ROADWAY GEOTECHNICAL REPORT

55th Street at LaGrange Road
Cook County, Illinois
Job No. D-91-126-12
PTB # 164-008

Prepared For:

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AASHTO	American Association of State Highway Transportation Officials
ASTM	American Society of Testing Materials
bgs	Below ground surface
bpf	Blows per foot
c_u	Undrained Cohesion
IDOT	Illinois Department of Transportation
IDH	Illinois Division of Highways
ksi	Kips per square inch
N_{60}	Blow counts corrected for hammer efficiency
$N1_{60}$	Blow counts corrected for hammer efficiency and overburden effects
NCDC	National Climatic Data Center
PVC	Polyvinyl Chloride
psi	Pounds per square inch
pci	Pounds per cubic inch
psf	Pounds per square foot
tsf	Tons per square foot
Q_u	Unconfined compressive strength
SPT	Standard Penetration Test
SSRBC	Standard Specifications for Road and Bridge Construction
TERS	Temporary Earth Retention System
φ	Angle of internal friction
γ	Moist soil unit weight
μ	Coefficient of friction
ε_{50}	Strain at one half the maximum principal stress difference
k_s	Soil modulus of elastic loading
k_c	Soil modulus of cyclic loading
K_a	Active earth pressure coefficient
K_p	Passive earth pressure coefficient
K_o	At-rest earth pressure coefficient

1.0 EXECUTIVE SUMMARRY

This report presents the findings and recommendations of a geotechnical investigation conducted in connection with the proposed improvements of 55th Street at LaGrange Road, located in the City of Countryside, west central portion of Cook County, Illinois (hereafter referred to as Project Site). The purpose of this project is to address safety and operational concerns of 55th Street and LaGrange Road.

The project includes roadway resurfacing and widening, intersection improvements to 55th Street and LaGrange Road with increased left turn lengths, right turn lanes added to the south, east, and west legs, a raised median along 55th Street from west of Madison Avenue to 7th Street and along LaGrange Road from south of 56th Street to south of Bob O'Link Road, traffic signal modernization, sidewalk and multi-use path improvements and installation of a 30-inch and a 60-inch storm sewer. The following is a summary of findings, conclusions and recommendations based on our investigation.

Surface Conditions: The surface conditions show the existing pavement typically consisting of 4 to 6 of Hot-Mix Asphalt (HMA) over a concrete base of up to 18 inches. 10 inches of aggregate base was encountered in Borings B-07 and B-09.

Subgrade Conditions: The subgrade soils along the proposed improvement consist of up to approximately 6 feet of fill materials comprising medium stiff to hard, brown to gray and black silty clay loam and medium dense poorly graded gravel. Below the fill and/or pavement, the subgrade soils include about 4 to 21 feet of mostly native medium stiff to hard silty clay to silty clay loam. Groundwater was encountered at depths ranging from 1 to 8 feet below existing grades (approximate elevations of 656 to 642 feet).

Subgrade Support Rating: Laboratory testing performed on selected subgrade samples shows a Subgrade Support Rating (SSR) of FAIR to POOR. Considering the worst subgrade conditions, we recommend that an SSR of POOR be used in pavement design. The pavement could also be designed using an Illinois Bearing Ratio (IBR) value of 2 based on correlations provided in the IDOT Geotechnical Manual.

Subgrade Improvements: Approximately 12 to 24 inches of subgrade improvement by removal and replacement with Aggregate Subgrade Improvement (ASI) material is proposed at three areas within the project limits. Subgrade improvement recommendations are provided for areas where unsuitable/unstable soils were encountered. Considering the relatively flatter slopes and small cut depths and fill heights of up to 2 feet, the proposed cut and fill sections should be stable, and no global stability analysis are considered necessary for embankments and cut sections. The fill areas will undergo less than 0.15 inches of long-term settlement.

Roadway Drainage: In general, the subgrade will exhibit poor to fair drainage characteristics. A storm sewer drainage system consisting of a 30-inch and a 60-inch storm sewer is proposed within the project limits to collect storm water and also for detention. We recommend installing longitudinal pipe underdrains below the pavement for the roadways to provide drainage for the pavement in the widening areas. Transverse drains are not needed in areas that will only be widened. Drains should also be installed in low areas and at the base of any undercuts. The underdrains should tie into storm sewer drainage system and should be installed per Article 601 of the IDOT Standard Specifications and consist of Type 2 underdrains (Adopted January 1, 2016).

2.0 INTRODUCTION

This report provides the results of a subsurface investigation, field and laboratory testing, geotechnical analyses and recommendations conducted in connection with the proposed improvements of 55th Street at LaGrange Road, in Cook County, Illinois (hereafter referred to as Project Site). The intersection is approximately 2 miles east of I-294 and 55th Street and approximately 2 miles north of I-55 and LaGrange Road.

See Exhibit 1 for general location of the Project Site.

The purpose of this investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations to support the design and construction of the proposed improvements.

3.0 PROJECT DESCRIPTION

Based on the information obtained from Burns & McDonnell Engineering Company (B&M), the purpose of this project is to address safety and operational concerns of 55th Street and LaGrange Road. The project includes roadway resurfacing and widening, intersection improvements to 55th Street and LaGrange Road with increased left turn lengths, right turn lanes added to the south, east, and west legs, a raised median along 55th Street from west of Madison Avenue to 7th Street and along LaGrange Road from south of 56th Street to south of Bob O'Link Road, traffic signal modernization, sidewalk and multi-use path improvements and installation of a 60-inch storm sewer.

4.0 GEOLOGICAL SETTING

The Project Site is located in the City of Countryside, west central portion of Cook County, Illinois. On the USGS West Chicago Quadrangle 7.5 Minute Series map, the Project Site extends through the S 1/2 of Section 9 and 16, in Township 38 North, Range 12 East of the Third Principal Meridian, Cook County, Illinois.

Himalayan reviewed the following published geologic data with emphasis on factors that might influence the design and construction of the proposed engineering works and, thus, to confirm the dependability and consistency of the present subsurface investigation results. For the study of the regional geologic framework, Himalayan considered northeastern Illinois area in general and Cook County in particular.

4.1 Physiography

Cook County is dominated by the Wheaton Morainal Country to the west with broad parallel ridges that encircle the Chicago Lake Plain and Lake Michigan to the east [Ref. 1]. The project area is situated between the Tinley Moraine and Glenwood Shoreline, which is the oldest stage of Lake Chicago

(~12,000 BCE). The relief within the Project Site is generally flat. In general, the existing surface elevation at the intersection is 650 feet and fluctuates generally between 645 and 655 feet along LaGrange Road and 55th Street. The Site and Regional Geology is illustrated in Exhibit 3, Appendix A [Ref. 2, 3].

4.2 Pedological Features

After the Wisconsin glaciation, several types of soils developed through weathering of glaciogenic sediments. In Cook County, the soil types were surveyed by the United States Department of Agriculture in 1979 and updated in 2011 [Ref. 4]. A summary of the USDA soil types present within the Project Site including their relevant geotechnical index properties and suitability as subgrade and road fill are shown in the Site Pedological Map and Table showing engineering and physical properties of soil (Exhibit 2). The soil information provided by USDA is meant to be used as a general reference in the absence of a site-specific investigation. In this instance, our findings regarding soil features affecting suitability for highway and street construction may not necessarily in agreement with the information presented in the exhibit.

4.3 Surficial Cover

The surficial cover in Cook County ranges from 0 to 275 feet thick and is the result of Wisconsin-age glacial activity [Ref. 5]. The glaciogenic deposits were emplaced during pulsating advances and retreats of an ice sheet lobe responsible for the formation of end moraines and associated low-relief till and lake plains [Ref. 6]. Glacial deposits at the Project Site are estimated to be 25 to 50 feet thick [Ref. 5]. End moraine deposits of the Wadsworth Formation may be encountered along the project alignment. These debris flow deposits are identified as relatively homogeneous, gray till with clay to silty clay loam matrix, with a high content of dolomite and shale clasts and occasional lenses of sorted and stratified silt, gravel, and sand. Underlying the Wadsworth Formation may also be the dense, silty loam diamicton of the Lemont Formation [Ref. 7].

From a geotechnical viewpoint, the Wadsworth Formation diamicton is characterized by moderate to low plasticity, medium to low moisture content, medium to hard consistency, poor permeability, and low compressibility. The Lemont Formation diamicton is characterized by high silt content, low moisture content and higher strength [Ref. 8].

4.4 Bedrock

More than half of the bedrock in Cook County is covered by glacial till from the Wadsworth Formation. This surficial cover rests unconformably on top of Silurian-age bedrock that dips eastward toward Lake Michigan. Bedrock at the Project Site consists mainly of pure to silty dolomite, and the bedrock surface lies approximately 85 feet below the ground surface (bgs). The Silurian dolomite is estimated to be 250 feet thick along the project alignment. Structurally, the Project Site is located on

the eastern flank of the Wisconsin Arch and the inactive Des Plaines Disturbance [Ref. 9]. No active faults or underground mines are known in the area.

Our subsurface investigation results fit into the local geologic context. The borings drilled at the Project Site encountered native sediments consisting predominantly of silty clay and silty clay loam diamicton interbedded with sporadic sand and gravel layers. None of the structure borings drilled at the Project Site encountered bedrock.

4.5 Climate Data

The subsurface investigation along the roadways was performed between February 24, 2020 to February 27, 2020. To assess the possible effects of temperature and precipitation on water table and soil moisture data, the climatic conditions for the roadway investigation period and three months prior to the start of investigation are summarized in a tabular format represented in Table 1. The precipitation and temperature data for the investigation period are compared against thirty-year monthly data (1981 to 2010) with calculated departure shown to illustrate deviations from "normal" climate conditions during the investigation. Local climatologic data were obtained from the O'Hare Station (NCDC 2019) [Ref. 10].

Table 1– Monthly Precipitation and Temperature Data 2019 to 2020

										Current Investation + 3 Month Prior			
		MAR	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**
Precipitation (in)	1981 to 2010	2.49	3.38	3.68	3.47	3.71	4.90	3.21	3.15	3.14	2.25	1.73	1.78
	2019 to 2020	2.09	6.02	8.25	3.05	3.94	3.63	7.61	6.76	1.87	1.55	2.80	0.77
	Departure	**-0.40**	**2.64**	**4.57**	**-0.42**	**0.23**	**-1.27**	**4.40**	**3.61**	**-1.27**	**-0.70**	**1.07**	**-1.01**
Mean Average Temperature (°F)	1981 to 2010	37.7	48.9	59.0	68.9	73.9	72.3	64.5	52.5	40.3	27.7	23.7	27.7
	2019 to 2020	34.3	49.7	58.0	67.8	77.1	72.9	69.4	50.9	34.8	34.0	30.1	30.2
	Departure	**-3.4**	**0.8**	**-1.0**	**-1.1**	**3.2**	**0.6**	**4.9**	**-1.6**	**-5.5**	**6.3**	**6.4**	**2.5**

Precipitation for the months prior to the start of our soil investigation period shows low to high average precipitation. The month of December and January shows a relatively high monthly mean temperature, and the month of November shows a relatively low monthly mean temperature.

No historic data was available to determine the climate condition influence on soil moisture content and water table levels. However, the low to high average precipitation before our investigation might have impacted the moisture content of the upper soil layers and the groundwater levels.

5.0 METHODS OF INVESTIGATION

5.1 Subsurface Investigation

On February 24, 26 and 27, 2020, Wang Testing Services (Wang) under contract with Himalayan advanced 20 borings designated as B-01 to B-20 at the Project Site. Himalayan staked out the boring locations at the Project Site in accordance with the boring location plan approved by B&M. Borings were advanced from existing ground to boring termination depths which ranged from 10 to 25 feet below existing grades. The borings were advanced from elevations of approximately 649 to 659 feet.

In Table 2, we provide a summary of the investigation areas with approximate stations and reference borings/depths from the subsurface investigation program.

Table 2 – Investigation Program Summary

Boring No.	Roadway	Station, Offset [1]	Depth (feet) [2]	Boring for
55th Street				
B-01	55th Street	90+19, 24' RT	10	Roadway
B-02	55th Street	93+01, 30' LT	10	Roadway
B-03	55th Street	96+00, 24, RT	10	Roadway
B-04	55th Street	99+06, 35' LT	20	Bedrock Profile
B-05	55th Street	101+00, 37' RT	10	Roadway
B-06	55th Street	104+99, 29' LT	20	Traffic Signal
B-07	55th Street	107+99, 25' RT	10	Roadway
B-08	55th Street	110+99, 16' LT	10	Roadway
B-09	55th Street	114+02, 35' RT	10	Roadway
B-10	55th Street	117+00, 26' LT	20	Bedrock Profile
B-11	55th Street	120+00, 20' RT	10	Roadway
LaGrange Road				
B-12	LaGrange Road	191+02, 24' LT	10	Roadway
B-13	LaGrange Road	188+10, 23' RT	10	Roadway
B-14	LaGrange Road	196+98, 24' LT	10	Roadway
B-15	LaGrange Road	194+02, 24' RT	10	Roadway
B-16	LaGrange Road	199+44, 88' RT	25	Traffic Signal
B-17	LaGrange Road	200+61, 21' RT	25	Traffic Signal
B-18	LaGrange Road	203+00, 25' LT	10	Roadway
B-19	LaGrange Road	206+01, 25' RT	10	Roadway
B-20	LaGrange Road	208+56, 24' LT	10	Roadway

Notes:
1. LT = Left. RT = Right
2. Depth measured below ground surface

Himalayan supervised the drilling and sampling activities, conducted field tests on soil samples and prepared field logs describing the soils. The split-spoon samples obtained from the drilling operations were visually classified in the field per IDH Textural Classification. Cohesive samples were tested for unconfined compressive strength (Q_u) using an IDOT modified RIMAC test device and/or calibrated

hand penetrometer in the field. Soil samples collected from each sampling interval were placed in sealed jars and transported to the Wang laboratory for further examination and laboratory testing.

Himalayan obtained the as-drilled northing and easting coordinates and boring elevations including the boring stationing and offsets using a survey grade GPS unit. The as-drilled boring locations are shown in the Boring Location Plan (Exhibit 4) and boring location data are presented on the Boring Logs (Appendix A).

Groundwater levels were measured while drilling and at completion of each boring. Upon completion of sampling and water level observations, all boreholes were properly backfilled with soil cuttings and/or bentonite chips for safety considerations. The ground surface was restored to its original condition and patched with asphalt.

5.2 Laboratory Testing

Soil samples were tested in accordance with IDOT procedures outlined in the IDOT Geotechnical Manual [Ref. 11]. Soil samples were tested in Wang laboratory for natural water content (AASHTO T265). Atterberg Limits (AASHTO T89 and T90), Particle Size Analyses (AASHTO T88), and Loss on Ignition (AASHTO T267) were performed on selected soil samples. The tested soils were classified according to the IDH and AASHTO classification systems. Field visual-manual classifications were verified in Wang's Laboratory. The results of the laboratory testing program are shown in the attached Boring Logs (Appendix A) and in Laboratory Test Results (Appendix B).

6.0 INVESTIGATION RESULTS

Detailed description of soil and groundwater conditions encountered at each boring location is shown on the Boring Logs (Appendix B). It should be noted that the soil stratification lines shown in the boring logs represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions. Soil profiles are presented as Exhibit 5.

6.1 Surface Conditions

The proposed alignments will be constructed through areas with various surficial covers, including pavement, topsoil, and sidewalk.

6.2 Soil Conditions

Below the surface, the general lithological soil profile at the Project Site consists of 1) fill materials (man-made ground); and 2) silty clay to silty clay loam

55th Street

Borings B-01 to B-11were drilled along the 55th Street alignment conducted on road through the pavement. In Table 3, we provide a summary of the topsoil and pavement thicknesses.

Table 3 – Pavement Thickness Summary

Boring	Pavement Thickness (inches)		
	HMA [1]	Concrete	Aggregate Base
B-01	4	10	--
B-02	14	--	--
B-03	4	10	--
B-04	5	9	--
B-05	4	10	--
B-06	5	9	--
B-07	4	--	10
B-08	5	9	--
B-09	4	--	10
B-10	5	10	--
B-11	4	10	--
Notes: 1. Hot-Mixed Asphalt			

1) Fill Materials

Beneath the surface up to 4 feet, fill was observed. The fill consisted of medium stiff to hard, brown to gray and black silty clay loam and medium dense poorly graded gravel. The unconfined compressive strength (Q_u) for the cohesive soils ranged from 0.87 to 4.5 tsf and the SPT N-value for the poorly graded gravel was 14. The natural moisture contents ranged from 9 to 24%.

2) Silty Clay to Silty Clay Loam

Beneath the fill, native stiff to hard silty clay to silty clay loam was encountered from a depth of 2 feet to the boring termination depths in most of the borings. Stiff to very stiff, gray to black, clay was encountered from 2 feet to 6 feet below ground surface in Boring B-09. The Q_u values for the soil samples ranged from 1.25 to 6.8 tsf. The natural moisture contents for the samples ranged from 20 to 27%. Laboratory testing on samples from this strata shows LL of 38 to 60%, PL of 17 to 20%, and with a PI value of 21 to 40%. The AASTHO classification for these soils ranged from A-6 to A-7-6.

LaGrange Road

Pavement borings B-12 through B-20 were drilled along the LaGrange roadway alignment. In Table 4, we provide a summary of the pavement thicknesses.

Table 4 – Pavement Thickness Summary

Boring	Pavement Thickness (inches)	
	HMA [1]	Concrete
B-12	12	12
B-13	12	12
B-14	5	12
B-15	6	18
B-16	6	12
B-17	6	6
B-18	4	15
B-19	6	12
B-20	6	12

Notes:
1. Hot-Mixed Asphalt

1) Fill Materials:

Beneath the surface up to 5.5 feet, fill was observed. The fill consisted of stiff to hard, gray to brown and black, silty clay loam with little to some gravel. The Q_u values for these soils ranged from 1.0 to 6.7 tsf and the natural moisture contents ranged from 11 to 29 %.

2) Silty Clay to Silty Clay Loam

Beneath the fill, native medium stiff to hard silty clay to silty clay loam was encountered from a depth of 4 feet to the boring terminating depths in most of the borings. Stiff, gray, gravelly clay was encountered from 4 to 6 feet below ground surface in Boring B-20.

The Q_u values for these soils ranged from 0.75 to 7.81 tsf. The moisture contents ranged from 11 to 37%. Laboratory testing on samples from this strata shows LL of 36 to 53%, PL of 17 to 18%, and PI of 19 to 36%. The AASTHO classification for these soils ranged from A-6 to A-7-6.

6.3 Groundwater Conditions

Groundwater was encountered along 55th Street in only three borings B-01. B-05 and B-07 at depths ranging from 1 to 8 feet bgs (approximate elevations 656 to 643 feet). Groundwater was encountered along LaGrange Road in only two borings B-17 and B-20 at depths ranging from 4 to 8 feet bgs (approximate elevations 647 to 642 feet).

Note that fluctuation in the groundwater levels should be anticipated due to the seasonal variation in precipitation, surface runoff and water levels in the drainage ditches.

7.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

Based on the project plan and profile provided by B&M (dated 4/13/2020), the new roadway alignments closely follow the existing ground elevations. No significant change in grade elevations and current embankment widths is anticipated along 55th Street and LaGrange Road to accommodate the proposed geometric improvements.

The new design includes embankment fills of up to 2 feet and cuts as deep as about 2 feet for adding lanes and matching of existing embankment slopes.

The results of our geotechnical analysis and recommendations are provided in the following sections.

7.1 Site Preparation

It is recommended that the existing topsoil, vegetation, pavements, and debris be stripped within the limits of the proposed improvements. For estimating purposes, the average thickness of topsoil to be stripped for roadway widening can be considered to be 6 inches. The actual thickness of topsoil needing removal should be determined in the field. It is recommended that the stripped topsoil be stockpiled, sorted, and reused for landscaping purposes.

As per IDOT District one guidelines, a shrinkage factor of 15% is recommended to estimate the borrow and furnished excavation quantities. For temporary drainage during construction, we recommend the Contractor create sufficient drainage to facilitate runoff and to prevent excess pooling of precipitation in the event of extended construction delays.

After the surface removal as described, the stability of the exposed subgrade should be immediately observed for the presence of any unsuitable/unstable soil to determine if remedial treatment is needed. The subgrade in the new pavement areas should be proof rolled to observe the amount of deflection and rutting under the wheels of heavy construction equipment such as a fully-loaded dump truck. Subgrade areas should be tested and evaluated according to the IDOT Subgrade Stability Manual [Ref. 12].

7.2 Proposed Pavement Structure

Based on the typical proposed cross section drawings provided by B&M, the proposed pavement structure to be used for widening of the roadways proposed for 55th Street and LaGrange Road will consist of Polymerized HMA surface course over PPC Pavement over Aggregate Subgrade.

The existing pavement consists of HMA Surface Course over concrete (Tables 3 and 4). Any additional subgrade improvements identified in this report will be beyond the base of the existing pavement.

7.3 Subgrade Soil Treatment and Recommendations

The new roadway pavement for the widening will be supported on the existing cohesive, cohesionless, or on new compacted fill material.

With the exception of limited areas within the project, the subgrade soils encountered at the anticipated subgrade elevations within the existing embankment have Qu values greater than 1.0 tsf for cohesive soils and N-values greater than 10 for cohesionless soils. The moisture contents for cohesive soils generally are less than 25% and liquid limit values below 50% with the exception of a few samples. In general, these subgrade soils will provide a stable working platform,

Soils encountered at the anticipated subgrade elevations in a few borings (B-09, B-11 and B-12) have moisture contents equal to or greater than 25% and/or Qu values of less than 1.0 tsf. Some of these soils are considered unsuitable and/or unstable and will require removal and replacement if new pavement will be built over the existing grades in these locations. We recommend providing geotechnical fabric for ground stabilization prior to backfilling by the replacement material. As per IDOT District One policy, we recommend that a provisional quantity of Aggregate Subgrade Improvement (ASI) material (CU YD) be included to be used to replace any unsuitable soils below the bottom of the improved subgrade layer that are encountered in the field during construction. The provisional quantity should be 25% of the planned full depth pavement areas assuming a thickness of 12 inches. This material should be added to the Schedule of Quantities (SOQ) for estimating purposes.

The actual need for removal and replacement with Aggregate Subgrade Improvement (ASI) 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 with Article 301.04 of the Standard Specifications for Road and Bridge Construction (SSRBC) and the undercut guidelines in the Subgrade Stability Manual [Ref 12,13]. 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.

The limits of the areas with unstable soils requiring subgrade treatment are summarized in Table 5.

Table 5 – Summary of Subgrade Treatment Recommendations

Boring/ Approx Station	Approx Station Limits (feet) [1]	Subgrade Description	Remedial Treatment [2,3,4]			Subgrade Concerns
			Type	Width	Depth / Elevation (feet)	
55th Street						
B-09 / 114+02	112+50 to 115+51	Stiff to very Stiff Clay	ASI/ Geofabric	Roadway Widening Width	1.0/648.6	Unsuitable Soils / High Shrink/Swell Potential Soils LL = 60% , w = 27%
B-11/ 120+00	118+50 to 120+41	Medium Stiff Silty Clay Loam (Fill)	ASI/ Geofabric	Roadway Widening Width	2.0/647.7	Low Bearing, Unstable / Unsuitable Soils Qu = 0.87 tsf, w = 24%
LaGrange Road						
B-12/ 191+02	189+56 to 192+52	Stiff Silty Clay Loam	ASI/ Geofabric	Roadway Widening Width	2.0/650.6	Unstable/Unsuitable Soils Organic Content = 15.5%, Qu = 1.5 tsf, w = 29%

Notes
1. Based on distance measured approximately halfway between the adjacent borings.
2. Undercuts, depths and elevations are at boring locations and are based on the thickness estimated from the bottom of the 12-inch aggregate subgrade improvement layer.
3.The base of the undercuts should extend away from the pavement at a minimum slope of 1:1 (V:H).

As per the above recommendations, two separate ASI line items in the SOQ should be 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 section.
- Aggregate Subgrade Improvement (SQ YD): This will be used in locations where there are undercuts (below the 12-inch improved subgrade layer) where poor soils were removed.

The ASI material associated with both of the above line items should be according to the District One Aggregate Subgrade Improvement Special Provision.

We also recommend including a plan quantity of Geotechnical Fabric Stabilization (SQ YD) equal to at least 25% of the planned pavement area in addition to the areas listed in the undercut table (Table 5). We recommend placing geotextile fabric at the base of the 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 the time of construction should be deleted from the contract with no extra compensation to the contractor.

The widened sections along 55th Street (Station 89+91 to 120+41) and LaGrange Road (Station 188+00 to 209+07) will be constructed on embankments with fill heights up to 2 feet. The embankments will be graded at slope of 1V:3H or gentler.

The frost depth for pavement design in northern Illinois is estimated to range from 45 to 60 inches [Ref. 11]. Based on the laboratory tests of the subgrade samples within the frost depths, the soils have silt and fine sand contents of more than 65% and had PI ranging from 19 to 40%. Additionally, groundwater was encountered within the top 6 feet in at least six borings although many of the borings were dry, potentially due to low permeable clayey soils encountered. Therefore, the subgrade soil will exhibit high frost susceptibility. Adequate drainage should be provided to alleviate any frost heave. Any highly moist soils, if not otherwise unsuitable or unstable, encountered within the exposed roadways subgrade should be disked or tilled, dried, and compacted before placing the new pavement structure.

7.4 Subgrade Support Rating

The proposed pavement will be supported on stiff to hard clayey soils, medium dense gravel or compacted borrow material. Laboratory testing performed on selected subgrade samples shows a Subgrade Support Rating of FAIR to POOR (Exhibit 6). Considering the worst subgrade conditions, we recommend that an SSR of POOR be used in pavement design. The pavement could also be designed using an Illinois Bearing Ratio (IBR) value of 2 based on correlations provided in the IDOT Geotechnical Manual [Ref. 11].

7.5 Roadway Drainage

The proposed subgrade and pavement should have proper surface grading to avoid stagnant water. The soils encountered beneath the proposed subgrade will exhibit poor to fair drainage characteristics. Most of the fill materials to be placed in support of roadway widening will likely be cohesive exhibiting poor drainage characteristics.

The proposed drainage system consists of a curb and gutter and storm sewer drainage system. A storm sewer drainage system consisting of a 30-inch and a 60-inch storm sewer is proposed within the project limits to collect storm water and also detention.

We recommend installing longitudinal pipe underdrains below the pavement for the roadways to provide drainage for the pavement in the widening areas. Transverse drains are not needed in areas that will only be widened. Drains should also be installed in low areas and at the base of any undercuts. The underdrains should tie into the storm sewer drainage system and should be installed per Article 601 of the IDOT Standard Specifications and consist of Type 2 underdrains (Adopted January 1, 2016).

7.6 Embankment and Cut Sections

The proposed construction of the roadway will have both fill and cut sections. The new design includes embankment fills of up to 2 feet and cuts as deep as about 2 feet for adding lanes and matching the existing grades. The embankments and cut sections will have side slopes of no steeper than 1:3 (V:H). We have evaluated long-term settlement and global slope stability of the cut and fill sections along the proposed 55th Street and LaGrange Road roadway alignments.

7.6.1 Settlement

We performed settlement analyses for four critical sections between Stations 114+02 to 120+00 along 55th Street (Boring B-09 and B-11) and between Stations 191+02 to 208+91 along LaGrange Road (Borings B-12 to B-20).

Our evaluations show estimated long-term settlements on the order of less than 0.15 inches.

Settlement analyses were performed using Rocscience Settle 3D computer program. Because consolidation tests were not performed, the consolidation soil parameters were estimated based on other index properties of soils.

7.6.2 Slope Stability Analysis

Considering the relatively flatter slopes and small cut and fill depths (maximum 2 feet), the proposed cut and fill sections should be stable, and no global stability analysis are considered necessary for embankments and cut sections. Per IDOT Geotechnical Manual, areas with a fill height or cut depth less than 15 feet will not require slope stability analysis.

7.7 Traffic Signal Structures

New traffic signals will be installed to accommodate the proposed lane configuration. These structures have high lateral (overturning) loadings primarily due to wind and usually are supported on shaft foundations. The IDOT standard foundation details (Highway Standard 878001-10) requires an average Qu of cohesive soils to be greater than 1.0 tsf for these structures.

The traffic signal structure Borings B-06, B-16 and B-17 encountered cohesive soils with average Qu of greater than 1.0 tsf. These soils meet the requirements of the standard details and the foundations for the proposed traffic signal structures can be designed using the standard details.

7.8 Excavation, Dewatering, and Utilities

The roadway excavations should be performed in accordance with local, state, and federal regulations. If excavations are equal or greater than 4 feet, the slopes should be graded, benched, or supported in accordance with the latest Occupational Safety and Health Administration (OSHA) safety standards

and requirements for temporary side slopes. Allowances should be made for any surcharge loads adjacent to the excavation areas. Movement of adjacent soils near the edge of and into excavation areas should be prevented and the potential effects of ground movements upon nearby utilities should be considered during construction. Temporary excavations should be sloped at no greater than 1:1.5 (V:H).

According to B&M, the maximum vertical excavations up to 12 feet bgs will be needed for utility construction that includes a 30-inch storm sewer drain (Station 193+00 to Station 199+20 along the median of LaGrange Road) and a 60-inch storm sewer drain (Station 98+00 to Station 120+45 mostly along the median of 55th Street). Therefore, a Temporary Earth Retention System (TERS) will be needed to maintain the existing roadways during construction. The cohesive soils encountered in the borings have Q_u values greater than 4.5 tsf. These soil strengths encountered exceed the limits for using the temporary sheet pile tables. The short term soil parameters provided in Table 6 can be used in design of the TERS.

Table 6 – Soil Design Parameters for Temporary Earth Retention System

Material	Unit Weight. γ (pcf)	Shear Strength Parameters			
		Short Term (Undrained)		Long Term (Drained)	
		c (psf)	ϕ (deg.)	c' (psf)	ϕ' (deg.)
Existing Embankment Fill- Cohesive	125	1,500	0	0	32
New Fill	125	1,000	0	0	28
Medium Stiff - Cohesive Q_u = 0.5 to 0.99 tsf	115	1,000	0	0	26
Stiff- Cohesive Q_u = 1 to 1.99 tsf	120	1,500	0	0	28
Very Stiff-Cohesive Q_u = 2 to 3.99 tsf	125	3,000	0	0	32
Hard-Cohesive $Q_u \geq 4$ tsf	130	4,000	0	0	34

The design of the TERS is the responsibility of the contractor.

Excavations required for cuts and undercutting will require dewatering due to shallow groundwater encountered within the top 4 feet in some borings and also due to the perched water table sometimes located above the excavation depths. The contractor should ensure proper surface grading to prevent the pooling of run off into open excavations. Any water entering the excavations should immediately be removed.

In general, we expect that groundwater seepage into the excavations within mostly cohesive soils could be controlled with sump pump and pit procedures. However, where excavations penetrate to water bearing granular soils and adjacent to low lying area(s), more extensive dewatering should be anticipated.

Drilled shaft excavations should be as per IDOT Special Provision GBSP-86 Drilled Shafts.

Boring B-17 encountered cohesive soils in saturated conditions with relatively high Q_u values (3.3 to 6.3 tsf) below a depth of 4.5 feet. The contractor should review the attached boring logs, evaluate the soil conditions and depths, and determine the means and methods necessary for construction.

7.9 Filling and Backfilling

The fill material should be free of organic matter and debris and should be compacted in accordance with the requirements of Section 205 of the SSRBC [Ref. 13]. The structural fill utilized to attain the final design elevations should satisfy the requirements of the SSRBC. The backfill materials must be as per the SSRBC.

7.10 Reuse of Excavated Material

Excavated soils and granular subbase materials from within the project limits may be reused in embankments if it meets requirements of Section 204 of the SSRBC and District 1 Special Provision Embankment I.

7.11 Earthwork Operations

The required earthwork can be accomplished with conventional equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. The construction contractor should take measures to prevent erosion of the exposed subgrade due to water or surface runoff. A compacted subgrade will minimize water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall, or winter). Any soil allowed to freeze or soften due to standing water should be removed. Wet weather can cause problems with subgrade compaction.

It is recommended that an experienced geotechnical engineer or representative be retained to inspect the exposed subgrade, verify soils in the field, monitor earthwork operations, and provide material inspection services during construction phase of the project.

8.0 LIMITATIONS

Our analysis and recommendations are based upon the data obtained from the borings drilled at locations shown on the boring logs and boring location plan included in this report. Because the evaluation is based upon subsurface physical data obtained from soil borings only at specific locations and time and only to the depths sampled, the report does not reflect potential variations in the subsurface conditions that may occur between the borings or elsewhere on the Project Site, variations whose nature and extent may not become evident until the course of construction. The conclusions or recommendations contained represent our professional opinions. No warranty or guarantee is expressed or implied. If variations are encountered and/or the project scope is altered, we should be timely informed so that our recommendations can be adjusted accordingly.

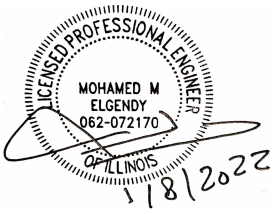
It has been a pleasure to assist Burns & McDonnell Engineering Company on this project. Please contact us if there are any questions, or if we can be of further service.

Respectfully Submitted,

Himalayan Consultants, LLC

Shardul Sharma
Geotechnical Engineer

Gopal K. Adhikary
Senior Geotechnical Engineer



Mohamed Elgendy, P.E.
Senior Geotechnical Engineer

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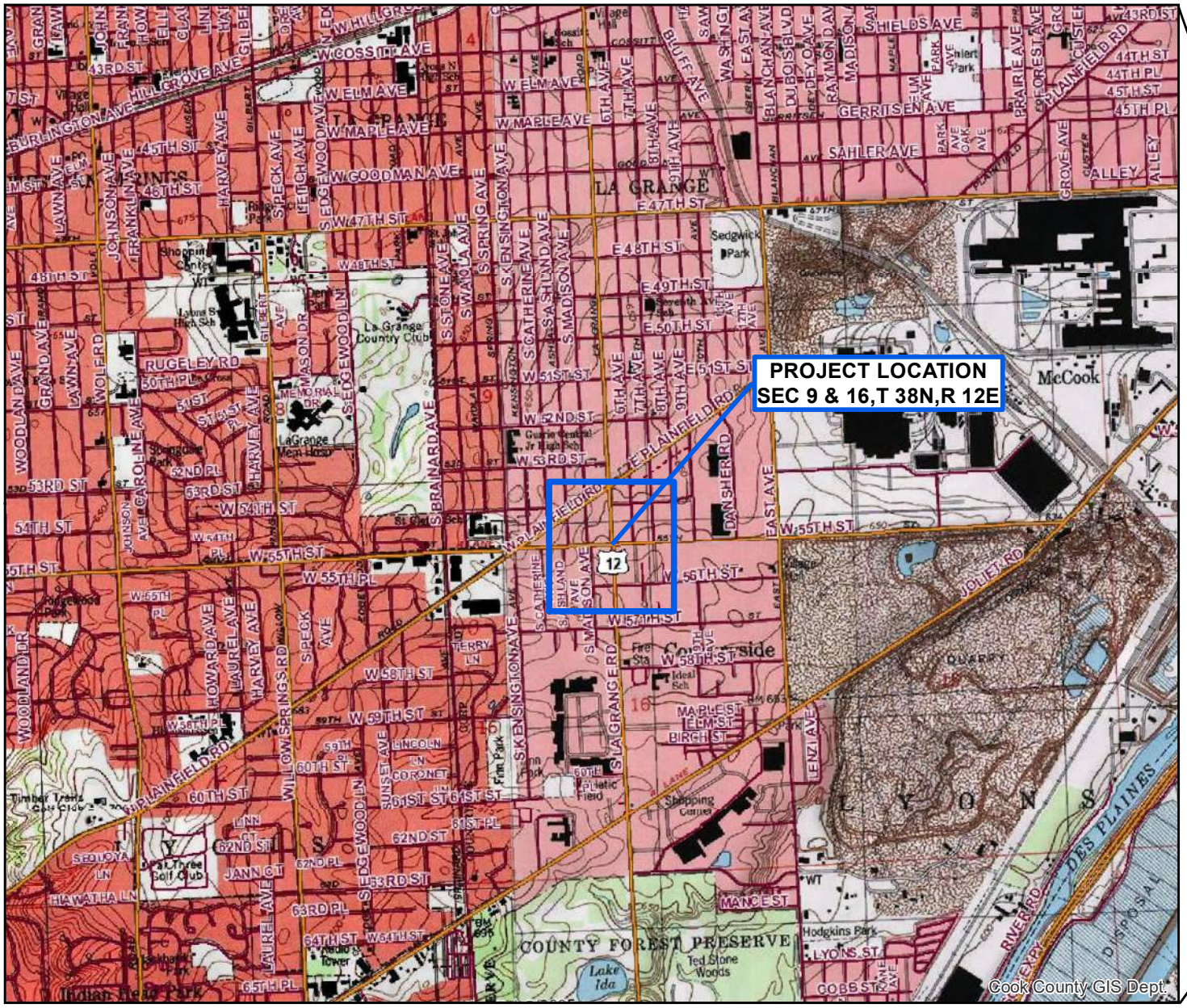
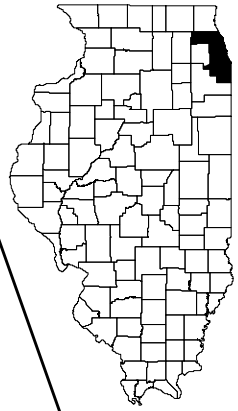
EXHIBITS





COOK COUNTY, IL

SITE LOCATION MAP:
55th STREET AT LAGRANGE ROAD, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 1

DRAWN BY: TJD
CHECKED BY: GKA

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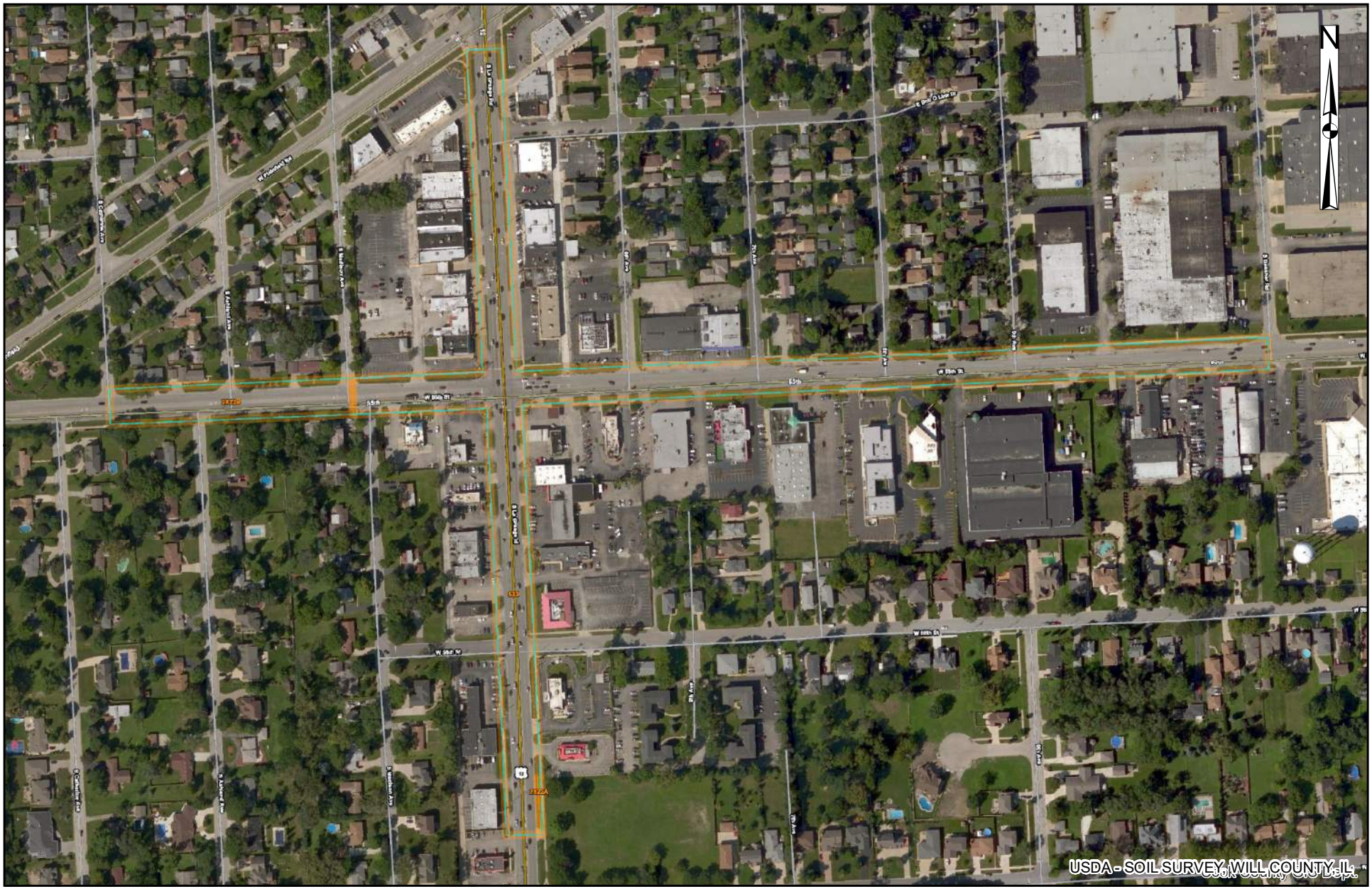

SITE PEDOLOGICAL MAP:
55th STREET AT LAGRANGE ROAD, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-1

DRAWN BY: TJD
CHECKED BY: GKA

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Engineers and Hydrogeologists

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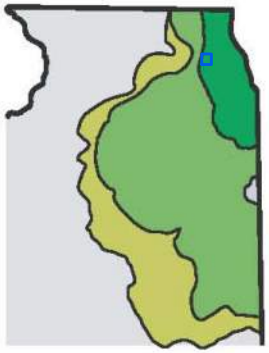
EXHIBIT 2-2: Engineering and Physical Properties of Soil

Map unit symbol and soil name	Depth	USDA texture	AASHTO	Fragments >10 inches	Fragments 3-10 inches	Sand	Silt	Clay	Moist Bulk Density	Saturated Hydraulic Conductivity	Organic matter	Erosion Factor Kw	Erosion Factor Kf	T	Liquid limit	Plasticity Index
	In			*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*Pct*	*(0.02 to 0.55)*	*(0.20 to 0.43)*	*(1 to 5)*	*Pct*	
533:																
Urban land	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Orthents, loamy, nearly level	0-8	Loam	A-6, A-7-6	0	0-4	23-50	28-50	22-27	1.70-1.75	1.41-4.23	0.5-2.0	.37	.37	5	32-41	15-19
	8-60	Clay loam, loam, silt loam	A-6, A-7-6	0-1	0-4	20-50	25-58	22-30	1.70-1.80	1.41-4.23	0.2-1.0	.32	.32		33-43	15-21
Orthents, clayey, nearly level	0-8	Silty clay	A-7-6	0	0-3	2-20	40-58	40-55	1.50-1.65	0.14-0.42	0.5-2.0	.32	.32	2	50-68	29-40
	8-60	Clay, silty clay, silty clay loam	A-7-6	0	0-2	2-30	10-60	35-60	1.60-1.90	0.14-0.42	0.2-1.0	.32	.32		46-70	25-44
Orthents, loamy-skeletal, nearly level	0-9	Very artifactual loam	A-2-6, A-2-7, A-6, A-7-6	9-18	16-26	23-50	28-50	22-27	1.70-1.75	1.41-4.23	0.5-2.5	.10	.37	5	32-42	15-18
	9-60	Very artifactual silt loam, extremely artifactual clay loam, extremely artifactual loam	A-2-6, A-2-7, A-6, A-7-6	12-28	20-52	20-50	25-58	22-30	1.70-1.80	1.41-4.23	0.2-1.0	.05	.32		33-43	15-21
2822A:																
Anthroportic Udorthents, moderately deep water table	0-5	Silty clay loam, silt loam	A-6, A-7-6	0	0-3	2-20	45-73	25-35	1.40-1.55	0.42-1.41	0.5-4.0	.43	.43	5	35-53	17-24
	5-28	Silty clay loam	A-6, A-7-6	0	0-3	2-20	45-71	27-35	1.45-1.70	0.42-1.41	0.2-1.0	.43	.43		37-46	19-25
	28-39	Silty clay loam	A-6, A-7-6	0	0-3	1-20	45-72	27-35	1.40-1.60	0.42-4.23	0.5-1.5	.43	.43		37-47	19-25
	39-49	Silty clay, silty clay loam	A-6, A-7-6	0	0-3	5-20	40-65	30-42	1.50-1.65	0.42-4.23	0.1-0.5	.37	.37		39-52	21-30
	49-60	Clay, silty clay, silty clay loam	A-6, A-7-6	0	0-3	5-20	30-65	30-50	1.60-1.75	0.42-4.23	0.0-0.5	.43	.43		39-60	21-36
Urban land	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Elliott	0-6	Silt loam	A-6, A-7-5, A-7-6	0	0	2-15	58-76	22-27	1.30-1.45	4.23-14.11	3.0-5.0	.32	.32	4	38-48	15-18
	6-11	Silty clay loam	A-7-6	0	0	2-15	50-71	27-35	1.25-1.45	4.23-14.11	2.5-4.0	.28	.28		42-53	18-25
	11-16	Silty clay, silty clay loam	A-7-6	0	0	2-15	40-61	37-49	1.35-1.55	1.41-4.23	0.5-1.6	.32	.32		46-61	26-35
	16-41	Silty clay, silty clay loam	A-6, A-7-6	0	0-1	2-20	40-65	27-45	1.45-1.75	0.42-4.23	0.1-0.8	.37	.37		34-55	16-32
	41-60	Silty clay loam	A-6, A-7-6	0	0-2	3-20	42-70	27-38	1.65-1.85	0.42-1.41	0.0-0.5	.49	.49		34-47	16-26
Ashkum, drained	0-12	Silty clay loam	A-7-5, A-7-6	0	0	1-15	45-64	35-40	1.20-1.45	1.41-4.23	3.0-8.0	.20	.20	5	51-66	25-28
	12-29	Silty clay, silty clay loam	A-7-6	0	0	2-15	43-63	35-42	1.30-1.50	1.41-4.23	0.5-2.5	.32	.32		46-57	25-30
	29-54	Silty clay, silty clay loam	A-6, A-7-6	0	0-1	5-20	40-65	30-42	1.50-1.70	1.41-4.23	0.1-1.0	.43	.43		39-53	21-30
	54-60	Silty clay loam	A-6, A-7-6	0	0-1	5-20	45-68	27-35	1.55-1.75	1.41-4.23	0.0-1.0	.43	.43		36-47	19-25
2822B:																
Anthroportic Udorthents, moderately deep water table	0-6	Silty clay loam, silt loam	A-6, A-7-6	0	0-3	2-20	45-73	25-35	1.40-1.55	0.42-1.41	0.5-4.0	.43	.43	5	35-53	17-24
	6-28	Silty clay loam	A-6, A-7-6	0	0-3	2-20	45-71	27-35	1.45-1.70	0.42-1.41	0.2-1.0	.43	.43		37-46	19-25
	28-38	Silty clay loam	A-6, A-7-6	0	0-3	1-20	45-72	27-35	1.40-1.60	0.42-4.23	0.5-1.5	.43	.43		37-47	19-25
	38-43	Silty clay, silty clay loam	A-6, A-7-6	0	0-3	5-20	40-65	30-42	1.50-1.65	0.42-4.23	0.1-0.5	.37	.37		39-52	21-30
	43-60	Clay, silty clay, silty clay loam	A-6, A-7-6	0	0-3	5-20	30-65	30-50	1.60-1.75	0.42-4.23	0.0-0.5	.43	.43		39-60	21-36
Urban land	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Elliott	0-9	Silt loam	A-6, A-7-5, A-7-6	0	0	2-15	58-76	22-27	1.30-1.45	4.23-14.11	3.0-5.0	.32	.32	3	38-48	15-18
	9-13	Silty clay loam	A-7-6	0	0	2-15	50-71	27-35	1.25-1.45	4.23-14.11	2.5-4.0	.28	.28		42-53	18-25
	13-17	Silty clay, silty clay loam	A-7-6	0	0	2-15	40-61	37-49	1.35-1.55	1.41-4.23	0.5-1.6	.32	.32		46-61	26-35
	17-35	Silty clay, silty clay loam	A-6, A-7-6	0	0-1	2-20	40-65	27-45	1.45-1.75	0.42-4.23	0.1-0.8	.43	.43		34-55	16-32
	35-60	Silty clay loam	A-6, A-7-6	0	0-2	3-20	42-70	27-38	1.65-1.85	0.42-1.41	0.0-0.5	.49	.49		34-47	16-26
Ashkum, drained	0-12	Silty clay loam	A-7-5, A-7-6	0	0	1-15	45-64	35-40	1.20-1.45	1.41-4.23	3.0-8.0	.20	.20	5	51-66	25-28
	12-29	Silty clay, silty clay loam	A-7-6	0	0	2-15	43-63	35-42	1.30-1.50	1.41-4.23	0.5-2.5	.32	.32		46-57	25-30
	29-54	Silty clay, silty clay loam	A-6, A-7-6	0	0-1	5-20	40-65	30-42	1.50-1.70	1.41-4.23	0.1-1.0	.43	.43		39-53	21-30
	54-60	Silty clay loam	A-6, A-7-6	0	0-1	5-20	45-68	27-35	1.55-1.75	1.41-4.23	0.0-1.0	.43	.43		36-47	19-25

REGIONAL GEOLOGY



Wedron Group

- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

Modified after Hansel and Johnson (1996)

LEGEND

LATE WISCONSIN

lca	LAKE CLAY AND SILT
lsa	LAKE SAND AND GRAVEL
gg	OUTWASH SAND AND GRAVEL
gs	OUTWASH SAND
kg	ICE-CONTACT SAND AND GRAVEL

CLAYEY TILL (WADSWORTH TILL MEMBER IN ILLINOIS AND EQUIVALENT IN INDIANA)

tah	Ground moraine
tah	Ground moraine and end moraine under Lake Michigan
tah	End moraine

SANDY LOAMY TILL (HAGER TILL MEMBER IN ILLINOIS AND EQUIVALENT IN WISCONSIN)

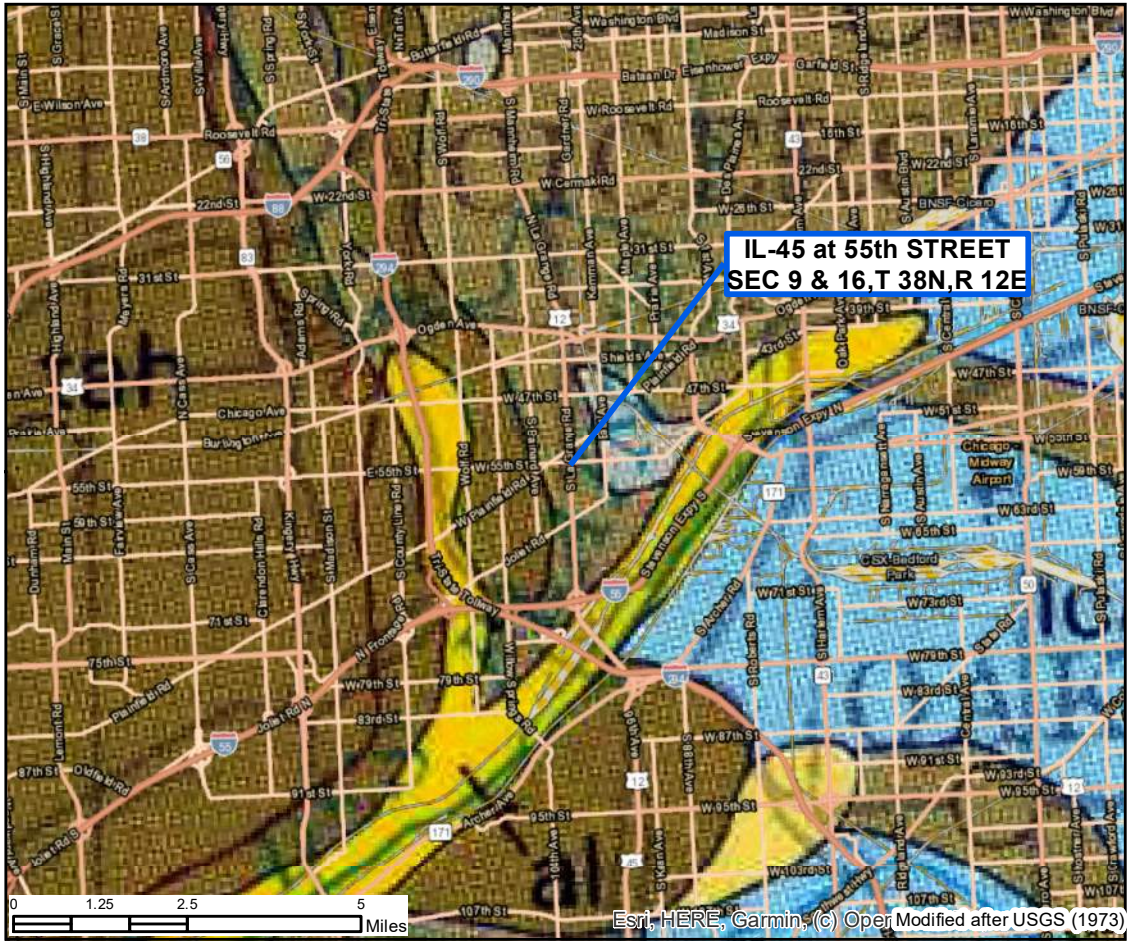
tea	Ground moraine
tea	End moraine

CLAYEY TILL (YORKVILLE TILL MEMBER IN ILLINOIS AND EQUIVALENT IN INDIANA)

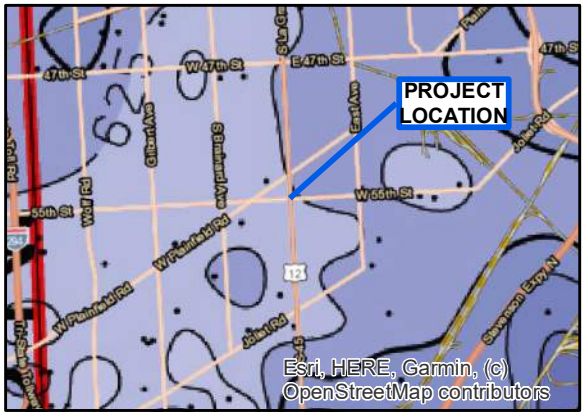
taj	Ground moraine
taj	End moraine

Modified after USGS (1973)

N

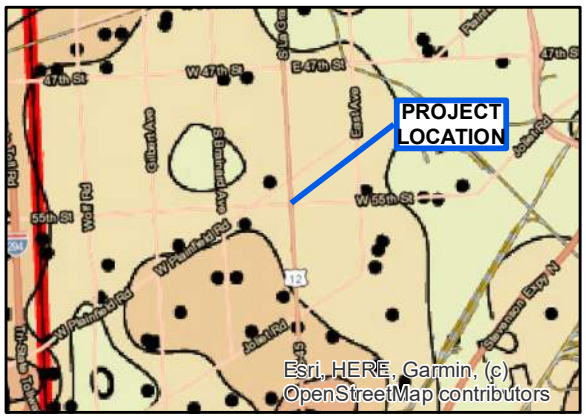


BEDROCK TOPOGRAPHY



454. 713. FEET
COLOR RANGE

DRIFT THICKNESS



0. 280. FEET
COLOR RANGE

Modified after Leetaru (2004)

SITE AND REGIONAL GEOLOGICAL MAP:
55th STREET AT LAGRANGE ROAD, COOK COUNTY, IL

SCALE: GRAPHICAL | **EXHIBIT 3** | DRAWN BY: TJD CHECKED BY: GKA

Himalayan Consultants, LLC
Engineers and Hydrogeologists
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Chicago, Illinois 60631
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LEGEND

BORING LOCATION B-XX

GRAPHIC SCALE

0 50 100 150 200 250

FEET

BEGIN IMPROVEMENT STA. 89+91

CATHERINE AVE.

55th STREET

MADISON AVE.

ASHLAND AVE.

6th AVE.

STA. 100+00 55th STREET = STA. 200+00 LAGRANGE ROAD

PISA PIZZA

BMJ CURRENCY EXCHANGE

OCULA RESTAURANT

INLAND TRUST BANK

CAFE SALSA

WENDY'S

PUMP ISLAND

COUNTRYSIDE MOBIL SERVICE

LONG JOHN SILVER'S

PROP. PCC SIDEWALK, 5'

PROP. PCC SIDEWALK 5'

PROP. RAISED MEDIAN WITH B-6.24 C&G

PROP. B-6.24 C&G

PROP. MOUNTABLE MEDIAN WITH M-2.12 C&G

PROP. PCC SIDEPATH, 8' & PARKWAY, 3' MIN. & VARIES

REPLACE 5' PCC SIDEWALK

PROP. C&G TAPER (TYP.)

PROP. PCC SIDEWALK, 7'

REM. EX. SIDEWALK, VAR WIDTH

PROP. PCC SIDEWALK 5'

B-01

B-02

B-03

B-04

B-05

MATCHLINE 103+00

PROPOSED 55th STREET ℄ PROFILE

EXISTING 55th STREET ℄ PROFILE

K = 157
120.68' V.C.

K = 165
130.06' V.C.

K = 165
150.74' V.C.

SSD = 895'
K = 151
120.14' V.C.

VPI STA. 94+65.86
ELEVATION 652.78

VPI STA. 96+75.86
ELEVATION 651.51

VPI STA. 99+82.52
ELEVATION 652.07

VPI STA. 101+47.91
ELEVATION 651.05

+06.52 EL. 653.60

+10.83 EL. 651.90

+27.20 EL. 652.41

+40.89 EL. 651.63

+22.45 EL. 651.96

+42.19 EL. 651.70

+72.54 EL. 651.51

+23.28 EL. 651.28

-1.37%

-0.61%

+0.18%

+0.30%

659.32 658.64 660.61 659.19 659.19 658.51 657.75 657.82 657.13 656.31 656.44 655.76 654.86 655.07 654.38 653.53 653.69 653.07 652.46 652.60 652.27 651.78 651.97 651.71 651.39 651.60 651.64 651.41 651.73 651.83 651.40 651.92 651.98 651.56 651.90 651.65 651.12 651.37 651.22 651.09 651.22 651.36 651.03 651.51

89+00 90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00 101+00 102+00 103+00

670 665 660 655 650 645 640 635 630

PLAN — SURVEYED / PLOTTED / CROSS SECT CHECKED / ALIGNMENT CHECKED / RT. OF WAY CHECKED / CADD FILE NAME / NOTE BOOK / NO. / BY / DATE

PROFILE — SURVEYED / PLOTTED / CROSS SECT CHECKED / BM, NOTED / STRUCTURE NO(TA)%S CHKD / NOTE BOOK / NO. / BY / DATE

MODEL: Default
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EXHIBIT 4-1

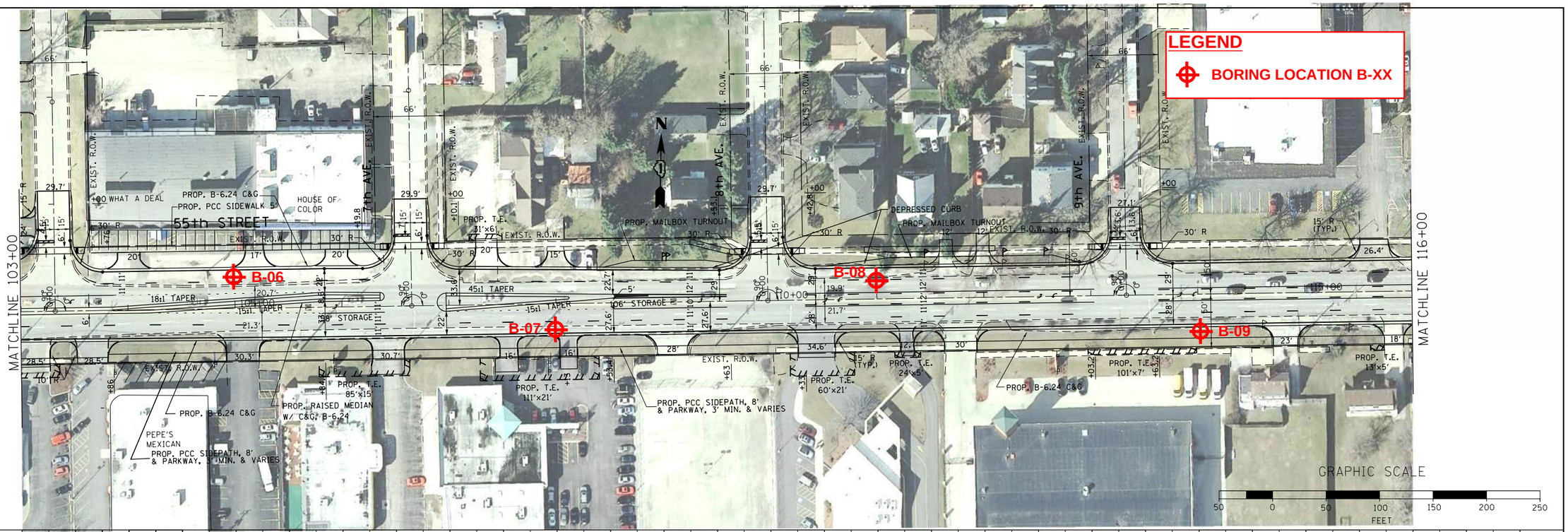
USER NAME = colsontb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 6/12/2018	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

55TH STREET PROPOSED PLAN AND PROFILE

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

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1504	0104WRS&N-11	COOK		5
		CONTRACT NO. 12306		
	ILLINOIS FED. AID PROJECT			



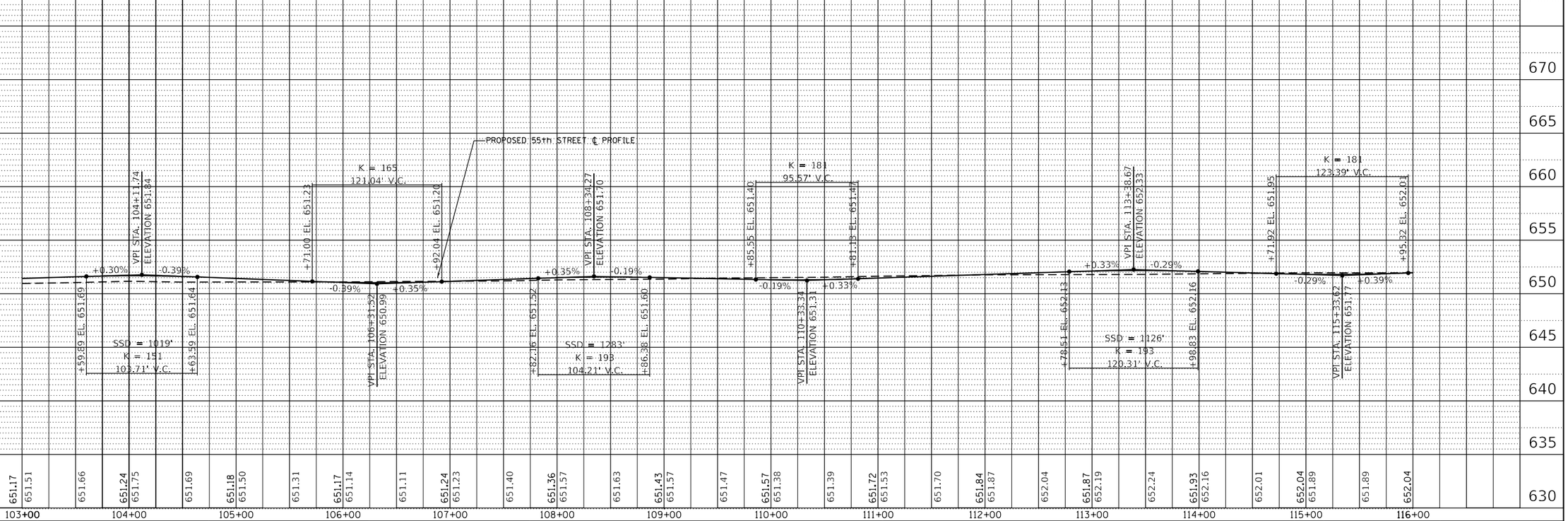


EXHIBIT 4-2	USER NAME = colsontb	DESIGNED -	REVISED -
		DRAWN -	REVISED -
	PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 6/12/2018	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

55TH STREET PROPOSED PLAN AND PROFILE

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

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1504	0104WRS&N-11	COOK		6
		CONTRACT NO. 12306		
	ILLINOIS FED. AID PROJECT			

PLAN: SURVEYED, PLOTTED, GRADES CHECKED, ALIGNMENT CHECKED, RT. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK, NO.

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, B.M. NOTED, STRUCTURE NOTATIONS CHKD, NOTE BOOK, NO.

BY DATE

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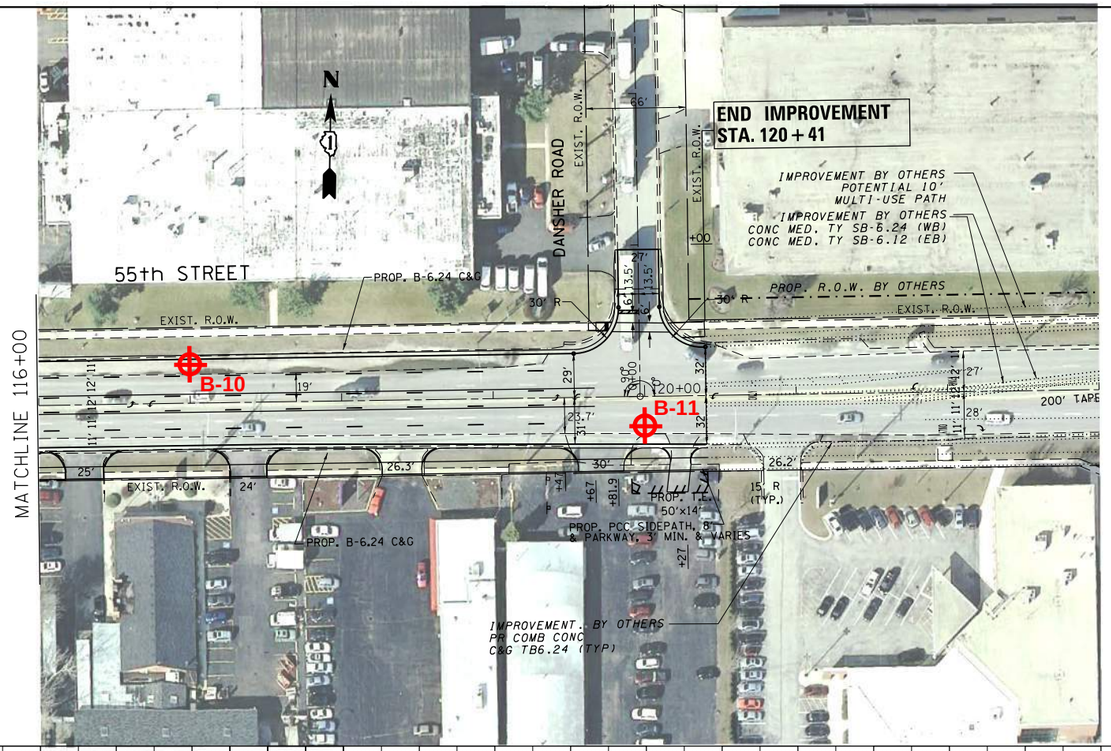
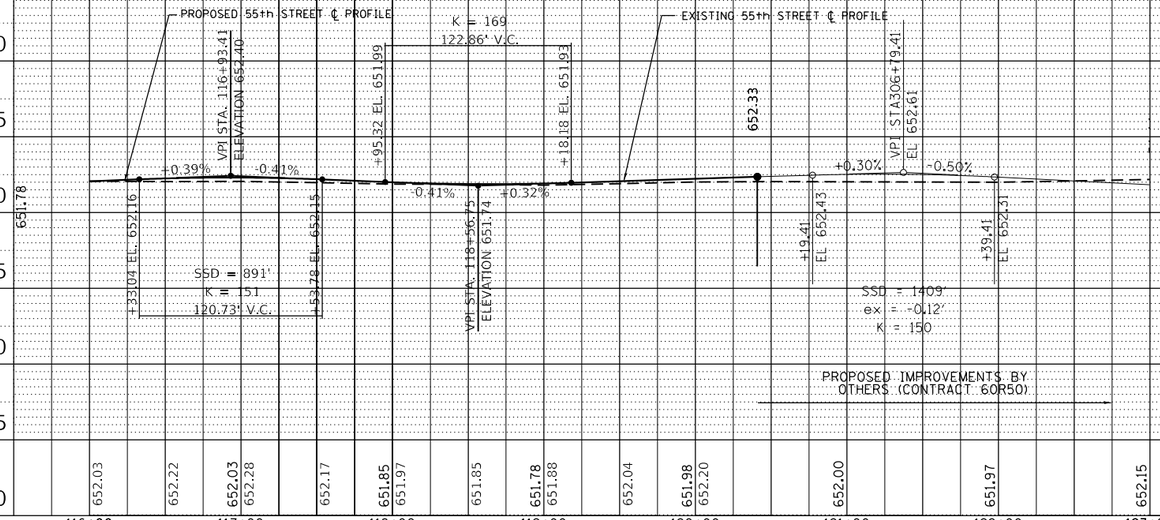
P126204-Planning_ii.dgn 6/12/2018 6:52:12 AM User=colsontb





LEGEND

BORING LOCATION B-XX

GRAPHIC SCALE

50 0 50 100 150 200 250
FEET

EXHIBIT 4-3

USER NAME = colsontb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 6/12/2018	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

55TH STREET PROPOSED PLAN AND PROFILE

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

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1504	0104WRS&N-11	COOK		7
		CONTRACT NO. 12306		
	ILLINOIS	FED. AID PROJECT		

PLAN — SURVEYED, PLOTTED, DESIGN CHECKED, QUANTITY CHECKED, RT. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK, NO., BY, DATE

PROFILE — SURVEYED, PLOTTED, DESIGN CHECKED, BM, NOTED, STRUCTURE NO(S), CHKD, NOTE BOOK, NO., BY, DATE

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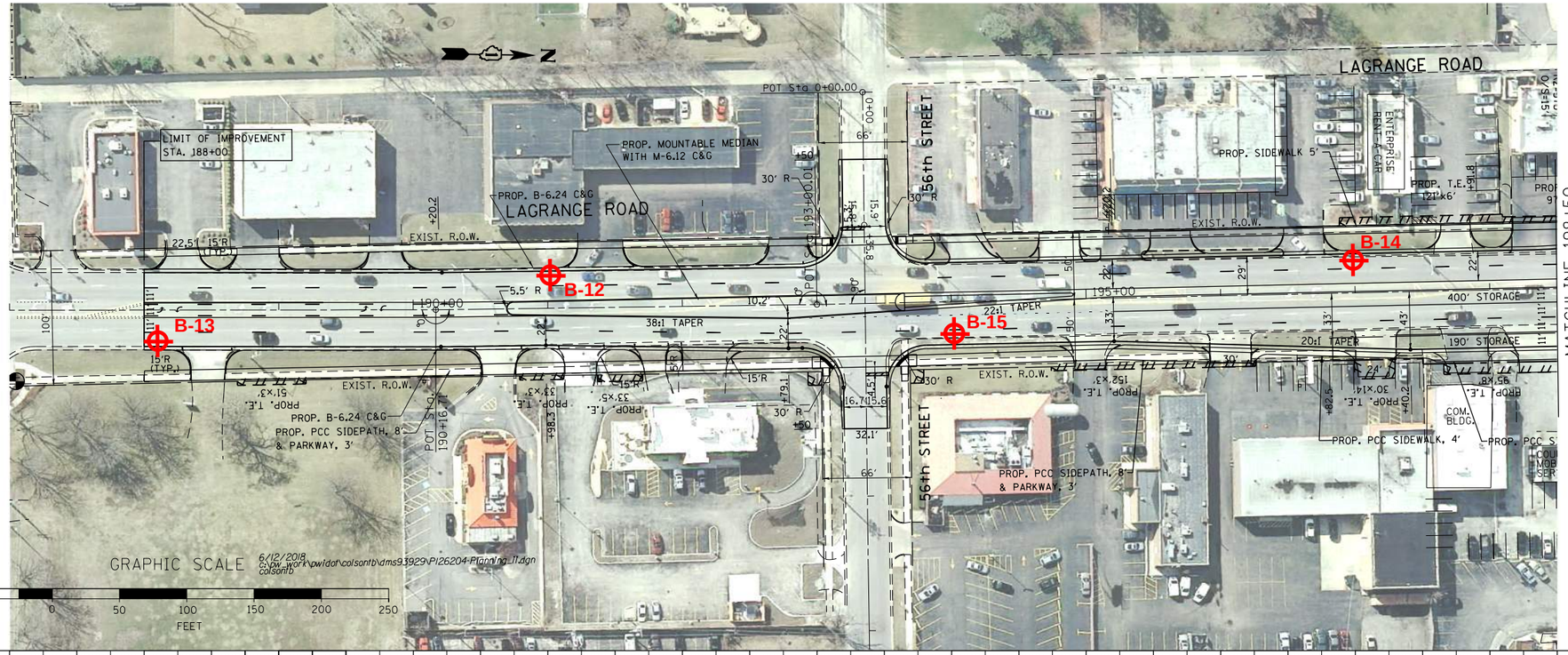

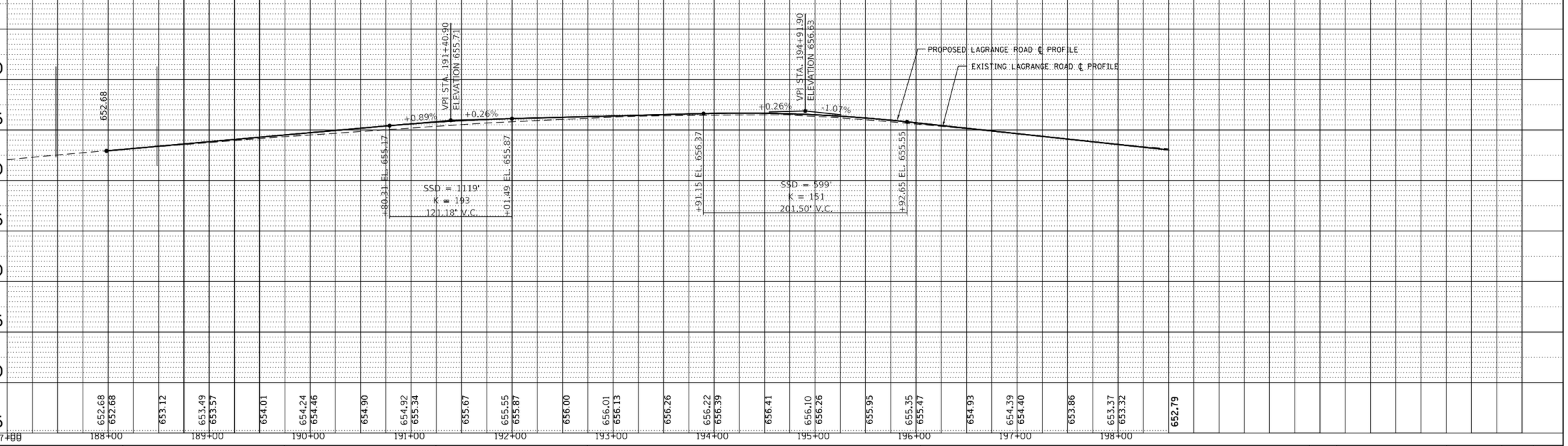

LEGEND

⊕ BORING LOCATION B-XX

PLAN — SURVEYED / PLOTTED / ALIGNMENT CHECKED / RT. OF WAY CHECKED / CAUD FILE NAME / NOTE BOOK / NO. / BY / DATE

PROFILE — SURVEYED / PLOTTED / GRADE CHECKED / BM. NOTED / STRUCTURE NOTATNS CHKD / NOTE BOOK / NO. / BY / DATE

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EXHIBIT 4-4

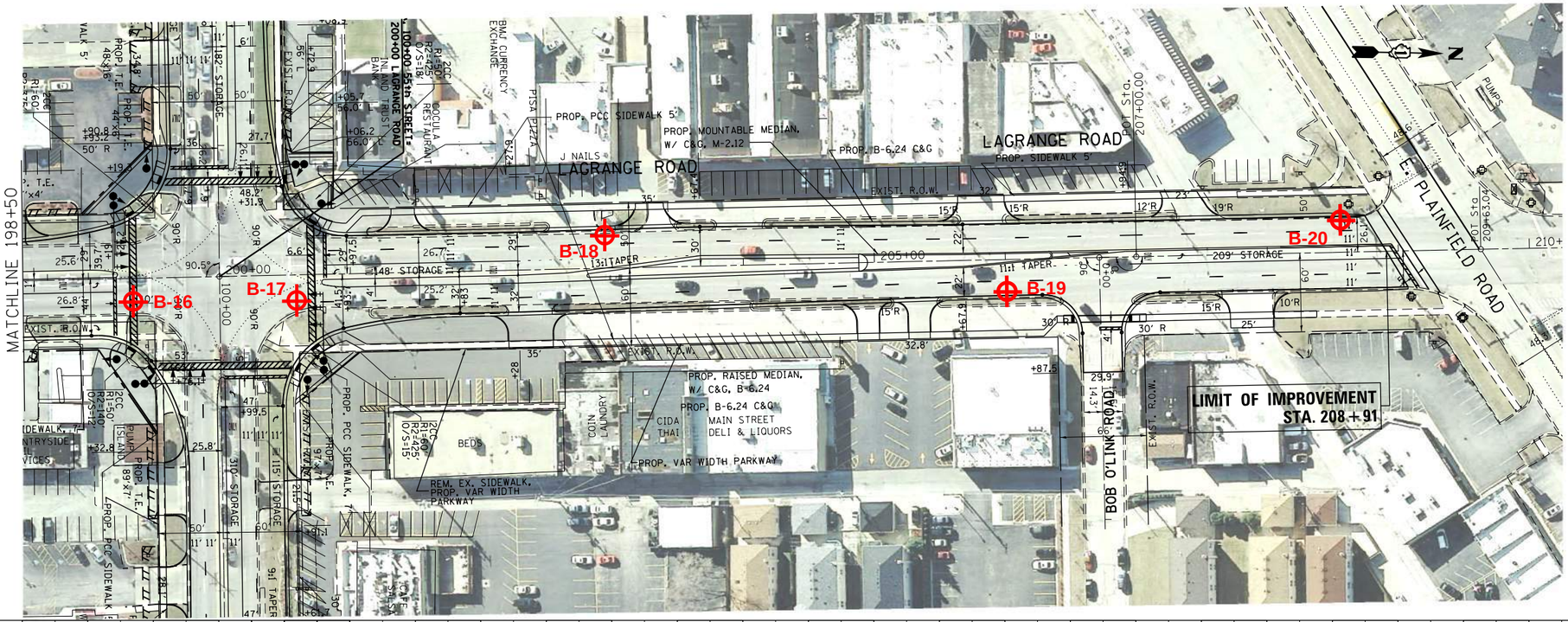
USER NAME = colsontb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 6/12/2018	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

US 12/20/45 PROPOSED PLAN AND PROFILE

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

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1504	0104WRS&N-11	COOK		8
		CONTRACT NO. 12306		
	ILLINOIS FED. AID PROJECT			



LEGEND

⊕ BORING LOCATION B-XX

GRAPHIC SCALE

50 0 50 100 150 200 250

FEET

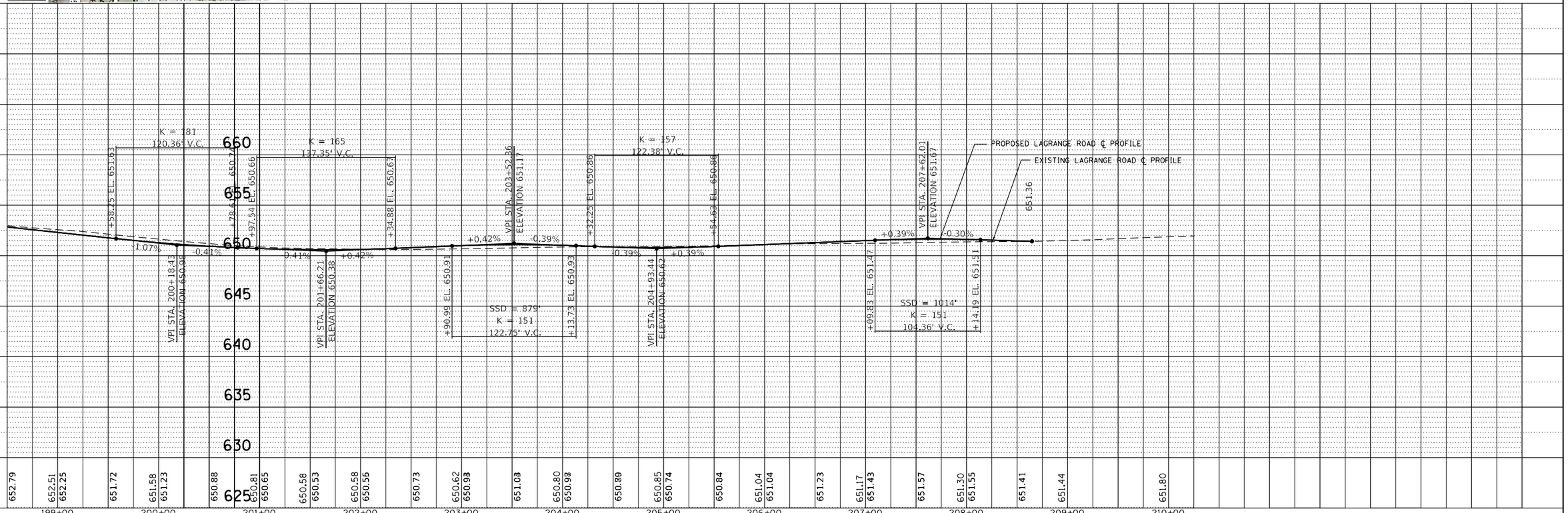


EXHIBIT 4-5

USER NAME = colsontb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 6/12/2018	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

US 12/20/45 PLAN AND PROFILE

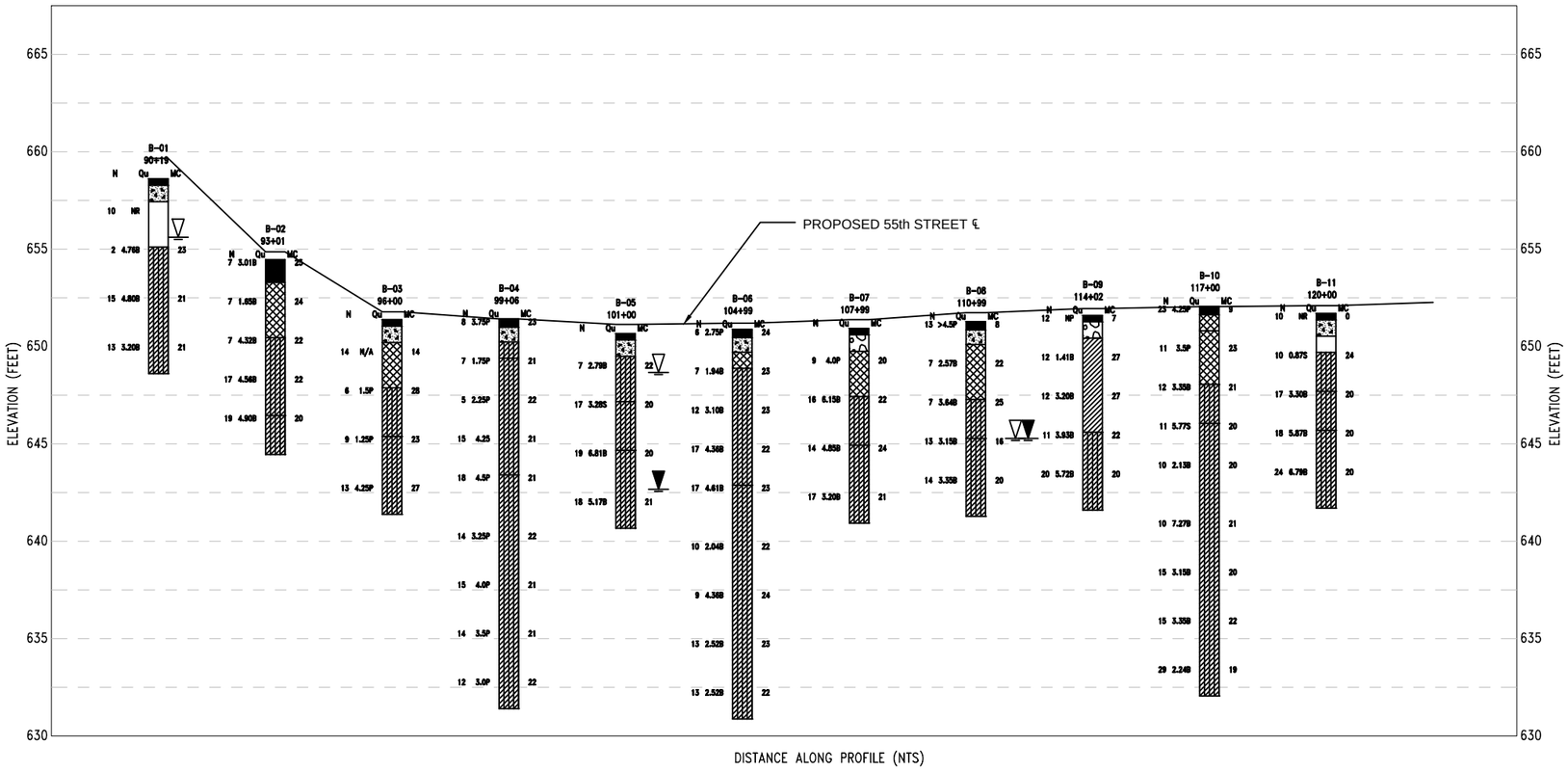
SCALE: SHEET OF SHEETS STA. TO STA.

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1504	0104WRS&N-11	COOK		9
		CONTRACT NO. 12306		
	ILLINOIS FED. AID PROJECT			

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

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, B.M. NOTED, STRUCTURE NOTATNS CHKD, NOTE BOOK, NO., BY, DATE

MODEL: Default
FILE NAME: c:\pw_work\pwidot\colsontb\dms93929\P126204-Planning_ii.dgn



Legend

B-01 — Borehole Number
90+19 — Station

Borehole Lithology
N--N-value, (blw/12in)
Qu--UC Strength, (tsf)
MC--Moisture Content (%)
ST -- Shelby Tube Sample

Water Level Reading at the time of drilling

Water Level Reading 24-hr after drilling or at end of drilling

Potential Bottom of Footing

Vertical Scale
1in = 15 ft

N

Lithology Graphics

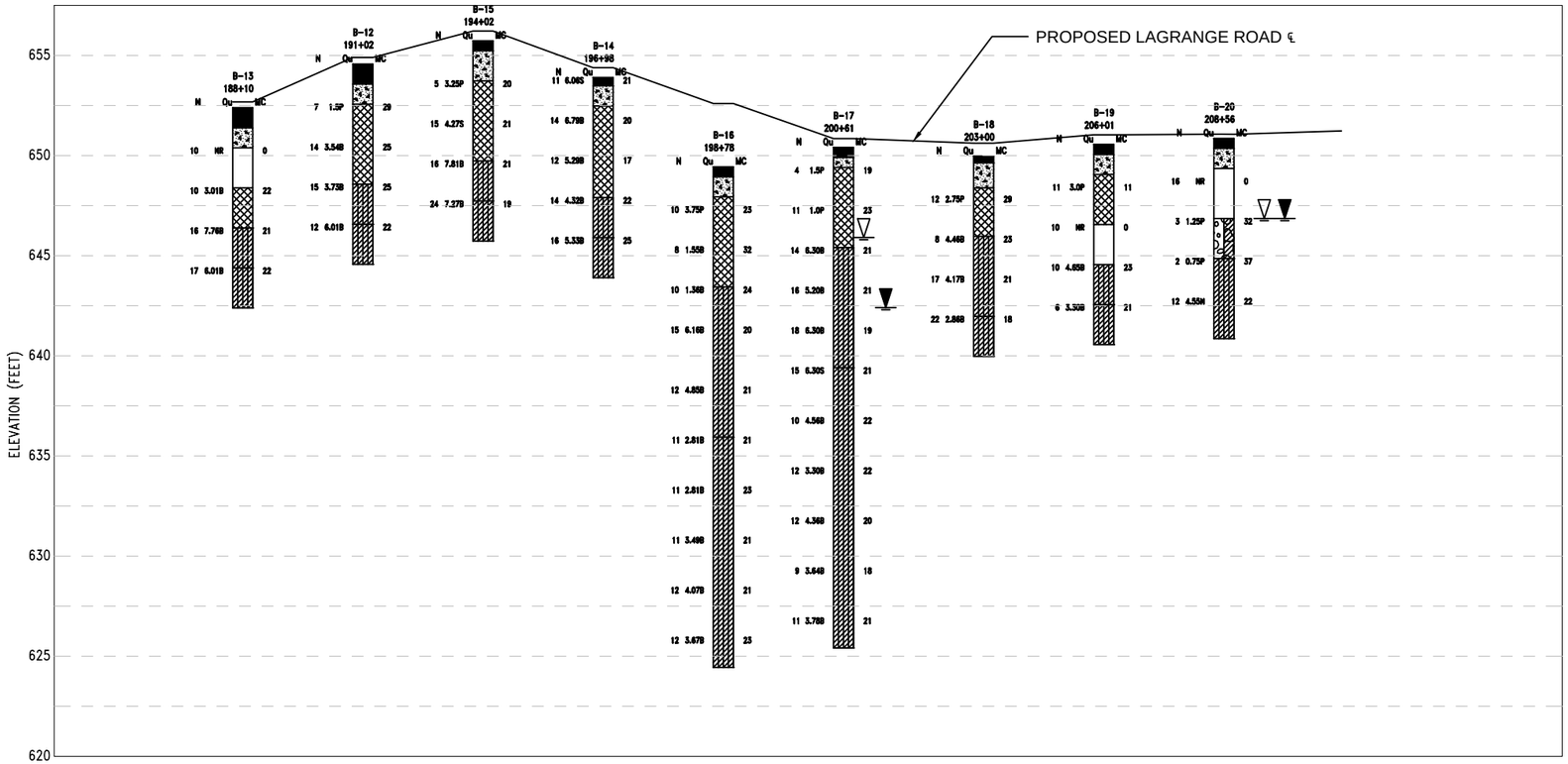
Asphaltic Pavement
No Recovery
Concrete Pavement
Gravelly Clay
Fill
IDH Clay
IDH Silty Clay, Silty Clay Loam
Gravel

Exhibit **5**

Soil Profile - 55th Street

55th Street at LaGrange Road
PTB# / Job No. - 164-008 / D-91-126-12
Will County, Illinois

Himalayan Consultants, LLC
Engineers and Hydrogeologists
8770 W. Bryn Mawr Avenue, Suite 1300
Chicago, Illinois 60631
Phone: (773) 867-2956
Fax: (773) 867-2910



Legend

B-01 — Borehole Number

90+19 — Station

Borehole Lithology

N--N-value, (blw/12in)

Qu--UC Strength, (tsf)

MC--Moisture Content (%)

ST -- Shelby Tube Sample

Water Level Reading at the time of drilling

Water Level Reading 24-hr after drilling or at end of drilling

Potential Bottom of Footing

Vertical Scale

1in = 15 ft

N

Lithology Graphics

- Asphaltic Pavement
- No Recovery
- Concrete Pavement
- Gravelly Clay
- Fill
- IDH Clay
- IDH Silty Clay, Silty Clay Loam
- Gravel

Exhibit **5**

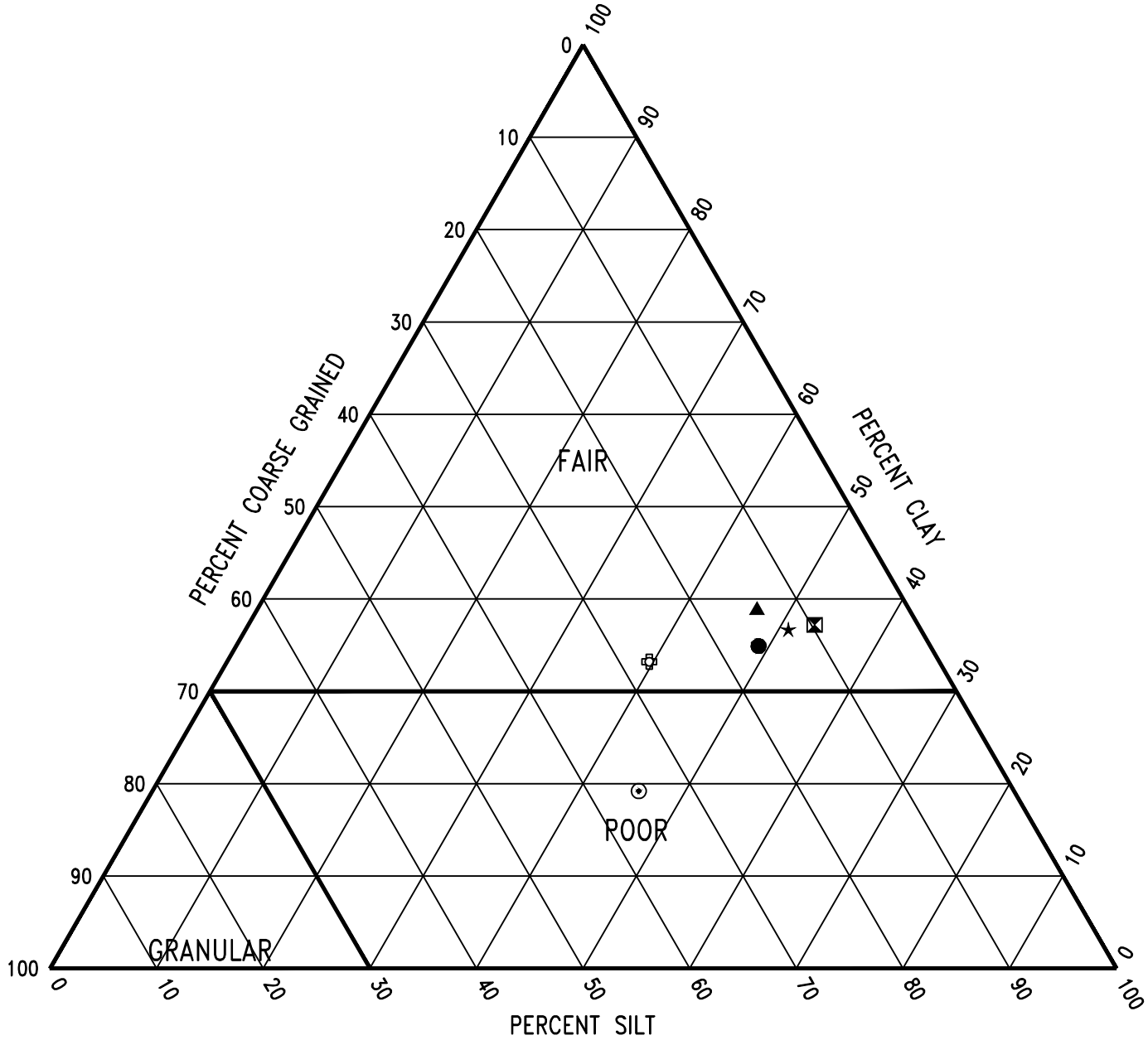
Soil Profile - LaGrange Road

55th Street at LaGrange Road

PTB# / Job No. - 164-008 / D-91-126-12

Will County, Illinois

Himalayan Consultants, LLC
Engineers and Hydrogeologists
8770 W. Bryn Mawr Avenue, Suite 1300
Chicago, Illinois 60631
Phone: (773) 867-2956
Fax: (773) 867-2910



	Borehole	Station	Offset	Depth (ft)	Classification
●	B-01	90+19	24' RT	10	A-6 SILTY CLAY
⊠	B-06	104+99	29' LT	20	A-7-6 SILTY CLAY LOAM
▲	B-09	114+02	35' RT	10	A-7-6 CLAY
★	B-14	196+98	24' RT	10	A-6 SILTY CLAY
⊙	B-17	200+61	21' RT	25	A-7-6 SILTY CLAY LOAM
⌖	B-20	208+56	24' RT	10	A-7-6 GRAVELLY CLAY

EXHIBIT 6 - SUBGRADE SUPPORT RATING

Route: FAU 1504/55th Street

Section: 0140WRS&N-11

County: COOK

SUBGRADE SUPPORT RATINGS 55TH STREET-LAGRANGE.GPJ IL_DOT.GDT 5/8/20

APPENDIX A

BORING LOGS

Himalayan Consultants, LLC
Engineers and Hydrogeologists
Chicago, IL 60631
Phone: (773) 867-2956
Fax: (773) 867-2910

SOIL BORING LOG

Date 2/24/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** 3.25" HSA: 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-01
Station 90+19
Offset 24' RT
Ground Surface Elev. 658.61 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 3 ft ▼
Upon Completion 3 ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4" Asphalt, black 658.28							
10" Concrete 657.44							
NO RECOVERY	8 6 4	NR					
▼ 655.11							
Very stiff to hard, brown and gray, SILTY CLAY, trace gravel, dry	4 1 1	4.76B	23				
-5				-25			
Sample at 3.5' to 5.0' L_L(%)=38 P_L(%)=17	6 6 9	4.80B	21				
	8 5 8	3.20B	21				
648.61 -10				-30			
End of Boring							
-15				-35			
-20				-40			

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

Himalayan Consultants, LLC
Engineers and Hydrogeologists
Chicago, IL 60631
Phone: (773) 867-2956
Fax: (773) 867-2910

SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-02
Station 93+01
Offset 30' LT
Ground Surface Elev. 654.46 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
14" Asphalt, black		3	3.01B	25
653.29		3		
Stiff to very stiff, black to gray, SILTY CLAY LOAM, some gravel, dry, FILL		4		
		7		
		4	1.65B	24
		3		
		4		
650.46		4		
Hard, gray to brown, SILTY CLAY LOAM, little gravel, moist		4	4.32B	22
	-5	3		
		4		
		6		
		6	4.56B	22
		8		
		9		
646.46		10		
Hard, brown, SILTY CLAY, trace gravel, moist		7	4.90B	20
		7		
		12		
644.46	-10	13		
End of Boring				
	-15			
	-20			

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

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

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Engineers and Hydrogeologists
Chicago, IL 60631
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Fax: (773) 867-2910

SOIL BORING LOG

Date 2/24/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** 3.25" HSA: 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-03
Station 96+00
Offset 24' RT
Ground Surface Elev. 651.38 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
651.05				4" Asphalt, black
650.21				10" Concrete
	25 5 9	N/A	14	Medium dense, black, POORLY-GRADED GRAVEL, trace clay, trace loam, trace sand, dry, FILL
647.88				
	3 3 3	1.5P	28	Stiff, brown, SILTY CLAY LOAM, trace sand, little gravel, moist
-5				
645.38				
	2 3 6	1.25P	23	Stiff to hard, brown, SILTY CLAY, trace gravel, moist
	4 6 7	4.25P	27	
641.38 -10				
				End of Boring
-15				
-20				

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

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

Himalayan Consultants, LLC
Engineers and Hydrogeologists
Chicago, IL 60631
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Fax: (773) 867-2910

SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-04
Station 99+06
Offset 35' LT
Ground Surface Elev. 651.41 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5" Asphalt, black	650.99		11	3.75P	23
9" Concrete	650.24		4		
Very stiff, black SILTY CLAY LOAM, some gravel, dry, FILL	649.41		4		
			6		
Stiff to Hard, brown, SILTY CLAY, trace to some gravel, dry to moist			4	1.75P	21
			3		
			4		
			6		
			2	2.25P	22
		-5	2		
			3		
			7		
			4	4.25	21
			7		
			8		
	643.41		12		
Very stiff to hard, brown, SILTY CLAY, trace gravel, moist			9	4.5P	21
			8		
			10		
		-10	11		
			5	3.25P	22
			6		
			8		
			4	4.0P	21
			6		
		-15	9		
			4	3.5P	21
			5		
			9		
			4	3.0P	22
			5		
	631.41	-20	7		

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

End of Boring

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

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Chicago, IL 60631
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Fax: (773) 867-2910

SOIL BORING LOG

Date 2/24/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** 3.25" HSA: 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-05
Station 101+00
Offset 37' RT
Ground Surface Elev. 650.67 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 2 ft ▼
Upon Completion 8 ft ▽
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
650.34				4" Asphalt, black
649.50				10" Concrete
	2 2 5	2.79B	22	Very stiff, gray, SILTY CLAY LOAM, little gravel, little sand, wet, FILL ▼
647.17				
	5 8 9	3.28S	20	Very stiff to hard, brown, SILTY CLAY LOAM, trace gravel, trace sand, wet
-5				
644.67				
	6 8 11	6.81B	20	Hard, brown, SILTY CLAY, trace gravel, moist ▽
	4 8 10	5.17B	21	
640.67 -10				End of Boring
-15				
-20				

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

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

Himalayan Consultants, LLC
Engineers and Hydrogeologists
Chicago, IL 60631
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Fax: (773) 867-2910

SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous to 10', 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-06
Station 104+99
Offset 29' LT
Ground Surface Elev. 650.88 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5" Asphalt, black	650.46		11	2.75P	24
9" Concrete	649.71		3		
Very stiff, black, SILTY CLAY LOAM, some gravel, dry, FILL	648.88		3		
			5		
Stiff to hard, brown, SILTY CLAY, trace gravel, dry to moist			3	1.94B	23
			3		
			4		
Sample at 2.0' to 4.0'			4		
L_L(%)=41			6	3.10B	23
P_L(%)=17		-5	6		
			8		
			8		
			5	4.36B	22
			7		
			10		
	642.88		9		
Very stiff to Hard, brown, SILTY CLAY, trace gravel, moist			6	4.61B	23
			7		
			10		
		-10	13		
			4	2.04B	22
			4		
			6		
			2	4.36B	24
			3		
		-15	6		
			3	2.52B	23
			5		
			8		
			3	2.52B	22
			5		
	630.88	-20	8		

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

End of Boring

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

Himalayan Consultants, LLC
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Fax: (773) 867-2910

SOIL BORING LOG

Date 2/24/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** 3.25" HSA: 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-07
Station 107+99
Offset 25' LT
Ground Surface Elev. 650.93 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 1' ft
Upon Completion N.E. ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
650.60 4" Asphalt, black			
649.76 10" Aggregate Base Course			
Hard, brown, SILTY CLAY LOAM, some gravel, wet, FILL	6 5 4	4.0P	20
647.43 Hard, brown, SILTY CLAY LOAM, trace gravel, wet	5 6 10	6.15B	22
-5 644.93 Very stiff to hard, brown, SILTY CLAY, trace gravel, moist	4 6 8	4.85B	24
	4 7 10	3.20B	21
-10 640.93 End of Boring			
-15			
-20			
-25			
-30			
-35			
-40			

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

Himalayan Consultants, LLC
Engineers and Hydrogeologists
Chicago, IL 60631
Phone: (773) 867-2956
Fax: (773) 867-2910

SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-08
Station 110+99
Offset 16' LT
Ground Surface Elev. 651.28 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 6 ft ▼
Upon Completion 6 ft
After _____ **Hrs.** _____ ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5" Asphalt, black	650.86		11	>4.5P	8
9" Concrete	650.11		9 4		
Very stiff to hard, black to brown, SILTY CLAY LOAM, little gravel, dry, FILL			4 3 3 3 4 4	2.57B	22
	647.28				
Very stiff, brown, SILTY CLAY LOAM, trace gravel, moist		-5	4 4 3 6	3.64B	25
	645.28 ▼				
Very stiff, brown, SILTY CLAY, trace gravel, wet			4 6 7 7	3.15B	16
			5 6 8 12	3.35B	20
	641.28	-10			
End of Boring					
		-15			
		-20			

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

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

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SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-09
Station 114+02
Offset 35' RT
Ground Surface Elev. 651.60 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4" Asphalt, black	651.27		9	NP	7
10" Aggregate Base Course	650.43		6		
Medium dense, black and gray, POORLY-GRADED GRAVEL, trace loam, dry, FILL	649.60		6		
			5		
			4	1.41B	27
Stiff to very stiff, brown, CLAY, trace gravel, moist			7		
			5		
			8		
Sample at 2.0' to 4.0'			4	3.20B	27
L_L(%)=60			5		
P_L(%)=20		-5	7		
			8		
	645.60				
Very Stiff to hard, brown, SILTY CLAY, trace gravel, moist			5	3.93B	22
			5		
			6		
			8		
			4	5.72B	20
			8		
			12		
	641.60	-10	15		
End of Boring					
		-15			
		-20			

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

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

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SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous to 10', 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-10
Station 117+00
Offset 26' LT
Ground Surface Elev. 652.06 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5" Asphalt, black 651.64		18	4.25P	9
10" Concrete 650.81		9		
Very stiff to hard, black to brown and gray, SILTY CLAY LOAM, little to some gravel, dry, FILL		14		
		12		
		5	3.5P	23
		5		
		6		
648.06		7		
Very stiff, brown, SILTY CLAY LOAM, little gravel, moist		3	3.35B	21
	-5	5		
		7		
646.06		10		
Very stiff to hard, brown, SILTY CLAY, trace gravel, moist to damp		3	5.77S	20
		5		
		6		
		7		
		3	2.13B	20
		5		
		5		
	-10	5		
		5	7.27B	21
		7		
		3		
		6	3.15B	20
		6		
	-15	9		
		4	3.35B	22
		6		
		9		
		7	2.24B	19
		6		
632.06	-20	23		

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

End of Boring

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

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SOIL BORING LOG

Date 2/26/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** 55th Street

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-11
Station 120+00
Offset 20' RT
Ground Surface Elev. 651.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4" Asphalt, black 651.37		6	NR	0
10" Concrete 650.53		5		
NO RECOVERY		5		
649.70		5		
Medium stiff, brown, SILTY CLAY LOAM, trace gravel, dry, FILL		4	0.87S	24
		4		
		6		
647.70		5		
Very stiff, brown, SILTY CLAY LOAM, trace to some gravel, dry	-5	4	3.30B	20
		8		
		9		
645.70		12		
Hard, brown, SILTY CLAY, some gravel, trace loam, moist		6	5.87B	20
		9		
		9		
		1		
		6	6.79B	20
		10		
		14		
641.70	-10	10		
End of Boring				
	-15			
	-20			

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

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-12
Station 191+02
Offset 24' LT
Ground Surface Elev. 654.57 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12" Asphalt, black 653.57							
12" Concrete 652.57							
Stiff to very stiff, black and gray, SILTY CLAY LOAM, little gravel, trace organics, dry, FILL	5 4 3 5	1.5P	29				
	4 4 10 9	3.54B	25	-25			
-5 648.57							
Very stiff, brown, SILTY CLAY LOAM, little gravel, moist	3 9 6 7	3.73B	25				
646.57							
Hard, brown, SILTY CLAY, trace gravel, moist	2 6 6 7	6.01B	22				
644.57 -10				-30			
End of Boring							
-15				-35			
-20				-40			

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-13
Station 188+10
Offset 23' RT
Ground Surface Elev. 652.39 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12" Asphalt, black 651.39							
12" Concrete 650.39							
NO RECOVERY	12 4 6 4	NR	0				
648.39							
Very stiff, gray to brown, SILTY CLAY LOAM, some gravel, dry, FILL	4 4 6 8	3.01B	22				
-5				-25			
646.39							
Hard, brown, SILTY CLAY LOAM, some gravel, dry	4 5 11 11	7.76B	21				
644.39							
Hard, brown, SILTY CLAY, little gravel, moist	6 6 11 11	6.01B	22				
642.39 -10				-30			
End of Boring							
-15				-35			
-20				-40			

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

BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-14
Station 196+98
Offset 24' LT
Ground Surface Elev. 653.90 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				5" Asphalt, black 653.48
				12" Concrete 652.48
	4 5 6	6.06S	21	Hard, gray to brown, SILTY CLAY, little gravel, dry, FILL
	7 7 6	6.79B	20	Sample at 2.0' to 4.0' L_L(%)=36 P_L(%)=17
-5	8 10 5	5.29B	17	
	6 6 8			647.90
	6 7 7	4.32B	22	Hard, brown, SILTY CLAY LOAM, trace gravel, dry
	11 5 7	5.33B	25	645.90 Hard, brown, SILTY CLAY, trace gravel, moist
-10	9 11			643.90
				End of Boring
-15				
-20				
-25				
-30				
-35				
-40				

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-15
Station 194+02
Offset 24' RT
Ground Surface Elev. 655.73 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6" Asphalt, black 655.23 18" Concrete 653.73				
Very stiff to hard, gray and black, SILTY CLAY LOAM, some gravel, dry, FILL		9 3 2 5	3.25P	20
		6 7 8 12	4.27S	21
649.73	-5			
Hard, brown, SILTY CLAY LOAM, little gravel, moist		6 6 10 13	7.81B	21
647.73				
Hard, brown, SILTY CLAY, little gravel, moist		7 9 15 14	7.27B	19
645.73	-10			
End of Boring				
	-15			
	-20			

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

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous to 10', 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-16
Station 198+78
Offset 16' RT
Ground Surface Elev. 649.44 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
648.94				6" Asphalt, black
				12" Concrete
647.94				--Boring moved due to unmarked gas utility--
	14	3.75P	23	Stiff to very stiff, gray and brown to brown, SILTY CLAY LOAM,
	5			some gravel, dry, FILL
	5			
	7			
	10	1.55B	32	
-5	3			
	5			
643.44	6			
	2	1.36B	24	Stiff to Hard, brown, SILTY CLAY LOAM, some gravel, dry
	3			
	7			
	9			
	2	6.16B	20	
	6			
	9			
-10	11			
	4	4.85B	21	
	5			
	7			
635.94				
	3	2.81B	21	Very stiff to hard, brown to gray, SILTY CLAY, trace gravel, moist
	5			
-15	6			
	4	2.81B	23	
	4			
	7			
	4	3.49B	21	
	4			
-20	7			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very stiff to hard, brown to gray, SILTY CLAY, trace gravel, moist *(continued)*
	4	4.07B	21	
	4			
	8			
	4	3.67B	23	
	6			
624.44 -25	6			
				End of Boring
-30				
-35				
-40				

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous to 10', 2.5' to EOB **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-17
Station 200+61
Offset 21' RT
Ground Surface Elev. 650.41 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 4.5 ft ▼
Upon Completion 8 ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6" Asphalt 649.91				
6" Concrete 649.41				
Stiff, black, SILTY CLAY LOAM, some gravel, dry, FILL		4 2 2	1.5P	19
Sample at 1.0' to 2.0' L_L(%)=46 P_L(%)=18		5 6 5	1.0P	23
645.41	-5	6 5		
Hard, brown, SILTY CLAY LOAM, little gravel, dry to moist		4 5 9	6.30B	21
		10 3 6	5.20B	21
		10 11 5	6.30B	19
	-10	7 11 13		
639.41				
Very stiff to Hard, brown to gray, SILTY CLAY, trace gravel, moist		5 6 9	6.30S	21
		4 4 6	4.56B	22
	-15			
		3 5 7	3.30B	22
		3 5 7	4.36B	20
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff to Hard, brown to gray, SILTY CLAY, trace gravel, moist *(continued)*		3 4 5	3.64B	18
		3 5 6	3.78B	21
625.41	-25			
End of Boring				
	-30			
	-35			
	-40			

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-18
Station 203+00
Offset 25' LT
Ground Surface Elev. 649.97 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4" Asphalt 649.64				
15" Concrete 648.39				
Very stiff, black, SILTY CLAY LOAM, some gravel, dry FILL 645.97		9 8 4 6	2.75P	29
Hard, gray, SILTY CLAY LOAM, little gravel, moist	-5	3 4 4 4	4.46B	23
		4 6 11 13	4.17B	21
641.97				
Very stiff, gray and brown, SILTY CLAY, little gravel, moist		3 8 14 14	2.86B	18
639.97	-10			
End of Boring	-15			
	-20			

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

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-19
Station 206+01
Offset 25' RT
Ground Surface Elev. 650.56 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				6" Asphalt, black
				650.06
				12" Concrete
				649.06
	7 8 3 4	3.0P	11	Very stiff, black and gray, SILTY CLAY LOAM, some gravel, dry, FILL
				646.56
-5	3 5 5 6	NR	0	NO RECOVERY
				644.56
	3 5 5 6	4.65B	23	Hard, brown, SILTY CLAY LOAM, brown, little gravel, dry
				642.56
-10	3 3 3 11	3.30B	21	Very stiff, brown, SILTY CLAY, trace gravel, moist
				640.56
				End of Boring
-15				
-20				
-25				
-30				
-35				
-40				

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

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SOIL BORING LOG

Date 2/27/2020

ROUTE FAU 1504/55th Street **DESCRIPTION** 55th Street at LaGrange Road **LOGGED BY** WL

SECTION _____ **LOCATION** LaGrange Road

COUNTY COOK **DRILLING METHOD** Continuous **HAMMER TYPE** B-57 (100%)

STRUCT. NO. _____
Station _____

BORING NO. B-20
Station 208+56
Offset 24' LT
Ground Surface Elev. 650.86 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 4 ft ▼
Upon Completion 4 ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				6" Asphalt, black 650.36
				12" Concrete 649.36
				NO RECOVERY
	50	NR	0	
	8			
	8			
	4			646.86 ▼
	2	1.25P	32	Stiff, gray GRAVELLEY CLAY, some gravel, wet
-5	1			
	2			Sample at 4.0' to 6.0'
	3			L_L(%)=53
	1	0.75P	37	644.86 P_L(%)=17
	1			Medium stiff to hard, gray, SILTY CLAY, trace to litte gravel, wet
	1			
	2			
	2	4.55N	22	
	5			
	7			
	9			640.86
-10				End of Boring
-15				
-20				

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

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

APPENDIX B

LABORATORY TEST RESULTS

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/27/2020 1:00
Analyst: MS

Date *Hour*
Oven out: 2/28/2020 8:00
Analyst: MS

Boring No.	B-1					
Sample No.	1	2	3	4		
Sampling interval	1-2.5 ft.	3.5-5 ft.	6-7.5 ft.	8.5-10 ft.		
Mass of tare and wet soil Ww (g) =		33.50	36.48	40.30		
Mass of tare and dry soil Wd (g) =	No Recovery	29.39	32.07	35.29		
Mass of tare Wt (g) =		11.15	11.38	11.54		
Water content w =		**23%**	**21%**	**21%**		

	B-2					
Sample No.	1	2	3	4	5	
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	
Mass of tare and wet soil Ww (g) =	35.56	33.11	35.33	32.08	38.57	
Mass of tare and dry soil Wd (g) =	30.75	28.81	31.00	28.27	34.01	
Mass of tare Wt (g) =	11.14	11.15	11.22	11.16	11.09	
Water content w =	**25%**	**24%**	**22%**	**22%**	**20%**	

	B-3					
Sample No.	1	2	3	4		
Sampling interval	1-2.5 ft.	3.5-5 ft.	6-7.5 ft.	8.5-10 ft.		
Mass of tare and wet soil Ww (g) =	39.58	30.42	32.12	31.73		
Mass of tare and dry soil Wd (g) =	36.04	26.25	28.25	27.34		
Mass of tare Wt (g) =	11.09	11.11	11.15	11.36		
Water content w =	**14%**	**28%**	**23%**	**27%**		

Prepared By: _____ Date: 3/9/2020
Approved By: _____ Date: 3/11/2020

AASHTO ACCREDITATION PROGRAM

Wang Engineering

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/27/2020 1:00
Analyst: MS

Date *Hour*
Oven out: 2/28/2020 8:00
Analyst: MS

Boring No.	B-4					
Sample No.	1	2	3	4	5	6
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	11-12.5 ft.
Mass of tare and wet soil Ww (g) =	38.25	35.33	35.52	34.68	38.55	39.50
Mass of tare and dry soil Wd (g) =	33.24	31.07	31.19	30.58	33.74	34.52
Mass of tare Wt (g) =	11.67	11.18	11.39	11.45	11.27	11.80
Water content w =	**23%**	**21%**	**22%**	**21%**	**21%**	**22%**

Sample No.	7	8	9			
Sampling interval	13.5-15 ft.	16-17.5 ft.	18.5-20 ft.			
Mass of tare and wet soil Ww (g) =	36.83	33.84	33.40			
Mass of tare and dry soil Wd (g) =	32.35	29.84	29.49			
Mass of tare Wt (g) =	11.35	11.19	11.38			
Water content w =	**21%**	**21%**	**22%**			

	B-5					
Sample No.	1	2	3	4		
Sampling interval	1-2.5 ft.	3.5-5 ft.	6-7.5 ft.	8.5-10 ft.		
Mass of tare and wet soil Ww (g) =	32.91	37.43	36.04	40.00		
Mass of tare and dry soil Wd (g) =	29.01	33.09	31.94	35.00		
Mass of tare Wt (g) =	11.26	11.13	11.29	11.06		
Water content w =	**22%**	**20%**	**20%**	**21%**		

Prepared By: _____ Date: 3/9/2020
Approved By: _____ Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/27/2020 1:00
Analyst: MS

Date *Hour*
Oven out: 2/28/2020 12:00
Analyst: MC

Boring No. **B-6**

Sample No.	1	2	3	4	5	6
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	11-12.5 ft.
Mass of tare and wet soil Ww (g) =	32.77	37.88	37.56	31.44	31.52	33.88
Mass of tare and dry soil Wd (g) =	28.65	32.87	32.62	27.81	27.72	29.85
Mass of tare Wt (g) =	11.16	11.17	11.39	11.02	11.39	11.16
Water content w =	**24%**	**23%**	**23%**	**22%**	**23%**	**22%**

Sample No.	7	8	9			
Sampling interval	13.5-15 ft.	16-17.5 ft.	18.5-20 ft.			
Mass of tare and wet soil Ww (g) =	39.94	36.89	39.20			
Mass of tare and dry soil Wd (g) =	34.44	32.16	34.23			
Mass of tare Wt (g) =	11.08	11.17	11.49			
Water content w =	**24%**	**23%**	**22%**			

Boring No. **B-7**

Sample No.	1	2	3	4		
Sampling interval	1-2.5 ft.	3.5-5 ft.	6-7.5 ft.	8.5-10 ft.		
Mass of tare and wet soil Ww (g) =	37.62	42.86	32.86	35.50		
Mass of tare and dry soil Wd (g) =	33.28	37.15	28.61	31.21		
Mass of tare Wt (g) =	11.35	10.99	11.20	11.16		
Water content w =	**20%**	**22%**	**24%**	**21%**		

Prepared By: _____ Date: 3/9/2020
Approved By: _____ Date: 3/11/2020

AASHTO ACCREDITATION PROGRAM

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/27/2020 1:00
Analyst: MS

Date *Hour*
Oven out: 2/28/2020 12:00
Analyst: MC

Boring No.	B-8					
Sample No.	1	2	3	4	5	
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	
Mass of tare and wet soil Ww (g) =	47.75	47.13	43.30	36.38	32.42	
11.17	45.12	40.66	36.83	32.84	28.96	
Mass of tare Wt (g) =	11.17	11.19	11.07	10.93	11.25	
Water content w =	**8%**	**22%**	**25%**	**16%**	**20%**	

	B-9					
Sample No.	1	2	3	4	5	
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	
Mass of tare and wet soil Ww (g) =	54.76	33.00	32.00	34.08	31.71	
Mass of tare and dry soil Wd (g) =	52.08	28.51	27.54	29.88	28.24	
Mass of tare Wt (g) =	11.47	11.75	11.12	11.06	11.27	
Water content w =	**7%**	**27%**	**27%**	**22%**	**20%**	

Sample No.						
Sampling interval						
Mass of tare and wet soil Ww (g) =						
Mass of tare and dry soil Wd (g) =						
Mass of tare Wt (g) =						
Water content w =						

Prepared By: _____ Date: 3/9/2020
Approved By: _____ Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

		Date	*Hour*
Oven in:		2/27/2020	1:00
Analyst:	MS		
Oven out:		2/28/2020	12:00
Analyst:	MC		

Boring No.	B-10					
Sample No.	1	2	3	4	5	6
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	11-12.5 ft.
Mass of tare and wet soil Ww (g) =	39.68	35.24	40.13	31.13	35.20	33.54
11.17	37.33	30.70	35.05	27.75	31.15	29.76
Mass of tare Wt (g) =	11.07	11.08	11.19	11.16	11.11	11.60
Water content w =	**9%**	**23%**	**21%**	**20%**	**20%**	**21%**

Sample No.	7	8	9			
Sampling interval	13.5-15 ft.	16-17.5 ft.	18.5-20 ft.			
Mass of tare and wet soil Ww (g) =	34.72	34.72	44.24			
Mass of tare and dry soil Wd (g) =	30.84	30.52	38.88			
Mass of tare Wt (g) =	11.17	11.22	11.14			
Water content w =	**20%**	**22%**	**19%**			

Sample No.						
Sampling interval						
Mass of tare and wet soil Ww (g) =						
Mass of tare and dry soil Wd (g) =						
Mass of tare Wt (g) =						
Water content w =						

Prepared By: _____ Date: 3/9/2020
Approved By: _____ Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/28/2020

Oven in: 2/28/2020 3:00
Analyst: LV

Date *Hour*
Oven out: 2/29/2020 14:00
Analyst: MC

Boring No.	B-11					
Sample No.	1	2	3	4	5	
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	
Mass of tare and wet soil Ww (g) =		44.15	33.54	33.94	43.44	
11.17	No Recovery	37.74	29.88	30.20	38.01	
Mass of tare Wt (g) =		11.22	11.32	11.19	11.16	
Water content w =		**24%**	**20%**	**20%**	**20%**	

	B-12					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =	38.84	36.67	35.40	35.11		
Mass of tare and dry soil Wd (g) =	32.55	31.68	30.52	30.82		
Mass of tare Wt (g) =	11.14	11.70	11.14	11.12		
Water content w =	**29%**	**25%**	**25%**	**22%**		

	B-13					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =		35.53	35.70	36.68		
Mass of tare and dry soil Wd (g) =	No Recovery	31.24	31.44	32.15		
Mass of tare Wt (g) =		11.31	11.10	11.43		
Water content w =		**22%**	**21%**	**22%**		

Prepared By: Jay Date: 3/9/2020
Approved By: AZ Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/28/2020 3:00
Analyst: LV

Date *Hour*
Oven out: 2/29/2020 14:00
Analyst: MC

Boring No.	B-14					
Sample No.	1	2	3	4	5	
Sampling interval	0-2 ft.	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	
Mass of tare and wet soil Ww (g) =	36.05	35.20	37.10	42.94	42.00	
11.17	31.80	31.29	33.37	37.13	35.83	
Mass of tare Wt (g) =	11.16	11.44	11.21	11.11	10.96	
Water content w =	**21%**	**20%**	**17%**	**22%**	**25%**	

	B-15					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =	36.18	35.51	36.50	35.62		
Mass of tare and dry soil Wd (g) =	31.96	31.30	32.15	31.70		
Mass of tare Wt (g) =	11.31	11.11	10.96	11.17		
Water content w =	**20%**	**21%**	**21%**	**19%**		

Sample No.						
Sampling interval						
Mass of tare and wet soil Ww (g) =						
Mass of tare and dry soil Wd (g) =						
Mass of tare Wt (g) =						
Water content w =						

Prepared By: Tang Date: 3/9/2020
Approved By: [illegible] Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/28/2020 3:00
Analyst: LV

Date *Hour*
Oven out: 2/29/2020 14:00
Analyst: MC

Boring No.	B-16					
Sample No.	1	2	3	4	5	6
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.	11-12.5 ft.	13.5-15 ft.
Mass of tare and wet soil Ww (g) =	38.54	36.64	38.93	35.97	36.62	36.37
11.17	33.33	30.43	33.67	31.83	32.32	31.94
Mass of tare Wt (g) =	11.14	11.32	11.31	11.09	11.36	11.10
Water content w =	**23%**	**32%**	**24%**	**20%**	**21%**	**21%**

Sample No.	7	8	9	10		
Sampling interval	16-17.5 ft.	18.5-20 ft.	21-22.5 ft.	23.5-25 ft.		
Mass of tare and wet soil Ww (g) =	37.95	36.81	37.25	36.65		
Mass of tare and dry soil Wd (g) =	33.05	32.37	32.70	31.93		
Mass of tare Wt (g) =	11.36	11.18	11.38	11.18		
Water content w =	**23%**	**21%**	**21%**	**23%**		

Sample No.						
Sampling interval						
Mass of tare and wet soil Ww (g) =						
Mass of tare and dry soil Wd (g) =						
Mass of tare Wt (g) =						
Water content w =						

Prepared By: Jeng Date: 3/9/2020
Approved By: Li Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/27/2020

Oven in: 2/27/2020 3:00
Analyst: MS

Date *Hour*
Oven out: 2/29/2020 14:00
Analyst: MC

Boring No.	B-17					
Sample No.	1	2	3	4	5	6
Sampling interval	1-3 ft.	3-5 ft.	5-7 ft.	7-9 ft.	9-11 ft.	11-12.5 ft.
Mass of tare and wet soil Ww (g) =	40.75	30.27	33.64	30.30	33.16	41.13
11.17	36.12	26.70	29.75	27.05	29.59	35.87
Mass of tare Wt (g) =	11.15	11.23	11.23	11.21	11.16	11.30
Water content w =	**19%**	**23%**	**21%**	**21%**	**19%**	**21%**

Sample No.	7	8	9	10	11	
Sampling interval	13.5-15 ft.	16-17.5 ft.	18.5-20 ft.	21-22.5 ft.	23.5-25 ft.	
Mass of tare and wet soil Ww (g) =	34.72	38.44	31.55	45.69	51.02	
Mass of tare and dry soil Wd (g) =	30.40	33.49	28.08	40.33	44.00	
Mass of tare Wt (g) =	11.12	11.08	11.10	11.23	11.20	
Water content w =	**22%**	**22%**	**20%**	**18%**	**21%**	

Sample No.						
Sampling interval						
Mass of tare and wet soil Ww (g) =						
Mass of tare and dry soil Wd (g) =						
Mass of tare Wt (g) =						
Water content w =						

Prepared By: _____ Date: 3/5/2020
Approved By: _____ Date: 3/11/2020

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WATER CONTENT of SOILS and ROCK by MASS

AASHTO T 275 / ASTM D 2216

Client: Himalayan
Project: 55th Street
WEI Job No: 433-04-01

Sample Type: SS
Sample Date: 2/28/2020

Oven in:	2/28/2020	3:00
Analyst:	LV	
	Date	*Hour*
Oven out:	2/29/2020	14:00
Analyst:	MC	

Boring No.	B-18					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =	36.49	35.94	35.72	36.67		
11.17	30.82	31.30	31.38	32.73		
Mass of tare Wt (g) =	11.05	11.38	11.15	11.25		
Water content w =	**29%**	**23%**	**21%**	**18%**		

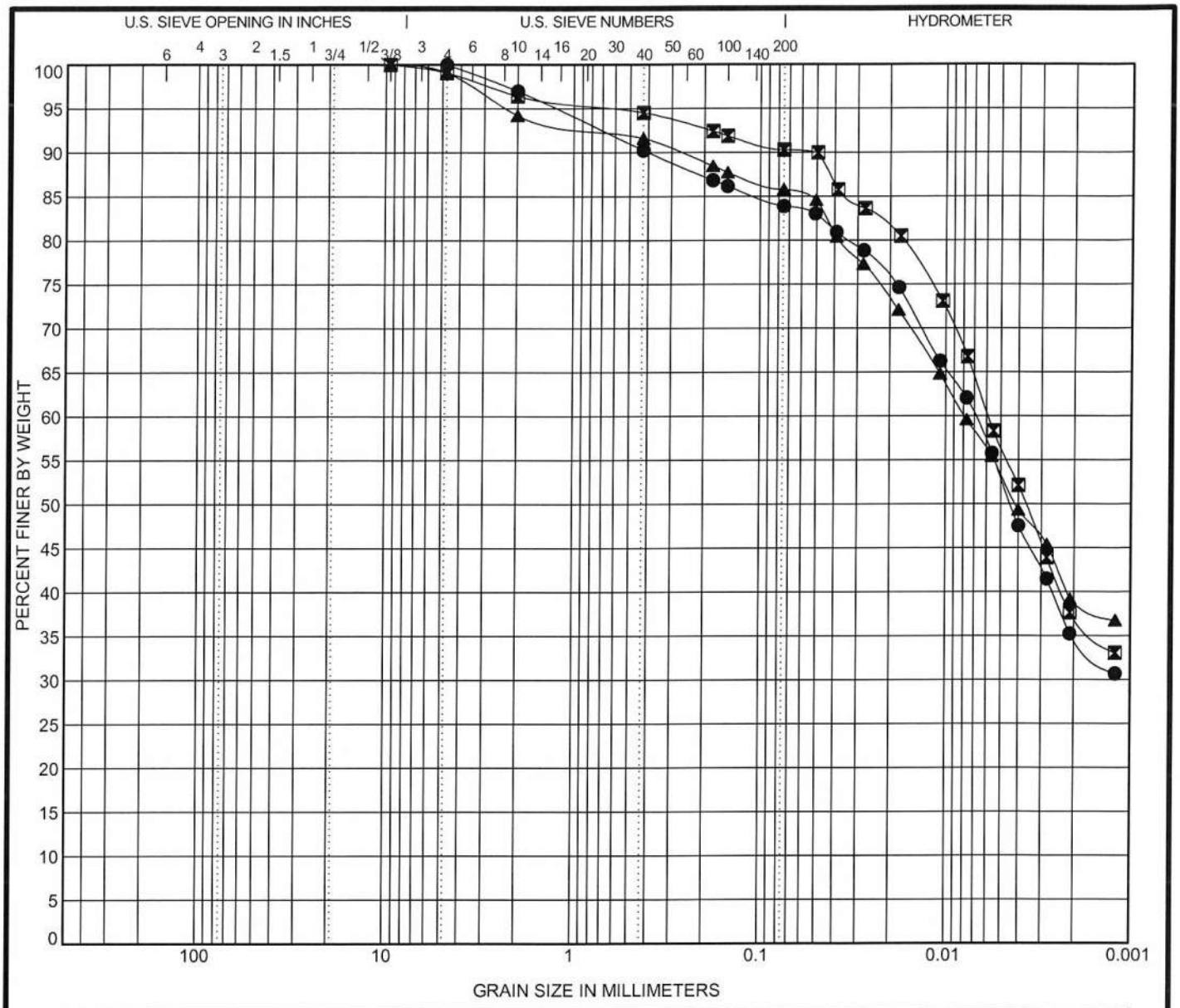
	B-19					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =	37.44		36.41	36.26		
Mass of tare and dry soil Wd (g) =	34.94	No Recovery	31.67	31.99		
Mass of tare Wt (g) =	11.15		11.08	11.51		
Water content w =	**11%**		**23%**	**21%**		

	B-20					
Sample No.	1	2	3	4		
Sampling interval	2-4 ft.	4-6 ft.	6-8 ft.	8-10 ft.		
Mass of tare and wet soil Ww (g) =		35.17	36.45	35.75		
Mass of tare and dry soil Wd (g) =	No Recovery	29.36	29.56	31.33		
Mass of tare Wt (g) =		11.18	11.17	11.19		
Water content w =		**32%**	**37%**	**22%**		

Prepared By: _____ Date: 3/9/2020

Approved By: _____ Date: 3/11/2020

AASHTO ACCREDITATION PROGRAM



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● B-01#	3.5 ft	**Silty Clay**	**38**	**17**	**21**		
⊠ B-06#	2.0 ft	**Silty Clay**	**41**	**17**	**24**		
▲ B-09#	2.0 ft	**Clay**	**60**	**20**	**40**		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-01#	3.5 ft	**4.75**	**0.007**			**3.0**	**13.1**	**49.0**	**34.9**
⊠ B-06#	2.0 ft	**9.5**	**0.006**			**3.6**	**6.1**	**53.1**	**37.2**
▲ B-09#	2.0 ft	**9.5**	**0.008**			**5.8**	**8.4**	**46.8**	**39.0**

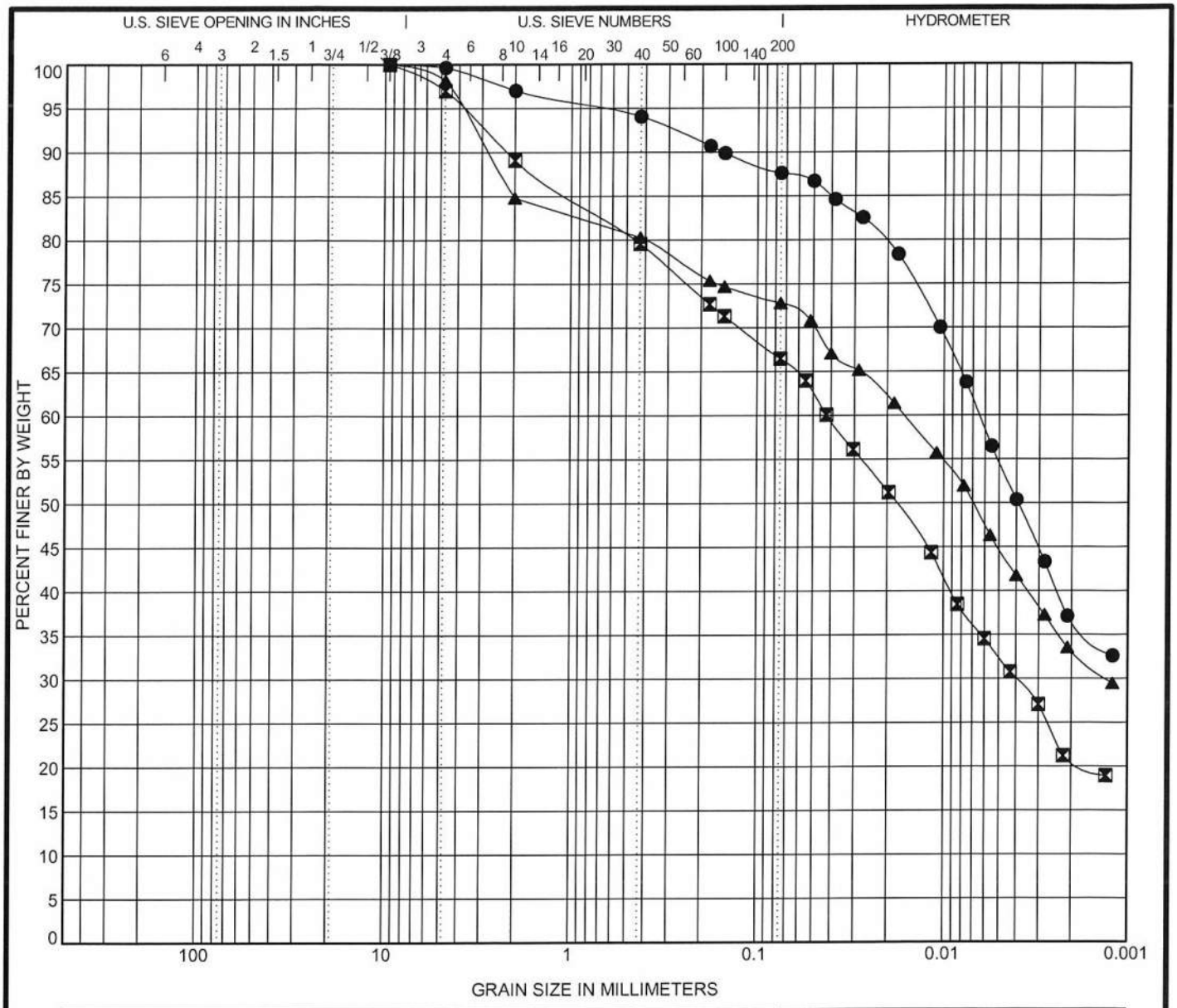
WEI SINCE 1982
Wang Engineering, Inc.
1145 North Main Street
Lombard, Illinois 60148
Telephone: 630-953-9928
Fax:

GRAIN SIZE DISTRIBUTION

Project: 55th.Street at Lagrange Rd. - PTB 164/008

Location: Cook Co.

Number: 433-04-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● B-14#	2.0 ft	**Silty Clay**	**36**	**17**	**19**		
⊠ B-17#	1.0 ft	**Silty Clay Loam**	**46**	**18**	**28**		
▲ B-20#	4.0 ft	**Gravelly Clay**	**53**	**17**	**36**		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-14#	2.0 ft	**9.5**	**0.006**			**3.0**	**9.4**	**50.9**	**36.7**
⊠ B-17#	1.0 ft	**9.5**	**0.042**	**0.004**		**10.9**	**22.7**	**45.6**	**20.8**
▲ B-20#	4.0 ft	**9.5**	**0.016**	**0.001**		**15.2**	**12.1**	**39.6**	**33.2**

WEI SINCE 1982
Wang Engineering, Inc.
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Lombard, Illinois 60148
Telephone: 630-953-9928
Fax:

GRAIN SIZE DISTRIBUTION

Project: 55th.Street at Lagrange Rd. - PTB 164/008

Location: Cook Co.

Number: 433-04-01

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

ORGANIC CONTENT in SOILS by LOSS on IGNITION

ASTM D 2974, Method C

Client: Himalayan
Project: 55th. Street at Lagrange Rd.
WEI Job: 433-04-01
Type/Condition: SS
Testing Furnace Temp °C.: 440

Analyst Name: M. Ciapas
Date Received: 2/27/2020
Date Tested: 4/13/2020
Soil Sample ID: B-04, SS#1 (0-2 ft.)
Sample Description: Brown&Gray Silty Clay

Moisture Content	Wet soil + tare (g)	Dry Soil + tare (g)	Tare mass (g)	w (%)
oven-dry method	80.98	73.64	41.81	23

Ash Content	Dry Soil + tare (g)	Ash + tare (g)	Tare mass (g)	Ash Content (%)
Loss On Ignition	73.64	72.57	41.81	3

Organic Content (%)= **3.5**

Prepared By: Jay 4/21/2020

Reviwed By: _____

AASHTO R18

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
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ORGANIC CONTENT in SOILS by LOSS on IGNITION

ASTM D 2974, Method C

Client: Himalayan
Project: 55th. Street at Lagrange Rd.
WEI Job: 433-04-01
Type/Condition: SS
Testing Furnace Temp °C.: 440

Analyst Name: M. Ciapas
Date Received: 2/27/2020
Date Tested: 4/13/2020
Soil Sample ID: B-12, SS#1 (2-4 ft.)
Sample Description: Black Silty Clay Loam

Moisture Content	Wet soil + tare (g)	Dry Soil + tare (g)	Tare mass (g)	w (%)
oven-dry method	91.79	77.92	43.27	40

Ash Content	Dry Soil + tare (g)	Ash + tare (g)	Tare mass (g)	Ash Content (%)
Loss On Ignition	77.92	73.27	43.27	16

Organic Content (%)= **15.5**

Prepeared By: Jay 4/21/2020

Reviwed By: _____

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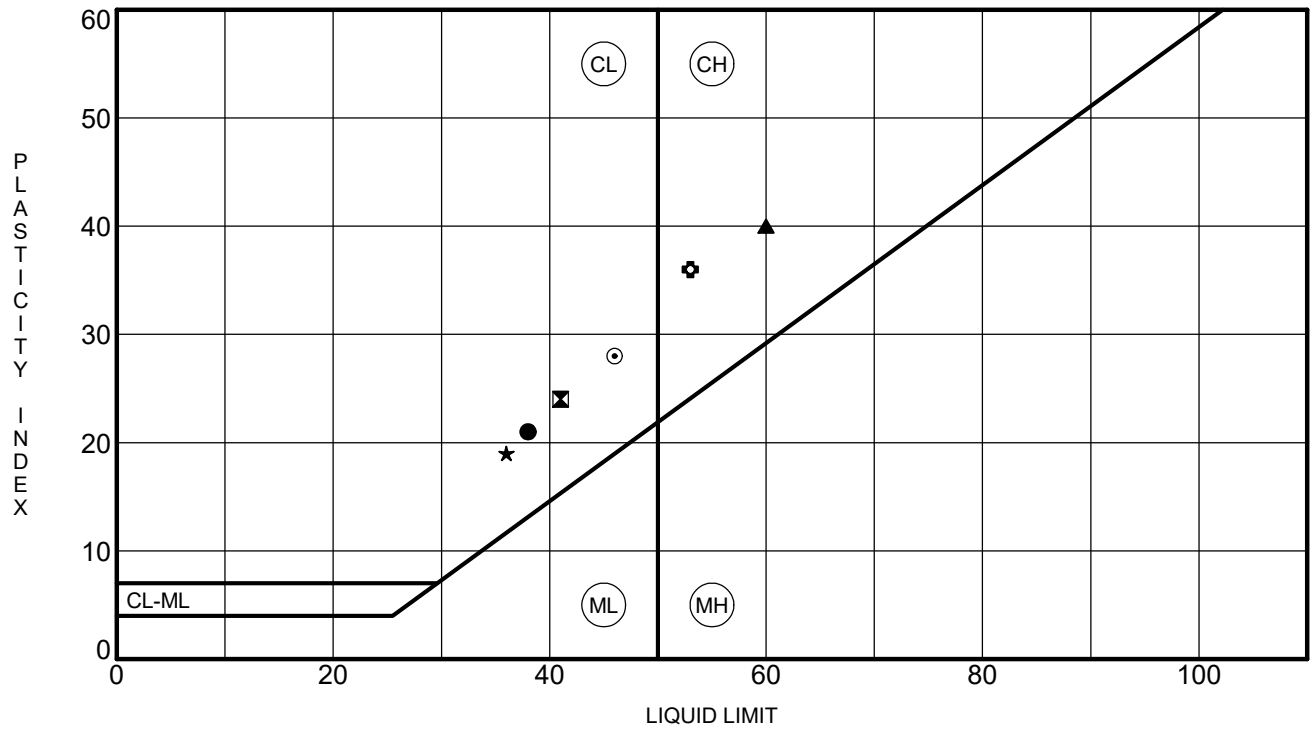

Specimen Identification			LL	PL	PI	Fines	Classification
●	**B-01**	**3.50**	**38.0**	**17.0**	**21.0**	**14.2**	**Silty Clay**
⧓	**B-06**	**2.00**	**41.0**	**17.0**	**24.0**	**40.8**	**Silty Clay**
▲	**B-09**	**2.00**	**60.0**	**20.0**	**40.0**	**14.2**	**Clay**
★	**B-14**	**2.00**	**36.0**	**17.0**	**19.0**	**12.4**	**Silty Clay**
⊙	**B-17**	**1.00**	**46.0**	**18.0**	**28.0**	**33.6**	**Silty Clay Loam**
✿	**B-20**	**4.00**	**53.0**	**17.0**	**36.0**	**27.2**	**Gravelly Clay**

Himalayan Consultants, LLC
Engineers and Hydrogeologists

ATTERBERG LIMITS' RESULTS

Route: FAU 1504/55th Street

Section:

County: COOK

ATTERBERG_LIMITS_55TH STREET-LAGRANGE.GPJ IL_DOT.GDT 5/8/20