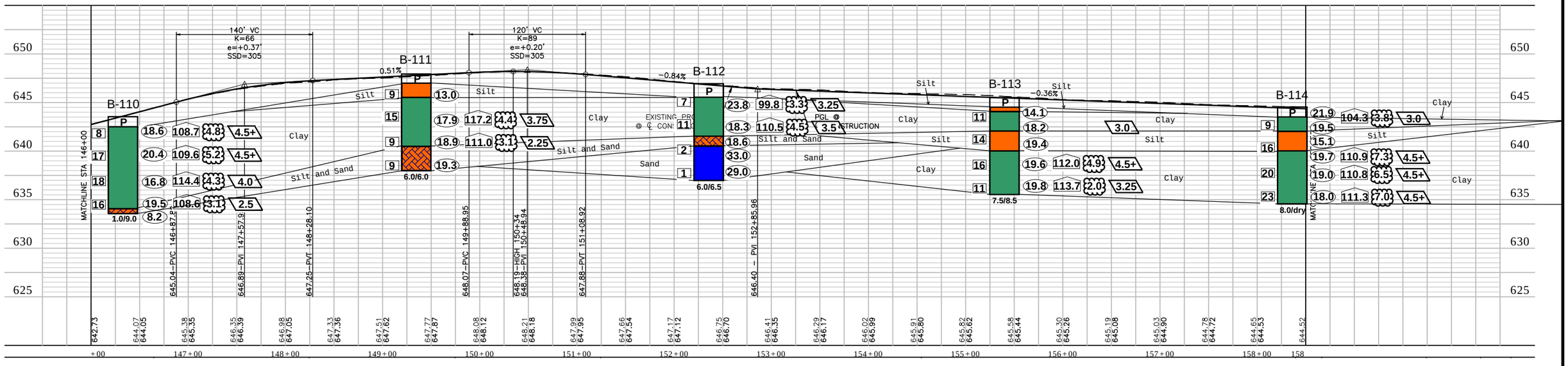
EXISTING CONDITIONS

N

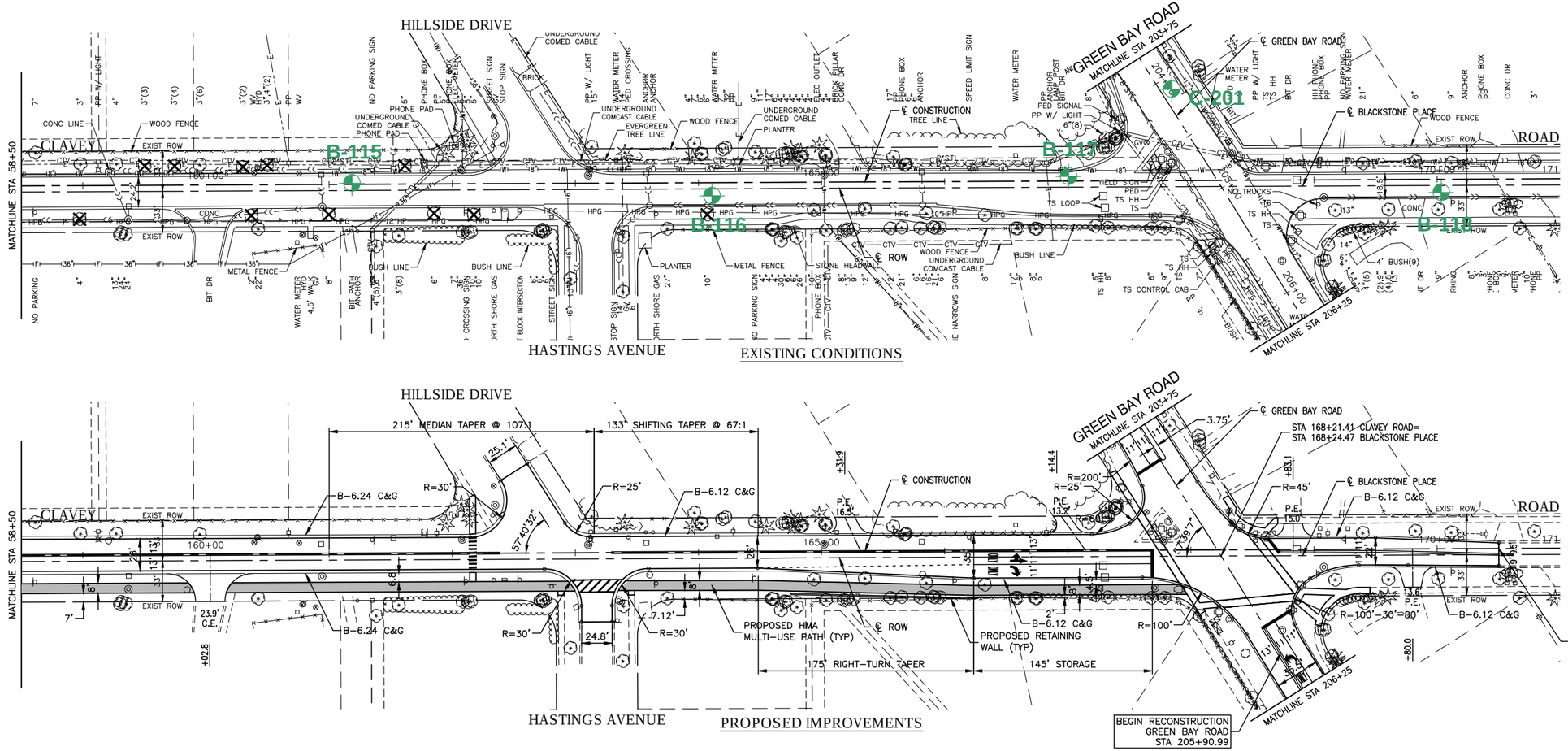
Scale: 1" = 100'

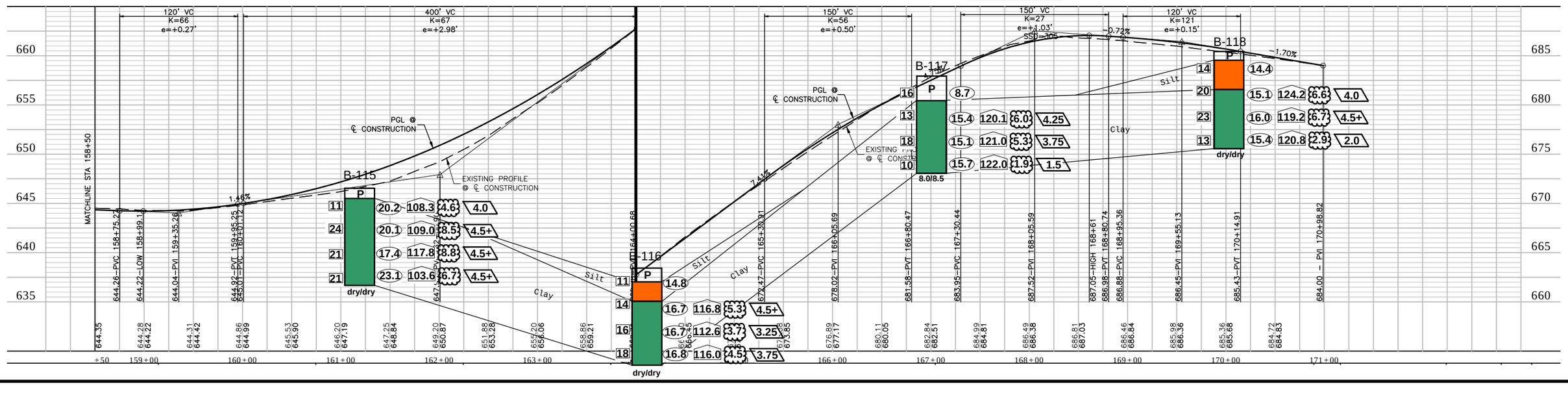


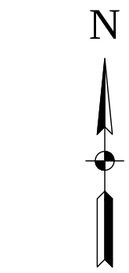
PROPOSED IMPROVEMENTS



SECTION 35, TOWNSHIP 43, RANGE 12







APPENDIX

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FIGURE 1
SITE VICINITY MAP
Clavey Road Bridge over Skokie River
Highland Park, Illinois

PROJECT NUMBER:
17-G0411

DATE: June 2017

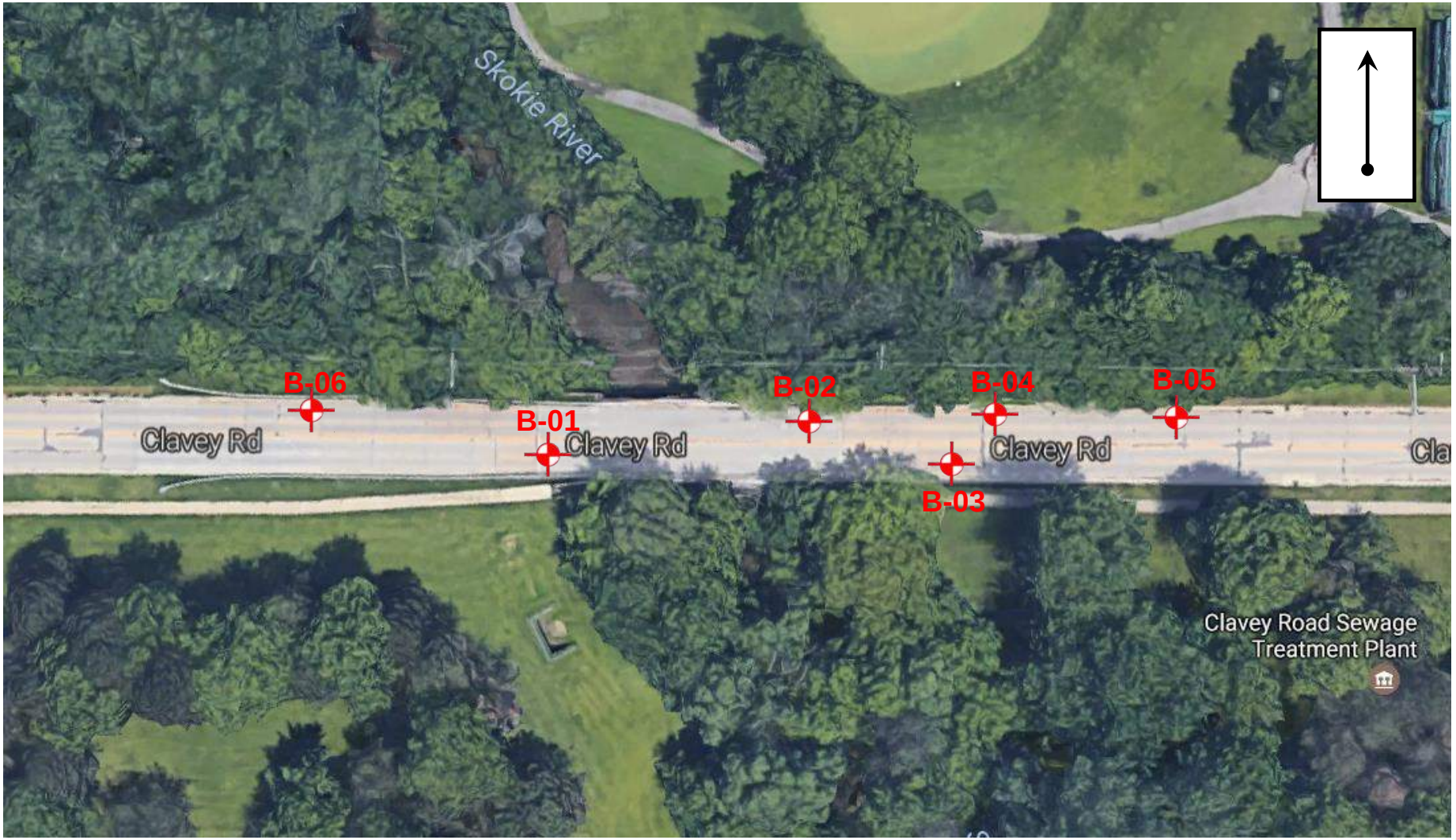

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FIGURE 2
BORING LOCATION DIAGRAM
Clavey Road Bridge over Skokie River
Highland Park, Illinois

PROJECT NUMBER: 17-G0411

DATE: April 2017

BORING NO. B-01

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	636.9	0-5" CONCRETE PAVEMENT											
	636.4	5-11" AGGREGATE BASE											
		mottled blue and gray CLAY FILL with gravel very stiff, moist	SS 1	56	5-3-7 (10)	2.0		17.3					
			SS 2	44	9-5-6 (11)	3.5	3.6	14.7					
5			SS 3	56	6-4-5 (9)	2.5	2.6	19.2					
	629.4	black BURIED TOPSOIL (A-8) medium stiff, moist	SS 4	44	1-2-4 (6)			56.3		7.4			
10	627.4	mottled brown and gray CLAY (A-6) soft, moist	ST 5	25		0.5	0.43	26.8	102.0				
			SS 6	56	2-1-2 (3)	0.5		28.1			28	14	14
15	622.4	gray SILTY LOAM (A-4) stiff, moist	SS 7	67	6-7-6 (13)	2.0	2.0	16.2					
	619.4												

COMPLETION DEPTH 100 ft **GROUND ELEVATION** 637.36 ft

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River
PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois
DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist											
				SS 8	78	4-8-12 (20)	3.5	3.2	13.2					
20														
				SS 9	78	5-10-16 (26)	2.5	2.4	17.6					
				ST 10	44		2.0	0.33	18.4	118.4				
25	612.4													
				SS 11	44	9-10-8 (18)			13.9					
	611.4		gray SILTY LOAM (A-4) with gravel dense, moist											
			brown CLAY (A-6) stiff, moist	SS 12	67	5-6-6 (12)	1.5	2.0	18.1					
				SS 13	89	6-6-7 (13)	1.5	1.7	16.7					
30														
				ST 14	92		2.0		15.4					
				SS 15	78	6-6-8 (14)	2.0	1.8	19.0					
35														
				SS 16	78	6-7-7 (14)	1.75	1.7	21.4					
40														

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			brown CLAY (A-6) stiff, moist *(continued)*											
	593.9													
45			brown CLAY (A-6) very stiff, moist	SS 17	78	6-8-9 (17)	2.5	2.0	19.9					
50				SS 18	89	5-10-14 (24)	3.0	3.3	19.8					
55				SS 19	78	6-10-15 (25)	3.0	3.1	21.4					
	578.9													
60			gray CLAY (A-6) very stiff, moist	SS 20	89	4-5-5 (10)	1.5	1.6	24.7					

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
65				SS 21	89	3-6-6 (12)	1.5	1.2	13.2					
70	567.4			SS 22	78	4-5-6 (11)	1.5	1.7	19.7					
			gray CLAY (A-6) very stiff to hard											
75				SS 23	100	9-50/2"	2.0		14.2					
80				SS 24	56	10-14-16 (30)	2.5		14.0					
85				SS 25	67	16-25-19 (44)	4.5	4.5	13.9					

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
85			gray CLAY (A-6) very stiff to hard *(continued)*											
90				SS 26	67	14-19-17 (36)	4.5	4.0	11.7					
95				SS 27	56	15-19-31 (50)	4.5	4.5	13.2					
100	537.4			SS 28	67	17-25-38 (63)	4.5		12.7					
			Bottom of borehole at 100.0 feet.											

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

BORING NO. B-02

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	638.1		0-5" CONCRETE PAVEMENT											
	637.7		5-10" AGGREGATE BASE											
			black CLAY FILL with gravel stiff, moist	SS 1	44	4-5-6 (11)			72.0					
	635.6													
			brown GRAVEL FILL dense, moist	SS 2	56	9-19-13 (32)			14.7					
5	632.6													
			brown CLAY FILL stiff, moist	SS 3	67 (6)	3-3-4 (7)	1.5	1.3	21.9					
	630.6													
			black BURIED TOPSOIL (A-8) stiff, moist	ST 4	58		1.0		56.0					
10														
	626.6			SS 5	78	1-1-2 (3)			43.6					
	625.6		brown CLAY LOAM (A-6) soft, moist											
			gray CLAY (A-6) very soft, moist	SS 6	67	1-1-2 (3)	0.25	0.2	29.6					
15														
	622.6													
			gray CLAY (A-6) very stiff, moist	ST 7	63		2.0		15.9					

COMPLETION DEPTH 80 ft **GROUND ELEVATION** 638.56 ft

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River
PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois
DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
20				SS 8	78	4-7-10 (17)	3.25	3.4	15.9			27	14	13
				SS 9	78	6-10-14 (24)	4.0	4.0	14.9					
25				SS 10	78	5-7-11 (18)	3.25	3.4	15.1					
				SS 11	78	7-7-10 (17)	3.0	3.1	16.6					
30				ST 12	96		3.0	2.42	17.4	116.1		28	15	13
				SS 13	89	6-10-10 (20)	2.25	2.3	16.8					
35				SS 14	89	4-7-7 (14)	2.25	2.1	19.5					
40				SS 15	100	4-8-9 (17)	2.5	2.5	14.6					

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
45				SS 16	78	5-8-8 (16)	2.5	2.9	20.9					
50				SS 17	78	6-9-11 (20)	2.25	2.2	22.1					
55	583.6			SS 18	78	5-9-10 (19)	2.25	2.6	20.5					
			gray CLAY (A-6) very stiff, moist											
60				SS 19	78	6-9-11 (20)	2.0	2.0	13.4					

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
65				SS 20	78	5-10-11 (21)	2.25	2.0	14.7					
70				SS 21	67	10-16-20 (36)	2.5	2.2	14.2					
75				SS 22	67	13-18-19 (37)	3.5	2.9	14.8					
80	558.6			SS 23	67	13-20-26 (46)	3.5	2.9	14.3					
			Bottom of borehole at 80.0 feet.											

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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BORING NO. B-03

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/19/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	638.1	0-6" CONCRETE PAVEMENT											
	637.7	6-11" AGGREGATE BASE											
		blue CLAY FILL with gravel stiff, moist	SS 1	44	3-3-5 (8)	1.0	1.3	21.8					
	634.6	brown CLAY FILL with gravel very stiff, moist	SS 2	44	9-11-7 (18)			6.5					
5			SS 3	44	3-2-3 (5)			19.7					
	631.6	black BURIED TOPSOIL (A-8) soft, moist											
	630.6	mottled brown and gray CLAY (A-6) medium stiff, moist	SS 4	56	2-2-2 (4)		0.8	26.3					
10		▼	SS 5	78	2-3-4 (7)		0.6	23.8			30	14	16
	625.6	▽ brown SILTY LOAM (A-4) medium stiff, moist	SS 6	56	3-3-3 (6)	0.5		16.8					
15	622.6	gray CLAY (A-6) very stiff, moist	SS 7	78	7-8-9 (17)	3.0	3.5	16.1					
			SS 8	78	10-12-13 (25)	4.0	3.0	13.4					
20													

COMPLETION DEPTH 40 ft **GROUND ELEVATION** 638.57 ft

CAVE DEPTH 10 ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

▽ **AT TIME OF DRILLING** 13.00 ft / Elev 625.57 ft

▼ **AT END OF DRILLING** 10.00 ft / Elev 628.57 ft

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/19/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*	SS 9	78	8-9-11 (20)	3.25	3.9	14.2					
25				SS 10	78	6-7-10 (17)	3.5	4.0	15.3			27	14	13
				SS 11	67	6-7-9 (16)	2.5	2.6	16.4					
30				SS 12	78	6-6-10 (16)	3.0	3.8	10.9					
35				SS 13	78	6-9-12 (21)	3.25	3.9	14.4					
40	598.6			SS 14	78	5-10-14 (24)	3.0	3.2	16.2					

Bottom of borehole at 40.0 feet.

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BORING NO. B-04

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	637.2		0-6" CONCRETE PAVEMENT											
	636.9		6-10" AGGREGATE BASE											
			mixed brown and blue CLAY FILL with gravel stiff, moist	SS 1	56	5-6-9 (15)	2.0	1.4	17.9					
	634.7		brown SAND FILL with gravel medium dense, moist	SS 2	33	6-6-5 (11)	0.5		23.0					
5	631.7		black BURIED TOPSOIL (A-8) soft, moist	SS 3	33	5-2-3 (5)			11.9		5.7			
	629.7		mottled brown and gray CLAY LOAM (A-6) very soft to medium stiff, moist	SS 4	100		0.75	0.49	31.4	91.5				
10				SS 5	78	2-2-1 (3)			23.2					
				ST 6	63		0.5	0.16	36.1	94.2				
15	622.7			SS 7	78	1-2-1 (3)	0.75	0.5	28.4					
			gray CLAY (A-6) very stiff, moist											
20				SS 8	78	6-8-9 (17)	2.75	3.5	15.8					

COMPLETION DEPTH 40 ft **GROUND ELEVATION** 637.72 ft

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*	SS 9	78	7-10-16 (26)	3.5	3.0	14.9					
25				SS 10	78	6-9-12 (21)	3.5	3.2	15.8					
				SS 11	78	5-7-9 (16)	2.5	2.8	17.2					
30				SS 12	67	6-9-10 (19)	2.5	2.0	14.4					
35				SS 13	78	5-7-8 (15)	2.25	2.2	17.5					
40	597.7			SS 14	78	4-6-8 (14)	2.25	2.4	18.8					

Bottom of borehole at 40.0 feet.

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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BORING NO. B-05

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/19/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	636.9		0-6" CONCRETE PAVEMENT											
	636.6		6-10" AGGREGATE BASE											
	635.4		mixed black and brown CLAY FILL with gravel very stiff, moist	SS 1	56	12-6-16 (22)	3.0	3.3	3.0					
			brown GRAVEL FILL medium dense, moist											
5	632.4			SS 2	56	3-4-4 (8)			3.2					
			mixed brown and gray CLAY FILL with sand soft, moist											
	630.4			SS 3	44	2-2-2 (4)	0.5	0.5	0.3					
	629.4		black BURIED TOPSOIL (A-8) soft, moist											
			mottled brown and gray CLAY (A-6) soft, moist											
10	627.4		▼	SS 4	67	2-2-3 (5)	0.25	0.5	27.1					
			gray SILT LOAM (A-4) stiff to very stiff, wet											
				SS 5	67	3-4-3 (7)			21.2					
				ST 6	88		2.5	3.24	19.2	251.1				
15			▽											
				SS 7	78	8-10-12 (22)	2.0	1.2	14.7					
	619.4													
			gray CLAY (A-6) very stiff to hard, moist											
20				SS 8	78	7-9-12 (21)	4.25	4.4	13.8					

COMPLETION DEPTH 40 ft **GROUND ELEVATION** 637.4 ft

CAVE DEPTH 13 ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

▽ **AT TIME OF DRILLING** 15.00 ft / Elev 622.40 ft

▼ **AT END OF DRILLING** 10.00 ft / Elev 627.40 ft

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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BORING NO. B-05

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/19/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff to hard, moist *(continued)*	ST 9	46		3.75	2.33	13.9	120.2				
25				SS 10	78	9-13-17 (30)	2.5	2.3	14.5					
				SS 11	89	5-6-12 (18)	2.0	4.0	16.2					
30				SS 12	78	6-8-11 (19)	3.0	4.0	16.0			27	12	15
	603.4													
35			gray CLAY (A-6) stiff, moist	SS 13	67	5-10-13 (23)		1.0	13.5			25	14	11
	599.4													
40	597.4		gray CLAY (A-6) hard, moist	SS 14	78	4-12-12 (24)	4.0	4.1	14.7					

Bottom of borehole at 40.0 feet.

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

BORING NO. B-06

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/19/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0.0	636.2		0-9" CONCRETE PAVEMENT											
	635.8		9-13" AGGREGATE BASE											
			brown SAND FILL with gravel loose to dense, moist	SS 1	56	2-2-2 (4)			4.8					
2.5														
				SS 2	56	5-5-6 (11)			5.7					
5.0														
				SS 3	67	4-3-3 (6)			7.0					
7.5														
				SS 4	33	5-12-13 (25)			8.4					
10.0	626.9													

Bottom of borehole at 10.0 feet.

COMPLETION DEPTH 10 ft **GROUND ELEVATION** 636.91 ft

CAVE DEPTH 9 ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

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9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

BORING NO. Composite

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED _____ **LOGGED BY** _____ **DRILLING METHOD** _____

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0				SS										

COMPLETION DEPTH 5 ft **GROUND ELEVATION** _____

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING ---

AT END OF DRILLING ---

AFTER DRILLING ---

NOTES

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9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

REPORT OF GEOTECHNICAL INVESTIGATION

Clavey Road Bridge over Skokie River

Existing Structure # 049-6585

Highland Park, Illinois

Prepared by:

Soil and Material Consultants, Inc.
8 West College Drive, Suite C
Arlington Heights, Illinois 60004

Prepared for:

Ciorba Group, Inc.
5507 North Cumberland Ave. Suite 402
Chicago, Illinois 60656

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September 3, 2020
File No. 24919
UPDATED

Brett Sauter, P.E., S.E.
Ciorba Group
5507 North Cumberland Avenue
Chicago, IL 60656

Re: Structural Geotechnical Report
Clavey Road Bridge over Skokie River
Structure No. 049-6585
Highland Park, Illinois

Dear Mr. Sauter:

This in an updated report to reflect changes to the project limits and incorporate IDOT review comments. The following is our structural geotechnical report, using the information provided by Geocon Professional Services report number 17-G0411 completed on April 17, 2017, for the Clavey Road Bridge over Skokie River in the Village of Highland Park, Illinois. This report is intended to assist in the planning, design, and construction of proposed site improvements.

We understand it is proposed to remove the existing bridge and replace it with a new bridge supported on a driven pile or drilled pier foundation. Specific plans for the bridge type and location have not been finalized at the time of this report. We understand the project limits in the design plans extend from Station 25+90 to Station 32+00.

SCOPE OF THE INVESTIGATION

The field investigation performed by Geocon Professional Services included 2 borings at the locations indicated on the enclosed location sketch.

The 2 structure borings were auger drilled to depths of 100.0 feet and 80.0 feet below existing surface elevations. Soil samples were obtained at a 2.5-foot interval until a depth of 35.0 feet in which soil samples were taken at a 5.0 foot interval to the end of the borings. Additional testing included determination of dry unit weight, unconfined compressive strength, grain-size distribution, Atterberg limits, and related testing.

SITE GEOLOGY/USDA SOIL TYPING

Enclosed is a map indicating the pedological characteristics of the site as determined by the USDA Soil Conservation Service. The soils indicated are a generalization of soil types and conditions anticipated to exist at or near existing surface elevations. Typically, these maps were developed without benefit of a direct on-site soil investigation. The soil typing map is presented for general information only.

Symbol	Soil Types
153A	Pella Silty Clay Loam, 0 to 2 percent slopes
330A	Peotone Silty Clay Loam, 0 to 2 percent slopes
802B	Orthents, loamy, undulating
805B	Orthents, clayey, undulating
1330A	Peotone Silty Clay Loam, undrained, 0 to 2 percent slopes

CLIMATIC CONDITIONS

Climatic conditions for the period prior to obtaining site soil borings include the following information recorded at O'Hare International Airport in Chicago, Illinois:

Month	Total Precipitation	Departure From Normal	Average Temperature	Departure From Normal
Dec 2016	1.77 in.	-0.48 in.	25.0° F.	-2.7° F.
Jan 2017	2.87 in.	1.14 in.	28.8° F.	5.0° F.
Feb 2017	1.52 in.	-0.27 in.	38.1° F.	10.4° F.
Mar 2017	4.01 in.	1.51 in.	39.5° F.	1.6° F.

The above information has been considered in our analysis of the site soil conditions.

RESULTS OF THE INVESTIGATION - BRIDGE

Enclosed are boring logs indicating soil conditions encountered at each location. Borings B-1 and B-2 were performed in the area of the proposed abutments. Site surface conditions include the existing structure, pavement materials, and fill soil conditions.

Fill soil conditions were encountered at each boring location. Composition of the fill includes the presence of clay/silt, and gravel mixtures extending to a depth of 8.0 feet below existing surface elevations. The limits of fill placement were not determined within the scope of this investigation. Beneath the fill soils, buried topsoil was encountered which extended to depths of 10.0 feet to 12.0 feet below surface elevations. Larger debris may also be present within the fill but was not encountered during the investigation.

Underlying natural soil conditions include the presence of cohesive soils. These are classified as stiff to very hard clay/silt mixtures with lesser portions of sand and gravel. Cobbles and boulders may be present within the site soils at any elevation, although none were encountered while drilling.

The following table summarizes depth ranges below existing grade, the magnitude of soil strength within these ranges and other information:

Boring	Surface Elevation (feet)	Depth Range Below Existing Surface (feet)	Net Allowable Bearing Capacity (lbs./sq.ft.)	Recorded Water Levels, W.D./A.D. (feet)
1	637.4	0.0 to 4.0	*2,000	Dry / Dry
		4.0 to 15.0	*500	
		15.0 to 19.0	4,000	
		19.0 to 25.0	*500	
		25.0 to 44.0	3,000	
		44.0 to 54.0	5,000	
		54.0 to 74.0	3,000	
		74.0 to 79.0	4,000	
		79.0 to 84.5	5,000	
		84.5 to 97.0	8,000	
2	638.6	1.5 to 17.0	*500	Dry / Dry
		17.0 to 19.0	4,000	
		19.0 to 24.0	6,000	
		24.0 to 74.0	4,000	
		74.0 to 77.0	5,000	

SHALLOW FOUNDATIONS

We understand shallow depth approach footings will be used beneath the approach pavements. These footings can be supported on suitable fill soils. Weak soil conditions may be discovered locally at design footing elevations and may require extending the foundation to a deeper elevation. Alternately, removal of the weak soil followed by replacement with properly compacted crushed granular fill may be feasible. When removal is approved by the Soil Engineer, the removal of the weak soil should also extend beyond the face of footings to a distance at least equal to the depth of fill that will be present beneath the footings. A capping layer of finer crushed granular fill (CA06) can be utilized to establish a working surface.

Sliding Resistance Factors for geotechnical resistance of shallow foundations at the strength limit state are 0.85 and 0.80 for the for cast-in-place concrete on clay and sand respectively. These values were obtained from Table 10.5.5.2.2-1-1 of the AASHTO LRFD Bridge Design Specifications.

DRILLED PIER FOUNDATIONS

A drilled pier foundation system is currently under consideration for support of the new bridge foundations. The drilled pier foundation system, designed by a licensed structural engineer, can be utilized to support the structure utilizing skin friction and end bearing of soils at deeper elevations. Drilled piers should extend about 3.0 feet or deeper into soils possessing the design bearing strength. The bottom of the shafts could possibly be belled to increase the load

carrying capacity of each caisson. Belling would require extending the drilled shaft further into the cohesive soils as needed to assure non-caving soil conditions in the sidewall of the bell.

Temporary or permanent casing extending above the ground surface is needed to prevent caving of the soil around the top of the drilled shaft. Further, temporary or permanent casing will be needed when drilling through caving soils. The casing will also reduce the volume of water seeping into the drilled shaft.

Downdrag and liquefaction are not expected to affect the design of the new bridge foundations. A scour elevation of 604.90 feet was provided by Ciorba Group, Inc. and used in estimating the drilled pier depths. If a drilled pier foundation is chosen, Ciorba has estimated 6 drilled piers will be used to support each bridge abutment with an approximate non-factored vertical load of 173 kips per drilled pier.

The following table shows estimated drilled pier lengths for a 3.0 ft. diameter shaft with a 4.5 ft. diameter bell. The estimates are based upon the Geocon boring logs and formulas by Reese and O'Neill (1989) for estimation of the ultimate and allowable bearing capacity of drilled shafts.

Location	Depth (feet)	Strength Limit State (kips)	Service Limit State (kips)
West Abutment (B-1)	44.0	125	295
	61.0	150	345
	70.0	175	403
East Abutment (B-2)	46.0	125	276
	53.0	150	336
	60.0	175	395

Please note the strength limit state was calculated using a safety factor of 3 while the service limit state does not contain a safety factor.

DRIVEN PILE FOUNDATIONS

A driven pile foundation system could also be considered for support of the new bridge. The pile foundation system, designed by a licensed structural engineer, can be utilized to transmit loads into suitable soil conditions present at the deeper elevations. The selection of a pile foundation system should include consideration of the negative impact of vibration on adjacent structures.

The following table shows estimated pile lengths for metal shell and H-Piles based upon the Modified IDOT Static Method of Estimating Pile Length using a geotechnical resistance factor (Φ_G) of 0.55, modified September, 2017. Downdrag and liquefaction are not expected to affect the design of the new bridge foundations. A scour elevation of 604.90 feet was provided by Ciorba Group, Inc. and used for estimating the driven pile lengths.

Table of Estimated Lengths for Metal Shell 14" w/ .312" Walls

Location	R_n (kips) [1]	R_f (kips) [2]	Length (ft.) [3]
West Side (B-1)	280	80	46
	332	100	52
	390	120	58
East Side (B-2)	330	80	44
	380	100	50
	415	120	54

Table of Estimated Lengths for Metal Shell 16" w/ .312" Walls

Location	R_n (kips) [1]	R_f (kips) [2]	Length (ft.) [3]
West Side (B-1)	385	125	53
	440	150	62
	482	175	67
East Side (B-2)	435	125	50
	485	150	57
	535	175	63

Table of Estimated Lengths for HP 12 x 53 Piles

Location	R_n (kips) [1]	R_f (kips) [2]	Length (ft.) [3]
West Side (B-1)	226	70	47
	250	85	57
	275	100	63
East Side (B-2)	240	70	46
	270	85	53
	300	100	58

[1] R_n: Nominal Required Bearing
[2] R_f: Factored Resistance Available
[3] Pile Lengths were estimated assuming the piles would be driven from a surface elevation of 633.4 feet and the piles would be cut-off at elevation 634.4 feet.

If pile foundations are chosen to support the structure, we recommend that one test pile be performed at each substructure location. The piles should be driven until the required driving resistance is developed as determined using the appropriate pile driving formula. The test piles should be driven to not less than 110% of the Nominal Required Bearing. We would also recommend that the WSDOT formula be used in the field as the construction verification. The designer should also consider the use of metal shell pile shoes as the piles may encounter cobbles, boulders and thin dense layers of material during driving.

We would recommend foundations extend at least 60.0 inches below exposed surface elevations to provide adequate protection against uplift due to freezing of the supporting soils. Adequate reinforcing steel in foundations and wing walls should be used to minimize the effects of long-term differential settlement.

DESIGN VALUES

Where applicable, the following average values can be utilized for design:

Clay Fill Soils

Unit Weight (lbs./cu.ft.)	=	120.0
Angle of Internal Friction (drained)	=	22°
Angle of Internal Friction (undrained)	=	0°
Cohesion, Cu (psf)	=	500
Active Stress Coefficient, K_a	=	0.45
Passive Stress Coefficient, K_p	=	2.20
At-Rest Stress Coefficient, K_o	=	0.63
Soil Modulus, K (pci)	=	100
Soil Strain, E50	=	0.01

Granular Fill Soils

Unit Weight (lbs./cu.ft.)	=	110.0
Angle of Internal Friction	=	38°
Active Stress Coefficient, K_a	=	.24
Passive Stress Coefficient, K_p	=	4.20
At-Rest Stress Coefficient, K_o	=	0.38

Topsoil

Unit Weight (lbs./cu.ft.)	=	85.0
Angle of Internal Friction	=	10°
Active Stress Coefficient, K_a	=	.70
Passive Stress Coefficient, K_p	=	1.42
At-Rest Stress Coefficient, K_o	=	0.83

Cohesive Soils (soft to stiff)

Unit Weight (lbs./cu.ft.)	=	110.0
Angle of Internal Friction (drained)	=	23°
Angle of Internal Friction (undrained)	=	0°
Cohesion, Cu (psf)	=	1500
Active Stress Coefficient, K_a	=	.29
Passive Stress Coefficient, K_p	=	3.39
At-Rest Stress Coefficient, K_o	=	.46
Soil Modulus, K (pci)	=	200
Soil Strain, E50	=	0.007

Cohesive Soils (very stiff to hard)

Unit Weight (lbs./cu.ft.)	=	132.0
Angle of Internal Friction (drained)	=	30°
Angle of Internal Friction (undrained)	=	0°
Cohesion, Cu (psf)	=	3000
Active Stress Coefficient, K_a	=	.33
Passive Stress Coefficient, K_p	=	3.00
At-Rest Stress Coefficient, K_o	=	.50
Soil Modulus, k (pci)	=	400
Soil Strain, E50	=	0.005

Granular Backfill (CA06, crushed gravel)

Unit Weight (lbs./cu.ft.)	=	142.0
Angle of Internal Friction	=	32°
Active Stress Coefficient, K_a	=	.31
Passive Stress Coefficient, K_p	=	3.25
At-Rest Stress Coefficient, K_o	=	.47

Granular Backfill (CA07, crushed gravel)

Unit Weight (lbs./cu.ft.)	=	105.0
Angle of Internal Friction	=	32°
Active Stress Coefficient, K_a	=	.31
Passive Stress Coefficient, K_p	=	3.25
At-Rest Stress Coefficient, K_o	=	.47

Factors of Safety are not applied to the above values. All backfill materials placed behind walls are presumed to be drained. Passive pressures within 4.0 feet of the surface should be omitted due to seasonal weather conditions.

The boring logs indicate subsurface water was not encountered in the bore holes at the time of the drilling operations and during the period of these readings. It is expected that fluctuations from the water levels recorded will occur over a period of time due to variations in rainfall, temperature, subsurface soil conditions, soil permeability and other factors not evident at the time of the water level measurements.

SEISMIC CONSIDERATIONS

Seismic Site Class is based on the average properties of subsurface materials to a depth of 100 feet below the ground surface. Based on the soil conditions encountered in Geocon's report and using the LRFD Seismic Soil Site Class Definition, a Site Class C was determined by Geocon.

The proposed new bridge is located in Seismic Performance Zone (SPZ) 1 with a risk category of II. The design spectral acceleration at 1.0 sec (S_{D1}) = 0.066 g and the design spectral acceleration at 0.2 sec (S_{Ds}) = 0.098 g.

SETTLEMENT

The existing soils are expected to undergo some small degree of long-term settlement as the soils consolidate under loading. A preliminary estimate based upon initial design information suggests that post-construction total and differential settlement of bridge abutments could be in the range of 0.75 inches and 0.50 inches respectively. Variations in supporting soil strength will likely increase the magnitude of total and differential settlement. Minimal settlement is expected for any new embankments constructed provided they are constructed in accordance with the IDOT Standard Specifications.

DEWATERING

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can likely be removed to depths of several feet by standard sump and pump operations. Soils exposed at foundation, slab or undercut elevations should not be permitted to become saturated. Loss of bearing strength and stability may occur, requiring additional soil excavation.

Cohesive soils, non-cohesive soils and others can be unstable when saturated. These soils tend to cave or run when submerged or disturbed. The stability of exposed embankments is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary at all times, particularly when excavations extend below anticipated water levels and below saturated soils.

The contractor should be made responsible for designing and constructing stable temporary excavations. Also, the contractor should shore, slope, bench or restrain the sides of the

excavations as required to maintain stability of both the excavation sides and bottom. In no case, should the slope, slope heights, or excavation depth exceed those in the local, state, and federal safety regulations.

CONCLUSION

The information within this report is intended to provide initial information concerning subsurface soil and water conditions on the site. Variations in subsurface conditions are expected to be present between boring locations due to naturally changing and filled soil conditions. Our understanding of the proposed improvements is based on information available to us at the writing of this report.

If you have any questions concerning the findings or recommendations presented in this report, please let us know.

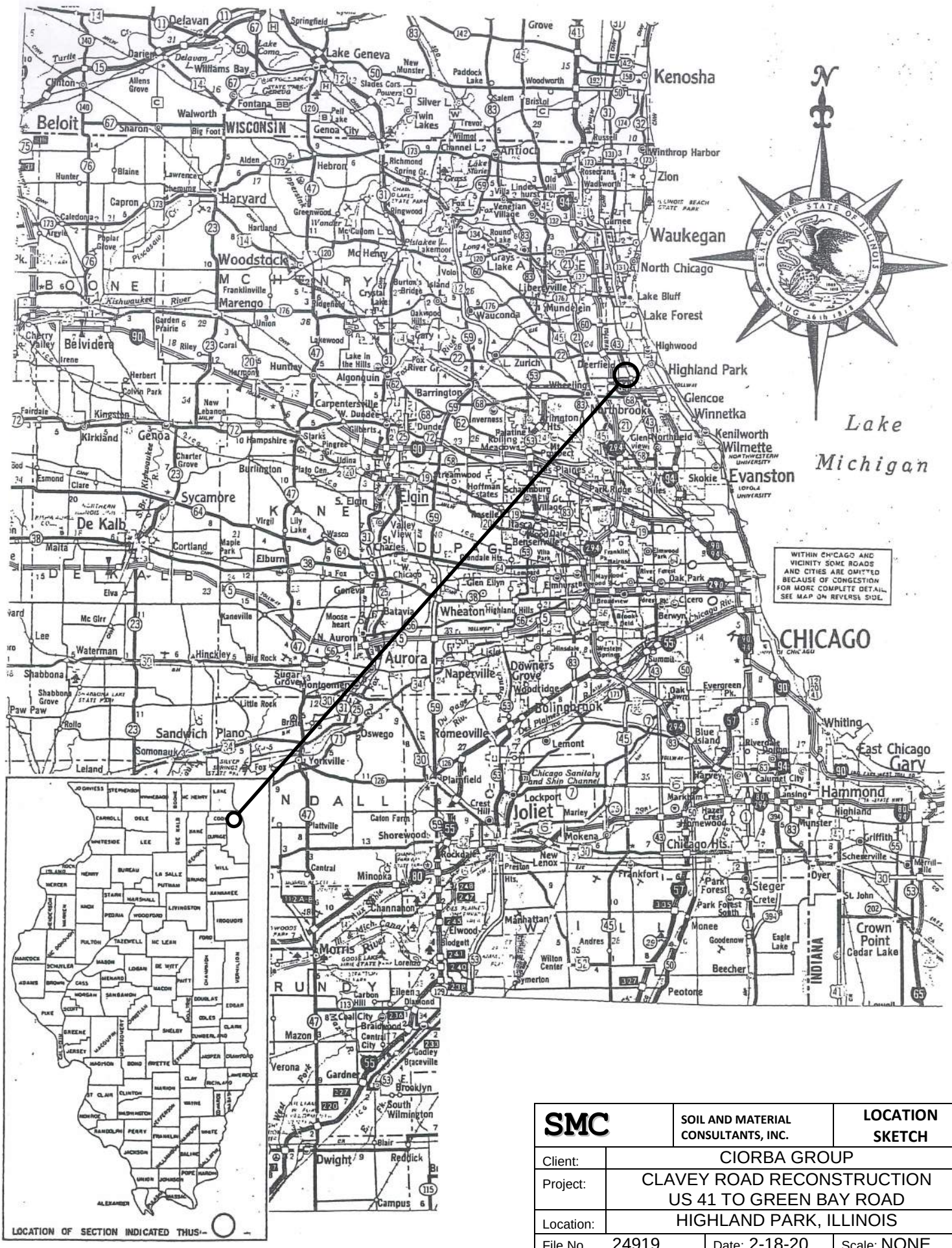
Very truly yours,

SOIL AND MATERIAL CONSULTANTS, INC.

Reid T. Steinbach, P.E.
Project Engineer

Thomas P. Johnson, P.E.
President

Enc.



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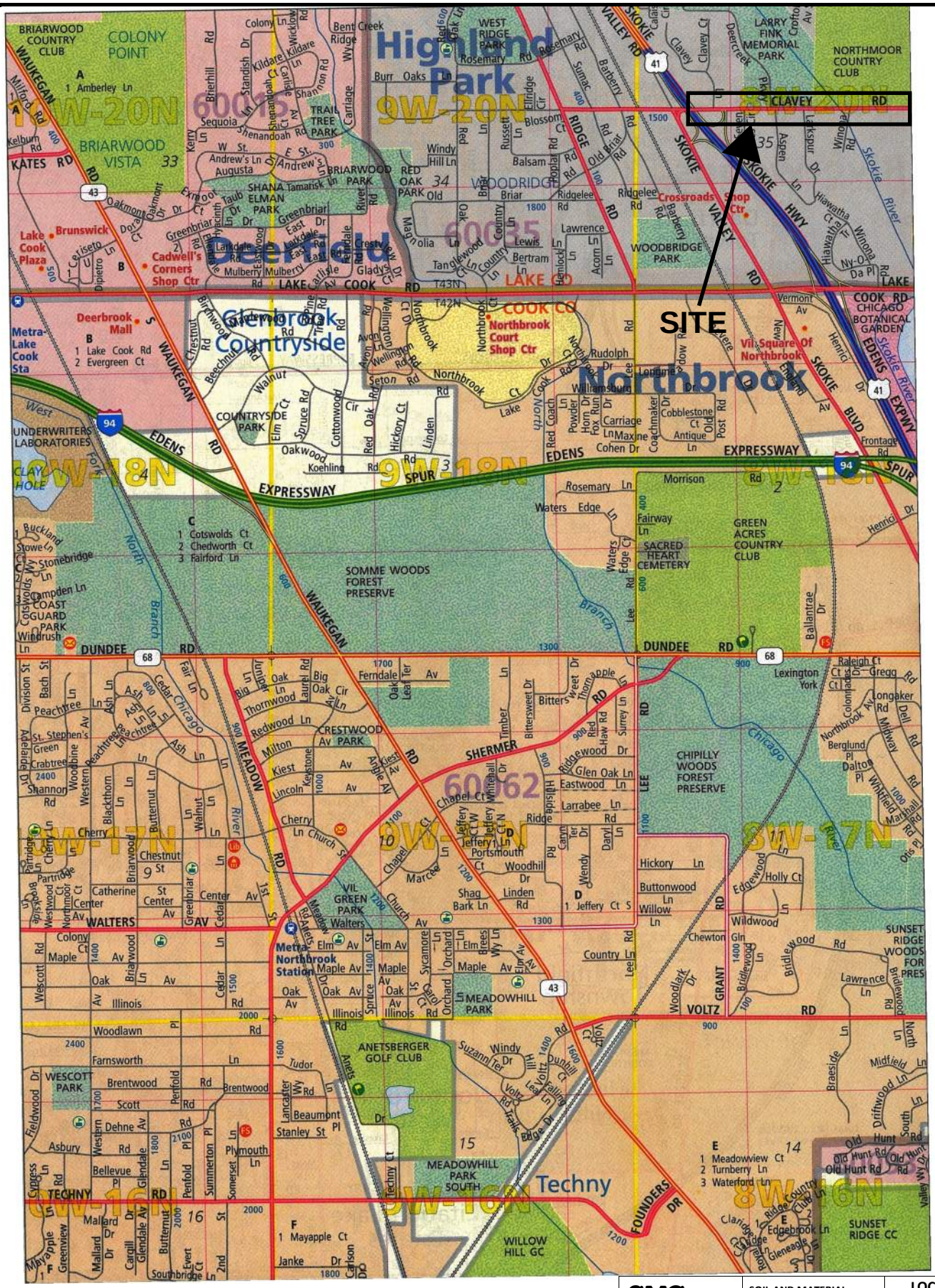
Client:	CIORBA GROUP	
Project:	CLAVEY ROAD RECONSTRUCTION US 41 TO GREEN BAY ROAD	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 24919	Date: 2-18-20	Scale: NONE



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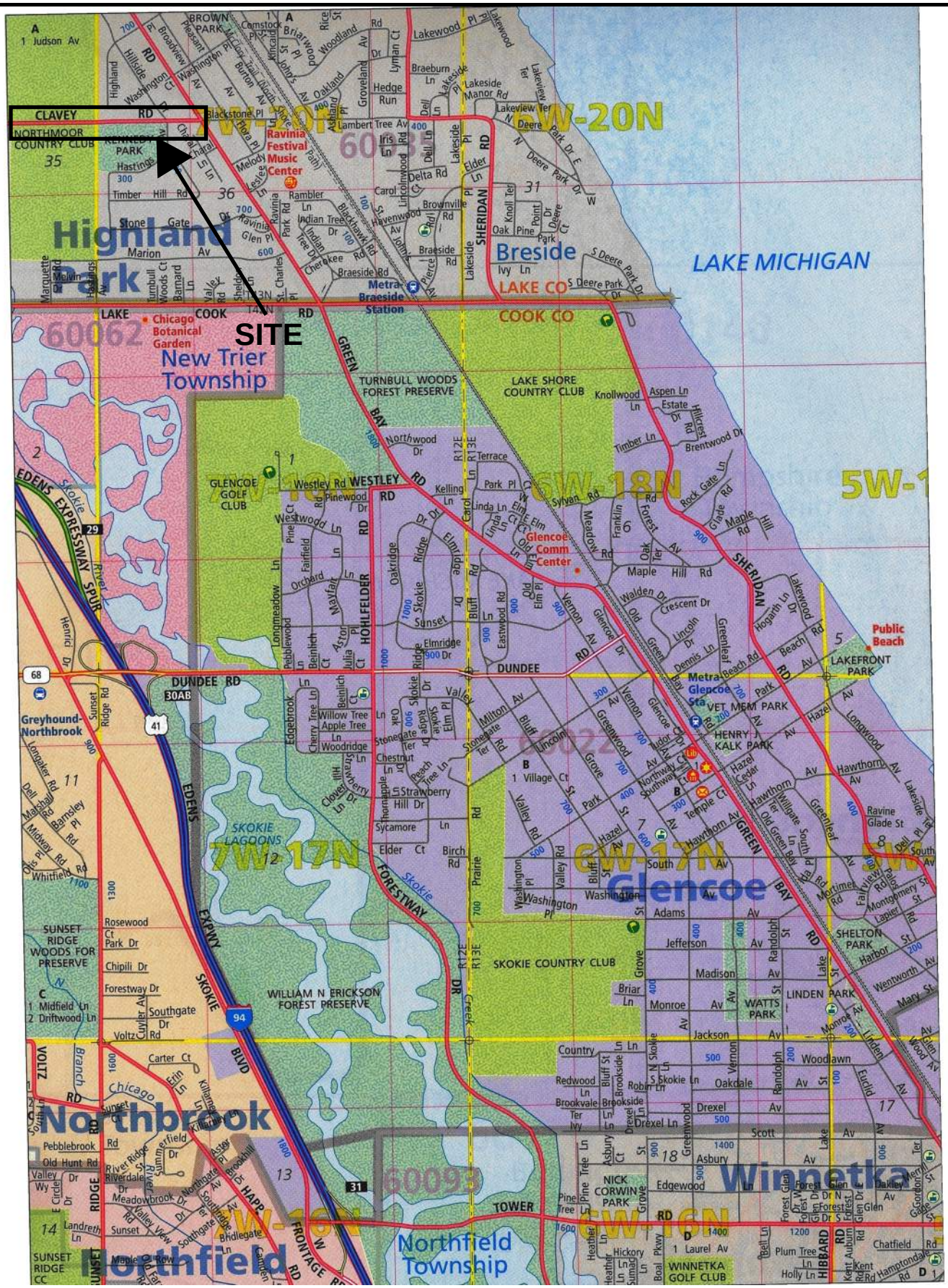
SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
Client:	CIORBA GROUP	
Project:	CLAVEY ROAD RECONSTRUCTION US 41 TO GREEN BAY ROAD	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 24919	Date: 2-18-20	Scale: 1" ≈ 2000'



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File No. 24919	Date: 2-18-20	Scale: 1" ≈ 2000'

N

SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
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File No. 24919	Date: 2-18-20	Scale: NONE

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FIGURE 1
SITE VICINITY MAP
Clavey Road Bridge over Skokie River
Highland Park, Illinois

PROJECT NUMBER:
17-G0411

DATE: June 2017

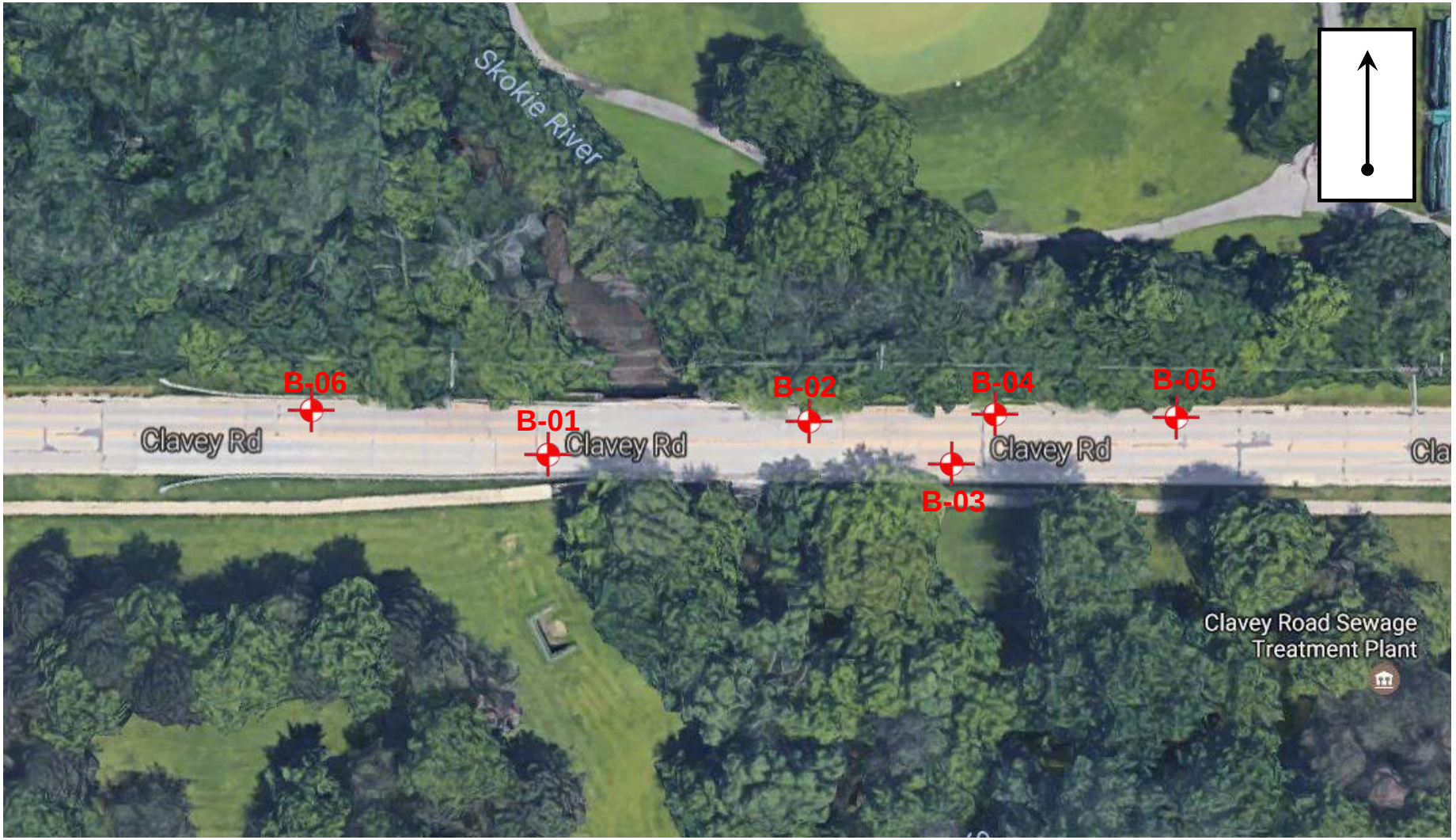

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FIGURE 2
BORING LOCATION DIAGRAM
Clavey Road Bridge over Skokie River
Highland Park, Illinois

PROJECT NUMBER: 17-G0411

DATE: April 2017

BORING NO. B-01

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	636.9	0-5" CONCRETE PAVEMENT											
	636.4	5-11" AGGREGATE BASE											
		mottled blue and gray CLAY FILL with gravel very stiff, moist	SS 1	56	5-3-7 (10)	2.0		17.3					
			SS 2	44	9-5-6 (11)	3.5	3.6	14.7					
5			SS 3	56	6-4-5 (9)	2.5	2.6	19.2					
	629.4	black BURIED TOPSOIL (A-8) medium stiff, moist	SS 4	44	1-2-4 (6)			56.3		7.4			
10	627.4	mottled brown and gray CLAY (A-6) soft, moist	ST 5	25		0.5	0.43	26.8	102.0				
			SS 6	56	2-1-2 (3)	0.5		28.1			28	14	14
15	622.4	gray SILTY LOAM (A-4) stiff, moist	SS 7	67	6-7-6 (13)	2.0	2.0	16.2					
	619.4												

COMPLETION DEPTH 100 ft **GROUND ELEVATION** 637.36 ft

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River
PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois
DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist											
				SS 8	78	4-8-12 (20)	3.5	3.2	13.2					
20														
				SS 9	78	5-10-16 (26)	2.5	2.4	17.6					
				ST 10	44		2.0	0.33	18.4	118.4				
25	612.4													
				SS 11	44	9-10-8 (18)			13.9					
	611.4		gray SILTY LOAM (A-4) with gravel dense, moist											
			brown CLAY (A-6) stiff, moist	SS 12	67	5-6-6 (12)	1.5	2.0	18.1					
				SS 13	89	6-6-7 (13)	1.5	1.7	16.7					
30														
				ST 14	92		2.0		15.4					
				SS 15	78	6-6-8 (14)	2.0	1.8	19.0					
35														
				SS 16	78	6-7-7 (14)	1.75	1.7	21.4					
40														

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			brown CLAY (A-6) stiff, moist *(continued)*											
	593.9													
45			brown CLAY (A-6) very stiff, moist	SS 17	78	6-8-9 (17)	2.5	2.0	19.9					
50				SS 18	89	5-10-14 (24)	3.0	3.3	19.8					
55				SS 19	78	6-10-15 (25)	3.0	3.1	21.4					
	578.9													
60			gray CLAY (A-6) very stiff, moist	SS 20	89	4-5-5 (10)	1.5	1.6	24.7					

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
65				SS 21	89	3-6-6 (12)	1.5	1.2	13.2					
70	567.4			SS 22	78	4-5-6 (11)	1.5	1.7	19.7					
			gray CLAY (A-6) very stiff to hard											
75				SS 23	100	9-50/2"	2.0		14.2					
80				SS 24	56	10-14-16 (30)	2.5		14.0					
85				SS 25	67	16-25-19 (44)	4.5	4.5	13.9					

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GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/17/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
85			gray CLAY (A-6) very stiff to hard *(continued)*											
90				SS 26	67	14-19-17 (36)	4.5	4.0	11.7					
95				SS 27	56	15-19-31 (50)	4.5	4.5	13.2					
100	537.4			SS 28	67	17-25-38 (63)	4.5		12.7					
			Bottom of borehole at 100.0 feet.											

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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BORING NO. B-02

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois

DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	638.1		0-5" CONCRETE PAVEMENT											
	637.7		5-10" AGGREGATE BASE											
			black CLAY FILL with gravel stiff, moist	SS 1	44	4-5-6 (11)			72.0					
	635.6													
			brown GRAVEL FILL dense, moist	SS 2	56	9-19-13 (32)			14.7					
5	632.6													
			brown CLAY FILL stiff, moist	SS 3	67 (6)	3-3-4 (7)	1.5	1.3	21.9					
	630.6													
			black BURIED TOPSOIL (A-8) stiff, moist	ST 4	58		1.0		56.0					
10														
	626.6			SS 5	78	1-1-2 (3)			43.6					
	625.6		brown CLAY LOAM (A-6) soft, moist											
			gray CLAY (A-6) very soft, moist	SS 6	67	1-1-2 (3)	0.25	0.2	29.6					
15														
	622.6													
			gray CLAY (A-6) very stiff, moist	ST 7	63		2.0		15.9					

COMPLETION DEPTH 80 ft **GROUND ELEVATION** 638.56 ft

CAVE DEPTH ft **BACKFILL** Soil Cuttings

GROUND WATER LEVELS:

AT TIME OF DRILLING --- None

AT END OF DRILLING --- Dry upon completion

AFTER DRILLING ---

NOTES

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

GEOCON PROFESSIONAL SERVICES

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River
PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois
DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
20				SS 8	78	4-7-10 (17)	3.25	3.4	15.9			27	14	13
				SS 9	78	6-10-14 (24)	4.0	4.0	14.9					
25				SS 10	78	5-7-11 (18)	3.25	3.4	15.1					
				SS 11	78	7-7-10 (17)	3.0	3.1	16.6					
30				ST 12	96		3.0	2.42	17.4	116.1		28	15	13
				SS 13	89	6-10-10 (20)	2.25	2.3	16.8					
35				SS 14	89	4-7-7 (14)	2.25	2.1	19.5					
40				SS 15	100	4-8-9 (17)	2.5	2.5	14.6					

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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GEOCON PROFESSIONAL SERVICES

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			gray CLAY (A-6) very stiff, moist *(continued)*											
45				SS 16	78	5-8-8 (16)	2.5	2.9	20.9					
50				SS 17	78	6-9-11 (20)	2.25	2.2	22.1					
55	583.6			SS 18	78	5-9-10 (19)	2.25	2.6	20.5					
			gray CLAY (A-6) very stiff, moist											
60				SS 19	78	6-9-11 (20)	2.0	2.0	13.4					

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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DATE COMPLETED 4/18/17 **LOGGED BY** NJ/GL **DRILLING METHOD** 3.25 in. I.D. HSA

DEPTH (ft)	ELEVATION (ft.)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (Qp) (tsf)	UNC. STRENGTH (Qu) (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ORGANIC CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
			gray CLAY (A-6) very stiff, moist *(continued)*											
65				SS 20	78	5-10-11 (21)	2.25	2.0	14.7					
70				SS 21	67	10-16-20 (36)	2.5	2.2	14.2					
75				SS 22	67	13-18-19 (37)	3.5	2.9	14.8					
80	558.6			SS 23	67	13-20-26 (46)	3.5	2.9	14.3					
			Bottom of borehole at 80.0 feet.											

Lines of Demarcation represent an **approximate** boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes.

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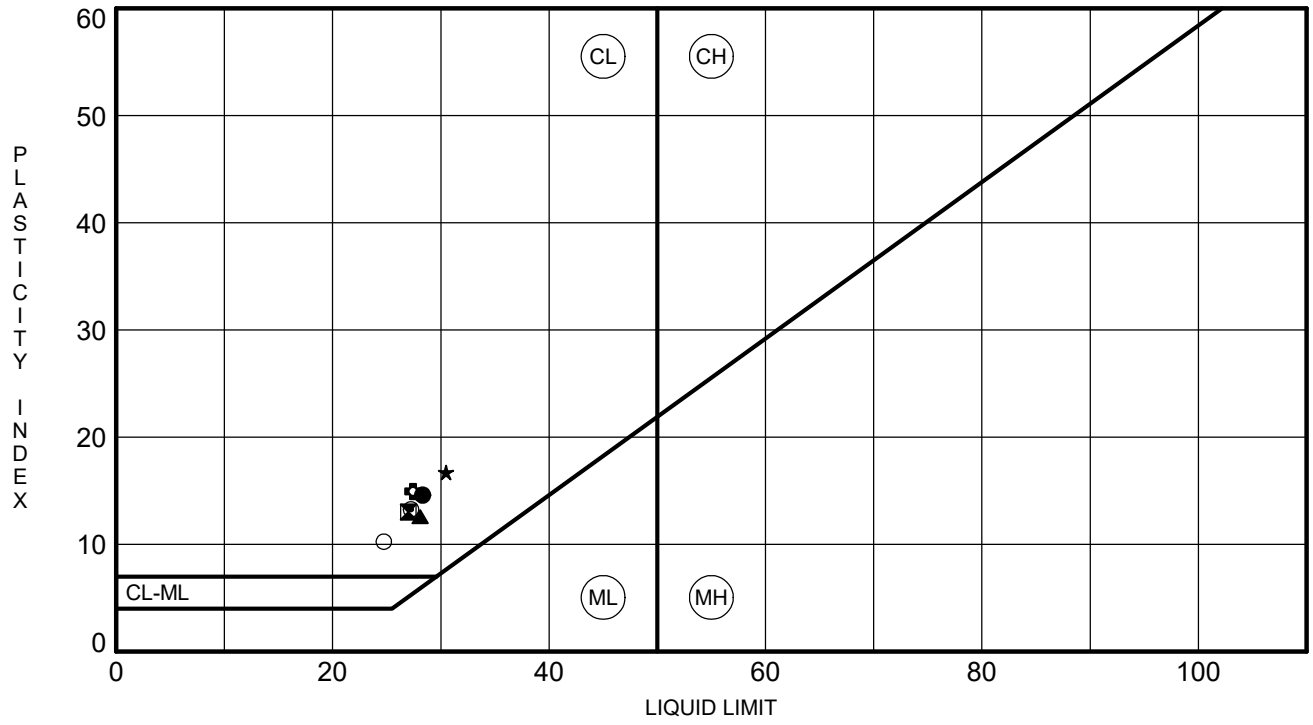
ATTERBERG LIMITS RESULTS

PRINT DATE 5/30/2017

CLIENT Robinson Engineering, Ltd.
PROJECT NAME Clavey Road over Skokie River
PROJECT NUMBER 17-G0411
PROJECT LOCATION Highland Park, Illinois



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-01**	**13.5**	**28**	**14**	**14**		**mottled brown and gray CLAY (A-6)**
⊠	**B-02**	**18.5**	**27**	**14**	**13**		**gray CLAY (A-6)**
▲	**B-02**	**28.5**	**28**	**15**	**13**		**gray CLAY (A-6)**
★	**B-03**	**11.0**	**30**	**14**	**16**		**mottled brown and gray CLAY (A-6)**
⊙	**B-03**	**23.5**	**27**	**14**	**13**		**gray CLAY (A-6)**
✿	**B-05**	**28.5**	**27**	**12**	**15**		**gray CLAY (A-6)**
○	**B-05**	**33.5**	**25**	**14**	**11**		**gray CLAY (A-6)**

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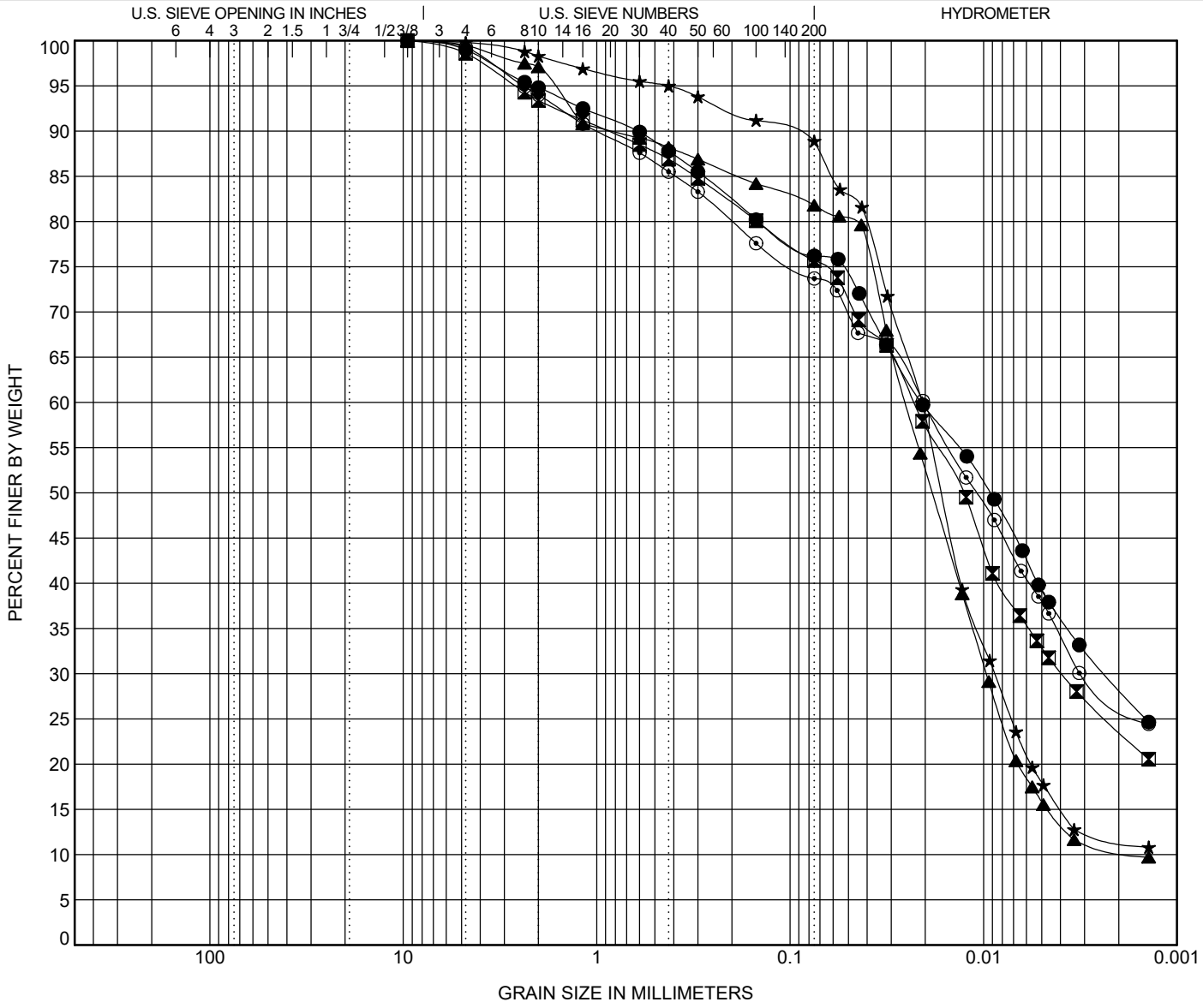
GRAIN SIZE DISTRIBUTION

PRINT DATE 5/30/2017

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-01**	**18.5**	**gray CLAY (A-6)**					
⊠	**B-02**	**30.0**	**gray CLAY (A-6)**					
▲	**B-03**	**13.5**	**brown SILT LOAM (A-4)**				**2.33**	**15.69**
★	**B-03**	**16.0**	**brown SILT LOAM (A-4)**					
⊙	**B-05**	**23.5**	**gray CLAY (A-6)**					

	BOREHOLE	DEPTH	D100	D60	D50	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-01**	**18.5**	**9.5**	**0.021**	**0.009**		**1.0**	**22.8**	**37.0**	**39.2**
⊠	**B-02**	**30.0**	**9.5**	**0.023**	**0.013**		**1.4**	**22.9**	**42.8**	**32.9**
▲	**B-03**	**13.5**	**9.5**	**0.025**	**0.018**	**0.002**	**0.5**	**17.7**	**66.0**	**15.8**
★	**B-03**	**16.0**	**9.5**	**0.021**	**0.017**		**0.2**	**10.9**	**70.9**	**18.0**
⊙	**B-05**	**23.5**	**9.5**	**0.02**	**0.011**		**0.7**	**25.6**	**35.8**	**37.9**

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GRAIN SIZE DISTRIBUTION

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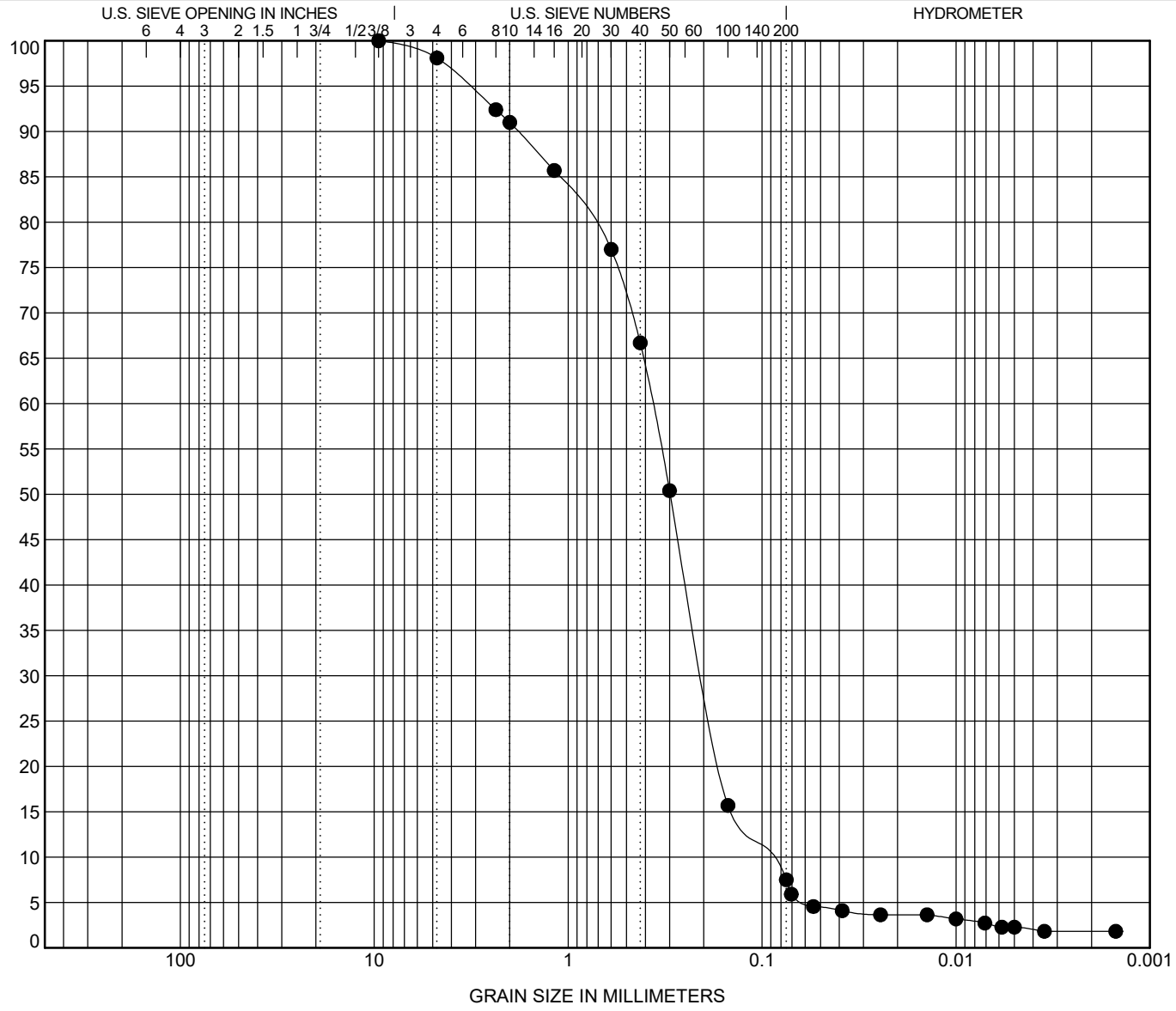

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-06**	**6.0**	**brown FINE SAND (A-3)**				**1.17**	**3.98**

	BOREHOLE	DEPTH	D100	D60	D50	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-06**	**6.0**	**9.5**	**0.368**	**0.298**	**0.093**	**1.9**	**90.6**	**5.2**	**2.3**

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UNCONFINED COMPRESSION TEST

GEOCON PROFESSIONAL SERVICES

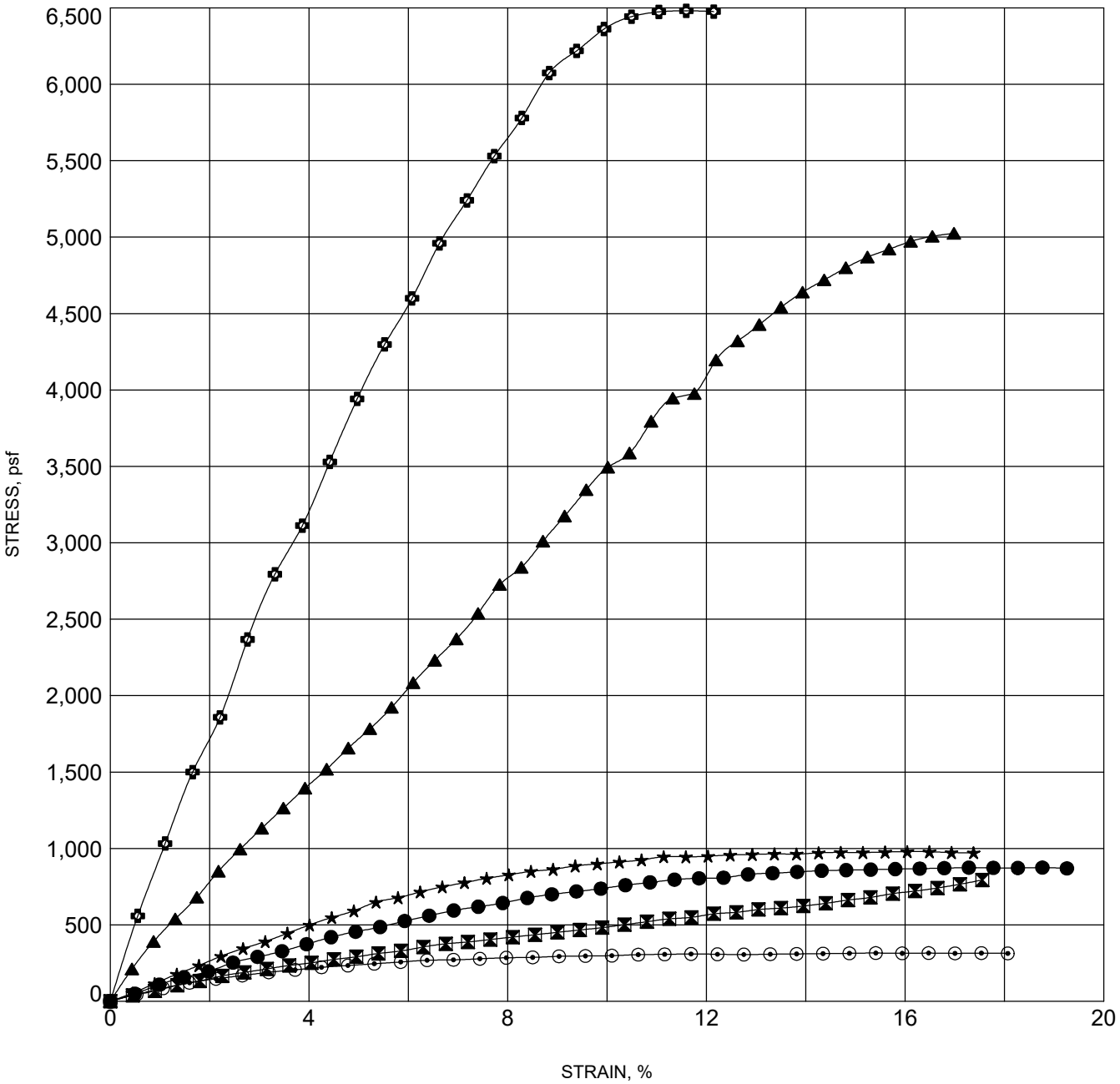
PRINT DATE 5/30/2017

CLIENT Robinson Engineering, Ltd.

PROJECT NAME Clavey Road over Skokie River

PROJECT NUMBER 17-G0411

PROJECT LOCATION Highland Park, Illinois



BOREHOLE		DEPTH	Unc. Comp. (psf)	γ_d (pcf)	MC%
●	B-01	11.0	860	102.0	26.8
⊠	B-01	23.0	670	118.4	18.4
▲	B-02	28.0	4830	116.1	17.4
★	B-04	8.0	970	91.5	31.4
⊙	B-04	11.5	310	94.2	36.1
✿	B-05	13.0	6480	251.1	19.2

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UNCONFINED COMPRESSION TEST

GEOCON PROFESSIONAL SERVICES

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CLIENT Robinson Engineering, Ltd.

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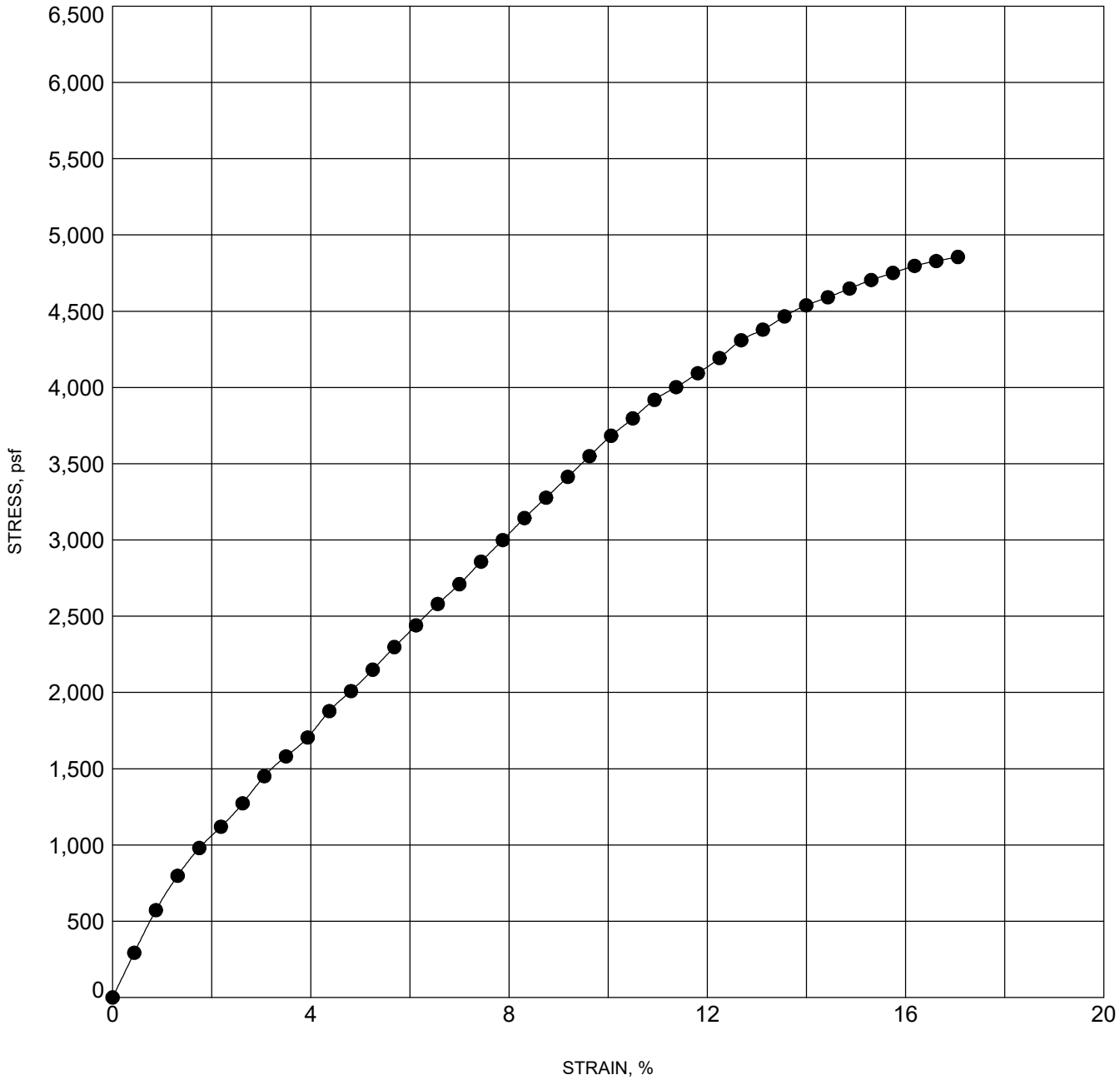
PROJECT NUMBER 17-G0411

PROJECT LOCATION Highland Park, Illinois



BOREHOLE	DEPTH	Unc. Comp. (psf)	γ_d (pcf)	MC%
● **B-05**	**21.0**	**4670**	**120.2**	**13.9**

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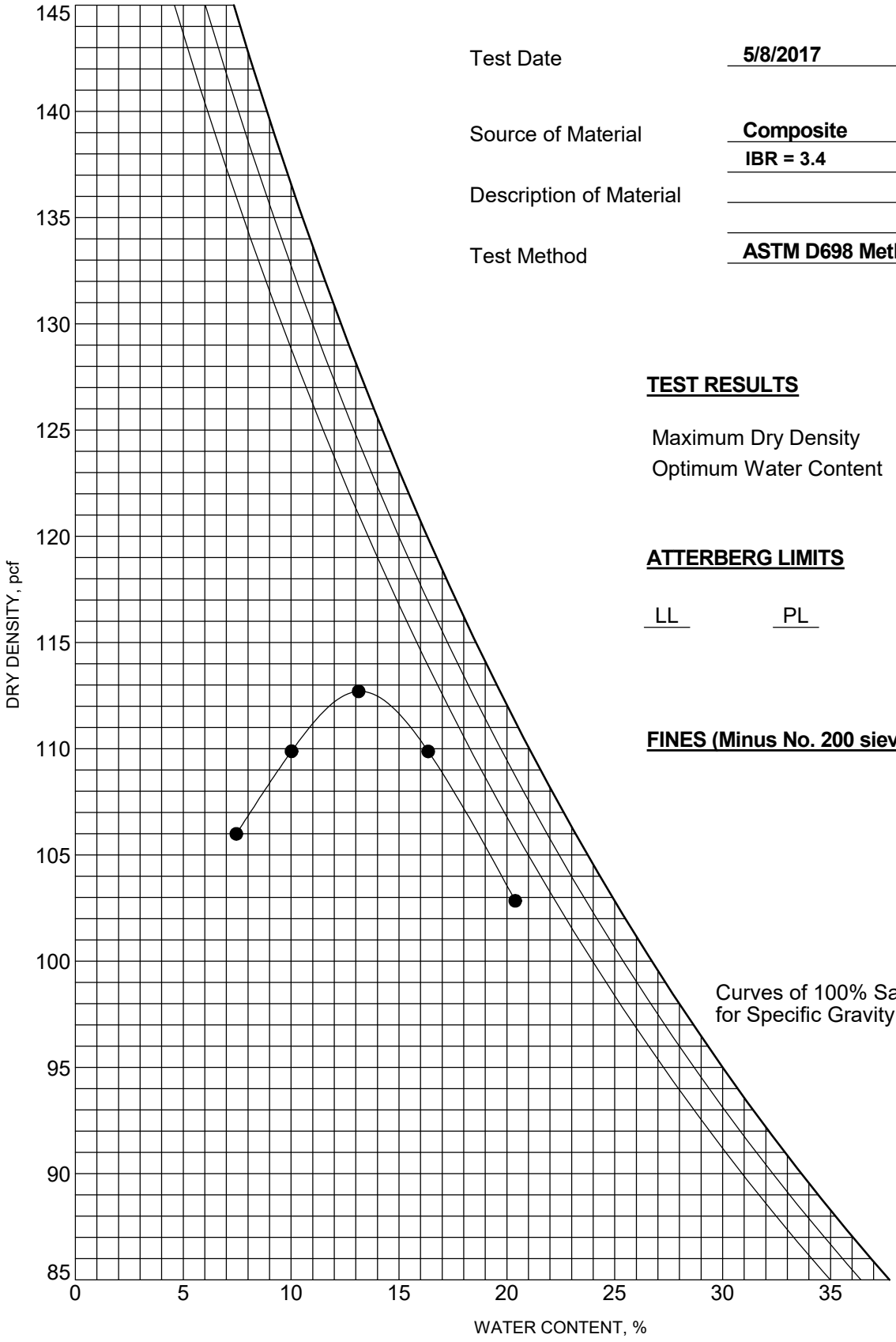
MOISTURE-DENSITY RELATIONSHIP

PRINT DATE 6/1/2017

CLIENT Robinson Engineering, Ltd. **PROJECT NAME** Clavey Road over Skokie River

PROJECT NUMBER 17-G0411 **PROJECT LOCATION** Highland Park, Illinois



Test Date **5/8/2017**

Source of Material **Composite**

IBR = 3.4

Description of Material

Test Method **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density **112.7 PCF**

Optimum Water Content **13.1 %**

ATTERBERG LIMITS

LL PL PI

FINES (Minus No. 200 sieve)

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GPS STD DATA TEMPLATE.GDT - 6/1/17 11:47 - C:\USERS\JKOOY\DOCUMENTS\GINT PROJECTS\17-G0411 CLAVEY ROAD BRIDGE OVER SKOKIE RIVER REL.GPJ

9370 W. Laraway Road, Suite D Frankfort, IL 60423 Phone 815-806-9986 Fax 815-464-8691

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====17-G0411 Clavey Road Bridge over Skokie River

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	622	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-01	
Top of Boring Elev.	637.4	ft.
Approximate Fixity Elev.	615	ft.

Individual Site Class Definition:

N (bar): 23 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 2.53 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	634.9	2.50	10	2.00	
	632.4	2.50	11	3.50	
	629.4	3.00	9	2.60	B
	627.4	2.00	6		B
	624.9	2.50		0.43	
	622.4	2.50	3	0.50	B
	619.4	3.00	13	2.00	B
	616.9	2.50	20	3.20	
0.6	614.4	2.50	26	2.40	
2.6	612.4	2.00		0.33	B
3.6	611.4	1.00	18		B
6.1	608.9	2.50	12	2.00	
9.1	605.9	3.00	13	1.70	
12.1	602.9	3.00		2.00	
15.1	599.9	3.00	14	1.80	
20.1	594.9	5.00	14	1.70	
25.1	589.9	5.00	17	2.00	
30.1	584.9	5.00	24	3.30	
35.1	579.9	5.00	25	3.10	
40.1	574.9	5.00	10	1.60	
45.1	569.9	5.00	12	1.20	
50.1	564.9	5.00	11	1.70	
55.1	559.9	5.00	30	2.00	
60.1	554.9	5.00	30	2.50	
65.1	549.9	5.00	44	4.50	
70.1	544.9	5.00	36	4.00	
75.1	539.9	5.00	50	4.50	
100.0	515.0	24.90	63	4.50	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	622	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-02	
Top of Boring Elev.	638.6	ft.
Approximate Fixity Elev.	615	ft.

Individual Site Class Definition:

N (bar): 22 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 2.54 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	635.6	3.00	11		B
	632.6	3.00	32		B
	630.6	2.00	7	1.30	B
	626.6	4.00		1.00	B
	625.6	1.00	3		B
	622.6	3.00	3	0.20	B
	620.1	2.50		2.00	
	617.6	2.50	17	3.40	
	615.1	2.50	24	4.00	
2.4	612.6	2.50	18	3.40	
4.9	610.1	2.50	17	3.10	
7.4	607.6	2.50		2.42	
9.9	605.1	2.50	20	2.30	
14.9	600.1	5.00	14	2.10	
19.9	595.1	5.00	17	2.50	
24.9	590.1	5.00	16	2.90	
29.9	585.1	5.00	20	2.20	
34.9	580.1	5.00	19	2.60	
39.9	575.1	5.00	20	2.00	
44.9	570.1	5.00	21	2.00	
49.9	565.1	5.00	36	2.20	
54.9	560.1	5.00	37	2.90	
100.0	515.0	45.10	46	2.90	B

Substructure 3

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

Individual Site Class Definition:

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

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

Substructure 4

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

Individual Site Class Definition:

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

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

Global Site Class Definition: Substructures 1 through 2

N (bar): 23 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 2.54 (ksf) Soil Site Class C <----Controls

Pile Design Table for West Abutement utilizing Boring #1

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
178	31	37
218	53	42
256	74	47
282	88	52
303	100	57
328	113	62
356	129	67
389	147	72
Metal Shell 14"Φ w/.25" walls		
211	38	37
260	65	42
304	89	47
332	104	52
356	118	57
385	134	62
419	152	67
458	174	72
Metal Shell 14"Φ w/.312" walls		
211	38	37
260	65	42
304	89	47
332	104	52
356	118	57
385	134	62
419	152	67
458	174	72
Metal Shell 16"Φ w/.312" walls		
245	46	37
303	77	42
354	105	47
382	121	52
409	136	57
443	155	62
482	176	67
528	201	72
Metal Shell 16"Φ w/.375" walls		
245	46	37
303	77	42
354	105	47
382	121	52
409	136	57
443	155	62
482	176	67
528	201	72
Steel HP 8 X 36		
144	43	47
155	50	52
166	56	57
181	64	62
197	72	67
216	83	72
255	105	77
255	105	82
273	114	87

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
156	42	42
182	56	47
193	62	52
206	70	57
224	80	62
244	91	67
268	104	72
321	133	82
Steel HP 10 X 57		
160	43	42
186	58	47
197	64	52
210	71	57
229	81	62
250	93	67
274	106	72
328	136	82
354	150	87
382	165	92
Steel HP 12 X 53		
155	33	37
196	55	42
226	71	47
236	77	52
250	85	57
273	98	62
298	112	67
328	128	72
397	166	82
Steel HP 12 X 63		
156	33	37
198	56	42
228	72	47
238	78	52
253	86	57
276	99	62
301	113	67
331	129	72
401	168	82
435	186	87
472	207	92
Steel HP 12 X 74		
159	34	37
201	57	42
231	73	47
241	79	52
256	87	57
280	100	62
305	114	67
336	131	72
407	170	82
442	189	87
480	210	92

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
161	34	37
204	58	42
235	75	47
245	80	52
259	88	57
283	102	62
309	116	67
341	133	72
413	173	82
449	192	87
487	214	92
Steel HP 14 X 73		
189	42	37
242	71	42
276	90	47
284	94	52
300	103	57
329	119	62
360	135	67
397	156	72
485	204	82
530	229	87
Steel HP 14 X 89		
192	42	37
245	72	42
280	91	47
288	95	52
304	104	57
333	120	62
364	137	67
401	158	72
491	207	82
538	233	87
587	260	92
Steel HP 14 X 102		
194	43	37
248	73	42
284	92	47
291	96	52
307	105	57
337	122	62
368	139	67
406	160	72
497	210	82
545	236	87
595	264	92
Steel HP 14 X 117		
197	44	37
252	74	42
287	94	47
294	98	52
311	107	57
341	123	62
372	140	67
411	162	72
504	213	82
552	239	87
603	267	92
Precast 14"x 14"		
226	25	32

Pile Design Table for East Abutment utilizing Boring #2

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.25" walls		
238	43	37
269	60	42
303	79	47
332	95	52
360	110	57
391	127	62
Metal Shell 14"Φ w/.25" walls		
239	29	32
283	53	37
317	72	42
358	94	47
390	112	52
424	131	57
Metal Shell 14"Φ w/.312" walls		
239	29	32
283	53	37
317	72	42
358	94	47
390	112	52
424	131	57
459	150	62
503	174	67
546	198	72
Metal Shell 16"Φ w/.312" walls		
278	36	32
329	64	37
367	85	42
414	111	47
450	130	52
488	151	57
529	174	62
580	202	67
629	229	72
Metal Shell 16"Φ w/.375" walls		
278	36	32
329	64	37
367	85	42
414	111	47
450	130	52
488	151	57
529	174	62
580	202	67
629	229	72
Steel HP 8 X 36		
159	46	47
174	54	52
190	62	57
207	72	62
228	83	67
248	94	72

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 42		
175	45	42
200	58	47
217	68	52
236	78	57
257	90	62
284	105	67
309	118	72
Steel HP 10 X 57		
179	46	42
204	60	47
221	69	52
241	80	57
263	92	62
290	107	67
315	121	72
Steel HP 12 X 53		
196	46	37
216	57	42
246	73	47
265	84	52
288	97	57
314	111	62
348	130	67
378	146	72
Steel HP 12 X 63		
198	46	37
218	57	42
248	74	47
268	85	52
291	98	57
317	112	62
352	131	67
381	147	72
Steel HP 12 X 74		
201	47	37
221	58	42
252	75	47
271	86	52
295	99	57
321	113	62
357	133	67
387	149	72

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 84		
204	48	37
224	59	42
256	77	47
275	87	52
299	100	57
326	115	62
361	135	67
392	152	72
Steel HP 14 X 73		
202	37	32
241	59	37
263	71	42
299	91	47
320	103	52
348	118	57
379	135	62
421	158	67
457	178	72
Steel HP 14 X 89		
204	38	32
244	60	37
266	72	42
303	92	47
324	104	52
352	119	57
383	137	62
427	160	67
462	180	72
Steel HP 14 X 102		
207	39	32
247	61	37
269	73	42
307	94	47
328	105	52
356	121	57
388	138	62
432	162	67
467	182	72
Steel HP 14 X 117		
210	40	32
251	62	37
272	74	42
311	95	47
332	107	52
360	122	57
392	140	62
437	164	67
473	184	72
Precast 14"x 14"		
257	19	27