STRUCTURE GEOTECHNICAL REPORT
MAIN STREET OVER I & M CANAL
UNNAMED TRIBUTARY
CULVERT 10 AT STATION 123+40.39
PR SN 016-0915, SECTION 2020-142-C&DR
LEMONT COOK COUNTY, ILLINOIS

For
Mott MacDonald
10 South LaSalle Street, Suite 2520
Chicago, IL 60603

Submitted by
Wang Engineering, Inc.
1145 North Main Street
Lombard, IL 60148

Original Report: December 27, 2021
Revised Report: May 11, 2022

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report, Culvert at Station 123+40.39 Main Street from Wheeler Road to Illinois 83 (Archer Avenue)		**2. Original Date:** December 27, 2021 **Revised Date:** May 11, 2022 **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☒ Final ☐ Revised
4. Route / Section / County/ District/ Region FAU3585/ 2020-142-C &DR/ Cook/ 1/ 1		**5. IDOT Job / Contract** D-91-449-20/ 62L30
6. PTB / Item No. 196/006	**7. Existing Structure Number(s)** 016-0915	**8. Proposed Structure Number(s)** 016-0915
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Ramesh KC, PE QA/QC: Corina T. Farez, PG, PE PM: Met Seyhun, PE	**Contact** (630) 953-9928 ext. 1018 mseyhun@wangeng.com
10. Prepared for Mott MacDonald 10 S. LaSalle Street, Suite 2520 Chicago, IL, 60603	**Design Engineer** Kevin Bollinger, P.E.	**Contact** (312) 894-5368 kevin.bollinger@mottmac.com

11. Abstract

The existing single cell culvert with 8-foot wide and 5.2-high opening that carries Main Street Culvert over I&M Canal Tributary will be replaced. The new culvert will be precast or cast-in-place single box culvert with an interior opening of 12-foot wide and 4-foot high. The culvert will have a length of 55 feet, a total width of 14 feet, and up to 3 feet of embankment fill on the top.

Beneath the surface and up to 4.9 feet of fill, the soil is made up of soft silty clay loam followed by 4.2 feet of soft to medium stiff silty clay loam. Underneath the cohesive soil, borings encountered up to 7.5 feet of medium dense gravelly loam to silty loam. Weathered bedrock was encountered at 595.3 to 595.7 feet elevation and sound dolostone bedrock at elevation 589 feet. Additionally, auger/sampler refusals were noted in two borings at elevation of 591 to 593 feet. Groundwater was encountered while drilling at elevations of 593.7 to 597.5 feet (3.3 to 14 feet bgs) and was measured at elevations of 593.2 to 596.0 feet (3.8 to 12 feet bgs) upon completion of drilling.

Bottom of culvert barrel elevations at upstream and downstream are 599.6 and 598.8, respectively. The weathered bedrock is at about 4 feet below the bottom of culvert barrel. The new culvert is anticipated to rest on the medium dense gravelly loam, silty loam to loam.

The groundwater was encountered about 1 foot below the culvert base elevations or in gravelly silty loam to silty loam layer. The anticipated long-term groundwater table could be as high as 603.0 feet elevation or above the proposed culvert base elevation. Contractor should be prepared for dewatering measures depending upon prevailing climate conditions and the time of the year the culvert construction taken place. Control runoff and maintenance of existing flows may require temporary water diversion and control.

For the replacement of culvert along Main Street, temporary soil retention system will be required. The TSRS should be included as Pay Item.

Wang recommends that the impact of the proposed culvert on the existing utilities including gas line, sanitary sewer, and water main be undertaken for safety and construction reasons.

12. Path to archived file

N:_WANGLegacy\SHARED\Netprojects\2690201\Reports\Culvert_10_SGR\V03\RPT_Wang_RKC-MWS_2690201MainStreetCulvert10FinalV01_20220511.doc

TABLE OF CONTENTS

Wang Engineering

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

STRUCTURE GEOTECHNICAL REPORT
MAIN STREET OVER I & M CANAL
UNNAMED TRIBUTARY
CULVERT 10 AT STATION 123+40.39
PR SN 016-0915, SECTION 2020-143-C&DR
LEMONT, COOK COUNTY, ILLINOIS
FOR
MOTT MACDONALD

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations to support the design and construction of replacement of culvert for Main Street over I & M Canal Unnamed Tributary at Station 123+40.39 in the Village of Lemont, Cook County, Illinois. On the USGS *Sag Bridge Quadrangle 7.5 Minute Series* map, the project site is generally located at SW ¼ of Section 14, Township 37N, Range 11E of the Third Principal Meridian. A *Site Location Map* is presented as Exhibit 1.

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

1.1 Proposed Structure

Based on *General Plan and Elevation (GPE) sheets* (Appendix D) dated December 15, 2021 provided by Mott MacDonald (Mott), Wang Engineering, Inc. (Wang) understands the existing single cell culvert will be removed and replaced with a precast or cast-in-place single-cell box culvert with an interior opening of 12-foot wide and 4-foot high. The culvert has proposed invert elevations of 600.75 feet and 599.65 at the upstream and downstream ends.

The culvert will have a length of 55 feet and total width of 14 feet with up to 3 feet of embankment fill on the top. Culvert wingwalls type is yet to be determined. The types of wingwalls at the upstream and downstream ends have not been determined at the time of report preparation.

1.2 Existing Structure and Land Use

The existing structure was constructed circa 1900. The structure consists of a single cell 8-foot wide and 5.2-foot high arch culvert. The existing overtop elevation is 608.4 feet at Station 123+40 and proposed overtop elevation is 608.76 feet at Sta. 123+00. The existing structure will be completely removed. The surrounding land of the structure is generally wooded area.

2.0 METHODS OF INVESTIGATION

The following sections outline the field and laboratory investigations performed by Wang.

2.1 Field Investigation

The field investigation consisted of three structure borings, designated as CUL-10-01 through CUL-10-03 drilled along either side of the right-of-way shoulders and in the westbound lane of Main Street. The borings were performed by Wang from October 5 to 13, 2021. The as-drilled northings and eastings were obtained with a mapping-grade GPS unit. Elevations, stations, and offsets were provided by Mott. As-drilled boring locations are presented in the *Boring Logs* (Appendix A) and the as-completed boring locations are shown in the *Boring Location Plan* (Exhibit 2).

A truck-mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain open boreholes for borings CUL-10-02 and CUL-10-03. Soil sampling was performed according to AASHTO T206, *"Penetration Test and Split Barrel Sampling of Soils."* The soil was sampled at 2.5-foot intervals to the boring termination depths. Rig access was limited to the north of the culvert thus a jackhammer driven Geoprobe sampler was used to continuously sample soils at Boring CUL-10-01. Bedrock cores were obtained in Boring CUL-10-03 in 10-foot runs with an NW4-sized core barrel. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examination and laboratory testing. Additionally, a bulk sample was collected in Boring CUL-10-01 for further hydraulic analysis.

Field boring logs, prepared and maintained by Wang geologists, include lithological descriptions, visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each boring. Each borehole was backfilled upon completion with soil cuttings and/or bentonite chips. The pavement surface was restored as close as possible to its original condition.

2.2 Laboratory Testing

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89 and T90) and particle size analyses (AASHTO T88) were performed on selected samples. An Unconfined Compressive Strength Test (AASHTO T22) was performed on one selected intact bedrock core. Tested samples were classified according to the IDH classification system. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B). Additionally, a bulk sample was tested for scour analysis.

3.0 INVESTIGATION RESULTS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 3). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

3.1 Lithological Profile

Boring CUL-10-01, drilled at the downstream end, encountered 4 feet of gravelly sandy loam. Boring CUL-10-02, drilled in the westbound lane, encountered pavement consisting of 7 inches of asphalt over 9 inches of concrete pavement. Boring CUL-10-03, drilled near the south right-of-way shoulder encountered 8 inches of silty clay loam topsoil. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); 2) soft to medium stiff silty clay loam; 3) medium dense gravelly loam and silty loam; 4) very dense sandy gravel to weathered dolostone bedrock; and 5) dolostone bedrock.

1) Man-made ground (fill)

Beneath the pavement and topsoil, the borings encountered 5.5 feet of soft, brown and dark brown silty clay loam fill. The cohesive fill has unconfined compressive strength (Q_u) values range between 0.3 and 0.4 tsf and moisture content values range between 11 and 28%.

2) Soft to medium stiff silty clay loam

Beneath the fill, at an elevation of 607.0 feet, the Boring CUL-10-02 encountered 4.2 feet of soft to medium stiff, brown silty clay loam. The unit has Q_u values range between 0.3 and 0.8 tsf and moisture content values range between 16 and 24%.

3) Medium dense gravelly loam and silty loam

At elevations of 602.5 and 602.8 feet, the borings encountered 6.8 to 7.5 feet of medium dense, brown, damp to wet gravelly loam and silty loam. The unit has SPT-N values range from 11 to 20 blows per foot and moisture content values range between 5 to 20%. Liquid Limit (LL) and Plastic Limit (PL) Test done on a sample taken from culvert stream bed shows LL values of 46% and PL values of 26%.

4) Very dense sandy gravel to weathered dolostone bedrock

At elevations of 595.3 and 597.0 feet, the borings encountered up to 6.7 feet of very dense, brown and gray, dry to saturated sandy gravel to weathered dolostone. The weathered bedrock has N values of greater than 50 blows per 2 to 6 inches and moisture content values range between 7 and 17%. Boring CUL-10-01 encountered sampler refusal at an elevation of 593.0 feet, indicating possible cobble or weathered bedrock.

5) Dolostone bedrock

At an elevation of 589.0 feet (19 feet bgs), Boring CUL-10-03 encountered strong, light gray, poor quality dolostone bedrock. The rock quality designation (RQD) values range from 49%, classifying the bedrock as poor. Laboratory testing on an intact rock core specimen showed a uniaxial compressive strength of 13,551 psi. *Bedrock Core Photographs* are attached in Appendix C.

3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 593.7 and 597.5 feet (3.3 and 14 feet bgs) and was measured in open boreholes at elevations of 593.2 and 596.0 feet (3.8 and 12 feet bgs) upon completion of drilling. We estimate the long-term groundwater elevation could be as high as 603 feet or on top of silty loam to gravelly loam layer.

4.0 ANALYSES AND RECOMMENDATIONS

In the following sections, we present the results of our analyses and recommendations for the proposed culvert and wingwalls.

4.1 Culvert Foundations

Based on the subsurface investigation, the soils at the base of culvert barrel are expected to be up to 4-foot thick medium dense gravelly loam, silty loam to loam layers followed by weathered dolostone bedrock. Prior to culvert barrel construction, we recommend removing any soft soils present at and below the culvert invert elevation. The replacement material could be IDOT CA-6 or IDOT District One "*Aggregate Subgrade Improvement*" materials. The removal and replacement material should extend a minimum of two foot beyond the edge of the box. The actual extent of the removal should be determined in the field by a geotechnical soil inspector at the time of construction. It should be noted that the long-term groundwater table can be as high as 603.0 feet elevation, thus water control may be needed during construction.

We estimate the foundation soils will experience long-term settlement of 1 inches or less with a differential settlement of 0.5 inches or less. Based on our geotechnical analysis both precast or cast-in-place culverts are feasible at this site.

4.2 Wingwalls

Based on the GPE and information provided by Mott, the wingwall types at the upstream and downstream ends have not been determined yet. It should be noted that if the proposed wingwalls are less than 16 feet in length, a horizontal cantilever wingwall type could be considered (IDOT 2017). Horizontal cantilever or L-type wingwalls are supported by the culvert box rather than the foundation soils and should be designed based on the guidelines provided in Section 4.2 and 4.3 of the IDOT *Culvert Manual* (2017).

We do not recommend driven sheet pile or soldier pile and lagging walls due to the presence of and shallow bedrock. Other wingwall type could be cast-in-place T-type walls, the footings should be established at a depth such that they would be at least 4 feet below culvert barrel invert elevation or on top of weathered bedrock which is expected to be encountered at elevations of 595.3 to 595.7 feet. Therefore, weathered bedrock excavation and levelling may be required before placement of footings. Based on the borings, saturated medium dense silty loam is expected to be

encountered at T-type wall footing. The T-type walls could be designed based on a maximum factored resistance of 3,000 psf, determined with a bearing resistance factor of 0.45 (AASHTO 2020). The wingwalls should be sized and designed based on the information and typical sections shown in Section 4.4 of the IDOT *Culvert Manual* (IDOT 2017).

4.3 Global Stability

Since the horizontal cantilever walls are expected to be preferred wingwall type, we do not anticipate global instability concerns for wingwalls. For the T-type wall, global stability analysis will be performed when cross-section drawing becomes available.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

The existing vegetation, surface topsoil, pavement, and debris should be cleared and stripped where the foundations will be placed.

5.2 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby roadways, utilities and structures should be considered during design and at the time of construction. Therefore, Wang recommends that the impact of the proposed culvert on the existing utilities including gas line and sanitary sewer at the north end and water line at the south end be undertaken for safety and construction reasons. Any excavation that cannot be sloped 1:2.5 (V:H) should be properly shored Temporary Soil Retention Systems (TSRS). The TSRS can be included as *Pay Item*. Due to the shallow bedrock, temporary sheet piling is not feasible using IDOT Design Guide 3.3.1.13 (IDOT 2012).

The anticipated long-term groundwater table could be as high as 603.0 feet elevation or above the proposed culvert base elevation. Contractor should be prepared for special dewatering measures. Depending upon prevailing climate conditions and the time of the year when wingwalls construction taken place, control runoff and maintenance of existing flows may require temporary water diversion and control. The contractor should be prepared for dewatering measures. Any water that accumulates in open excavations by seepage or runoff should be immediately removed.

Unstable or unsuitable materials exposed during excavation should be removed and replaced with

compacted structural fill as described in Section 4.1. Geotechnical and field engineer may extend or reduce the limits of excavation based on soil condition encountered during construction. The following note should be included:

The limits and quantities of removal and replacement shown are based on the boring data and may be modified by the District Geotechnical and Field Engineers for variable subsurface conditions encountered in the field.

In cases where replacement below the box culvert extension where dewatering and compaction is not possible, Rockfill shall be used and the following note should be added:

The Rockfill shall be capped with 6 inches of CA7 and satisfy the Standard Specifications unless otherwise indicated in the Special Provisions. The cost of the capping material shall be included in the pay item for Rockfill.

5.3 Filling and Backfilling

Fill used as embankment material and for replacement of any unstable or unsuitable soils encountered during construction should be pre-approved by the Engineer. The material used to backfill around and to a level at least 1 foot over the top of the culvert box, should be porous granular material conforming to the requirements specified in the IDOT 2022 Standard Specifications (IDOT 2022). The fill material should be free of organic matter and debris. Engineered fill should be placed in lifts and compacted according to Section 205, Embankment (IDOT 2022).

5.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. 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 the standing water should be removed. Wet weather can cause problems with subgrade compaction.

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

6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 2. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. If changes are planned to the proposed improvements as described in this report, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Mott MacDonald and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Metin W. Seyhun, P.E
Project Manager

Ramesh KC, P.E.
Project Geotechnical Engineer

Corina T. Farez, P.E., P.G.
QA/QC Reviewer

REFERENCES

AASHTO (2020) *LRFD Bridge Design Specifications, 9th Edition*. Washington DC.

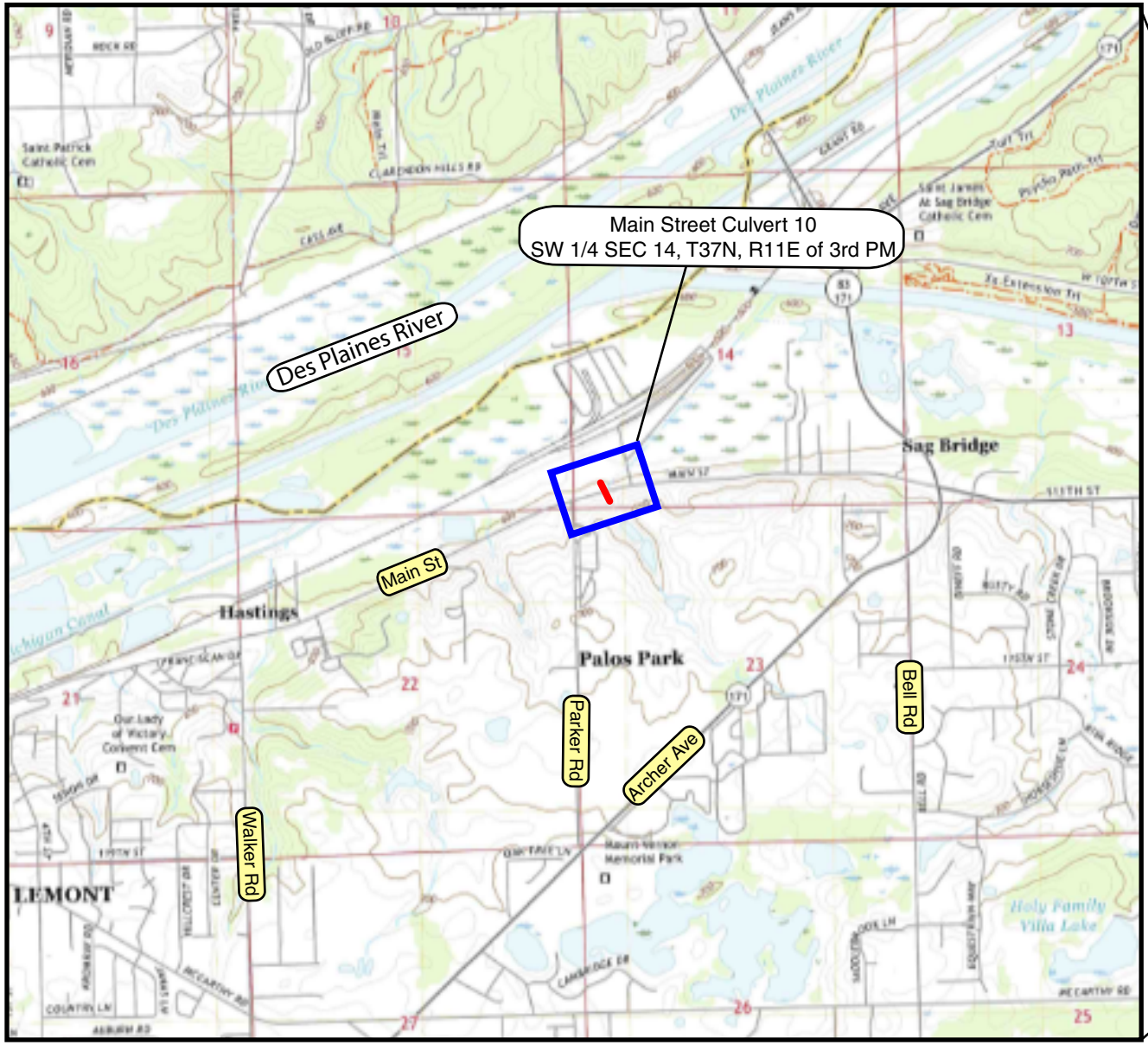
IDOT (2017) *Culvert Manual.* Illinois Department of Transportation.

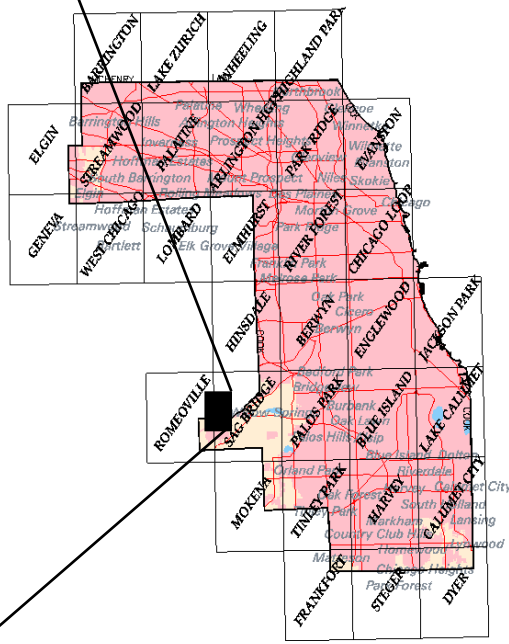
IDOT (2022) *Standard Specifications for Road and Bridge Construction.* Illinois Department of Transporation.

Wang Engineering

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

EXHIBITS





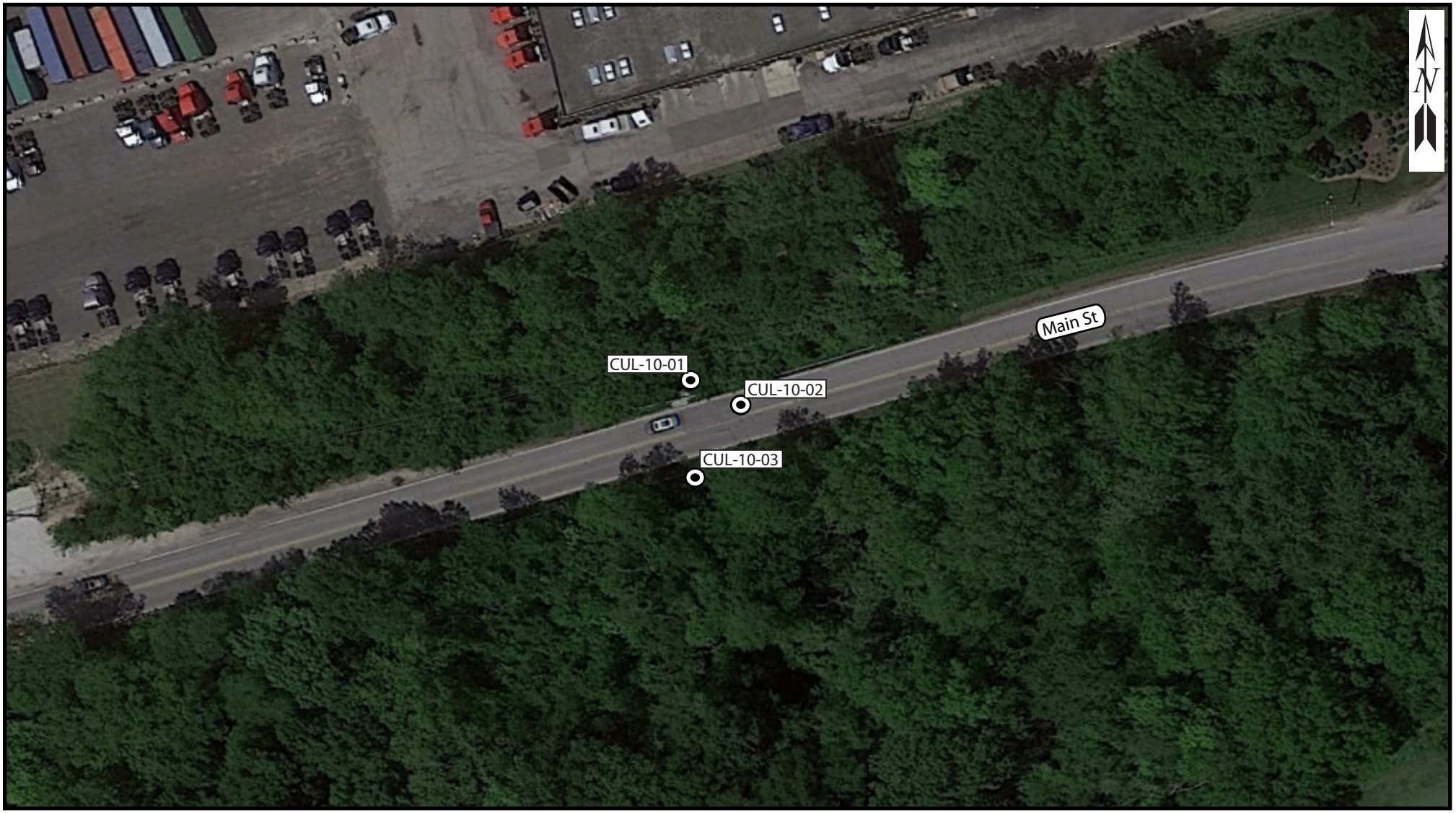
Cook County

SITE LOCATION MAP: MAIN STREET OVER I & M CANAL UNNAMED TRIBUTARY, CULVERT 10, STA. 123+40.39, COOK COUNTY, ILLILNOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: M. Seyhun

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR MOTT MCDONALD	269-02-01



0 100 200 Feet

Legend

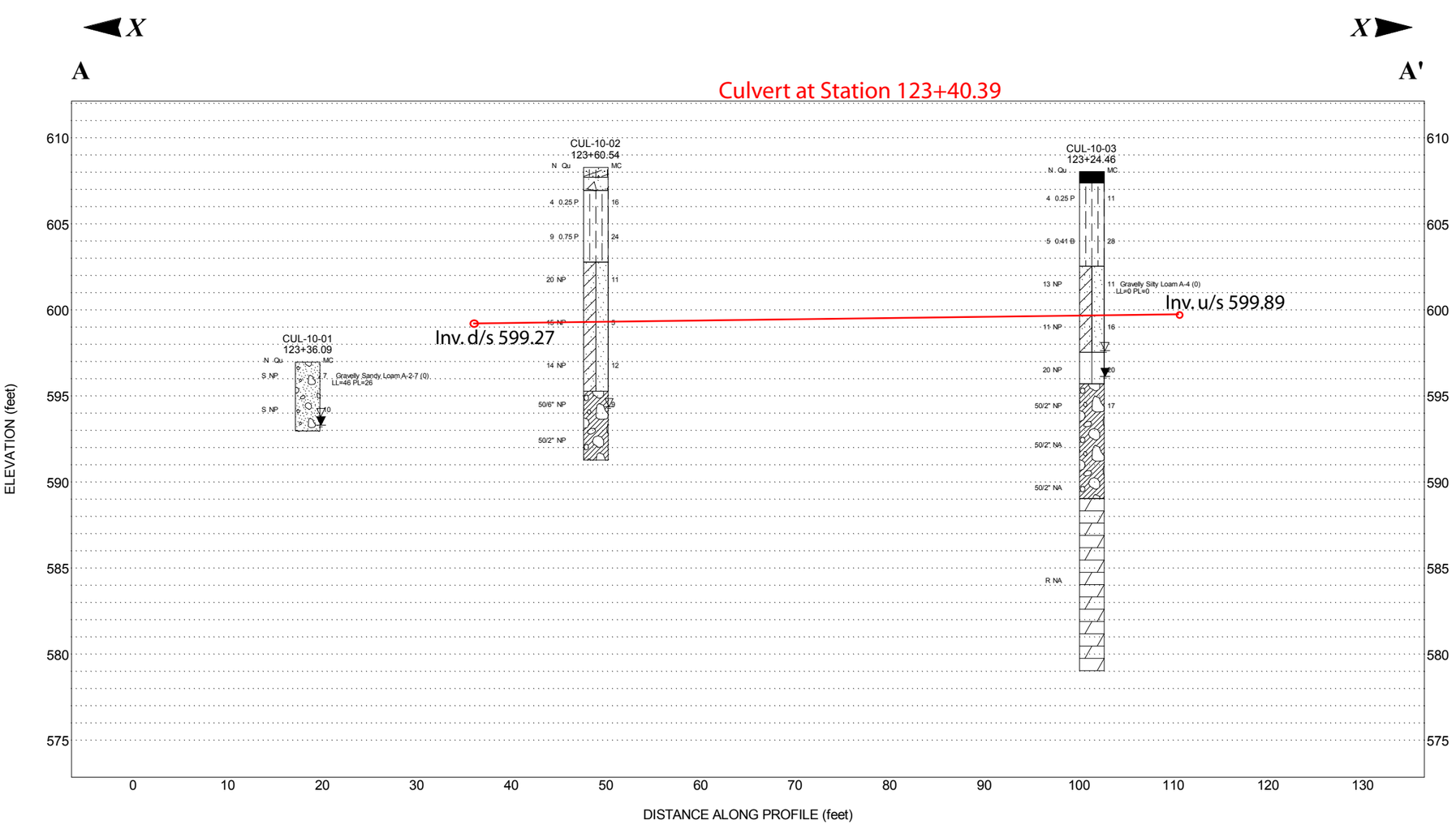
Boring Location

BORING LOCATION PLAN: MAIN STREET OVER I & M CANAL UNNAMED TRIBUTARY, CULVERT 10, STA. 123+40.39, COOK COUNTY, ILLILNOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: M. Seyhun

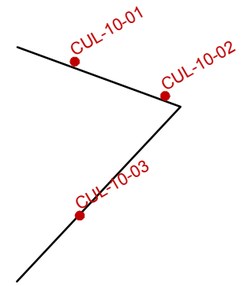
Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR MOTT MCDONALD	269-02-01



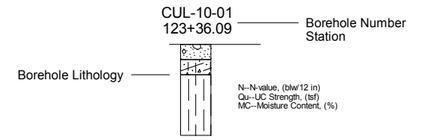
Lithology Graphics

- Gravelly sand, sandy gravel
- Pavement
- Concrete
- IDH Silty Clay, Silty Clay Loam
- IDH Loam
- Weathered bedrock
- Topsoil
- IDH Silt, Silty Loam
- Dolomite or Dolomitic Limestone



Site Map Scale 1 inch equals 50 feet

Explanation:



Water Level Reading at time of drilling.

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

Horizontal Scale (feet)

Vertical Exaggeration: 2x

Wang Engineering, Inc.
1145 N Main Street
Lombard, IL 60148

Subsurface Data Profile
Culvert at Station 123+40.39

Main Street Lemont from Wheeler RD to IL 83
Cook County, IL

JOB NUMBER	PLATE NUMBER
269-02-01	EXHIBIT 3

WEI SINCE 1982

WEI 11X17 269020I.GPJ WANGENG.GDT 12/8/21

Wang Engineering

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

APPENDIX A

Wang Engineering

LEGEND FOR BORING LOG

Relative Density of Non-Cohesive Soils

N-Blows/ 12 inches	Relative Density Term
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80+	Very Dense

Consistency of Cohesive Soils

Unconfined Compressive Strength Qu, tsf	Consistency Term
<0.25	Very Soft
0.25-0.49	Soft
0.50-0.99	Medium Stiff
1.00-1.99	Stiff
2.00-3.99	Very Stiff
>4.00	Hard

Rock Quality Designation (RQD)

0-25%	Very Poor
25-50%	Poor
50-75%	Fair
75-90%	Good
90-100%	Excelent

SS = Split Spoon
ST = Shelby Tube
SPT = Standard Penetration Test
Q_u = Unconfined Compressive Strength
NP = Non Plastic
P = Pocket Penetrometer
S = Shear failure of sample, Rimac test
B = Bulge failure of sample, Rimac test
SSA = Solid Stem Augers,
HSA = Hollow Stem Augers,

Proportional Terms

Trace	1-9	Percent of Dry Weight
Little	10-19	
Some	20-34	
And	35-50	

Gradation Terminology

Boulders	>200mm
Cobbles	200mm to 75mm
Gravel	75mm to 2mm
Sand	2-0mm to 0.074mm
Silt	0.074mm to 0.002mm
Clay	<0.002mm

Relative Moisture Conditions

Term	Description
Dry	Dusty, No visible moisture
Damp	Cohesives hard to mold; Granulars do not flow easily
Moist	Cohesives can be molded; Granulars start to stick together
Wet	Cohesives can be very easily molded and sticky; Granulars stick together easily
Saturated	Only granular soils; Water drains freely from sample

Relative Drilling Resistance (RDR)

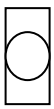
1	No Chatter - Very Easy Drilling
2	No Chatter - Easy Drilling
3	Some Chatter - Moderate Advancement
4	Frequent Chatter - Slow Advancement
5	Constant Chatter - Very Slow Advanement

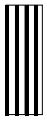
Sample Type Symbols


Split Spoon


Rock Core


In-situ Vane Shear Test


No Recovery


Shelby Tube

SPT = Standard Penetration Test
N Value is the sum of the second and the third numbers


Geoprobe


Auger Cuttings

(Rev. 05/23/2018)

Wang Engineering
wangeng@wangeng.com
1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG CUL-10-01

WEI Job No.: 269-02-01

Client **Mott MacDonald**
Project **Main Street Lemont from Wheeler RD to IL 83**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 596.97 ft
North: 1829021.81 ft
East: 1088830.25 ft
Station: 123+36.09
Offset: 28.24' LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Brown and gray GRAVELLY SANDY LOAM; dry to saturated			1	PUSH	NP	7
		--L_L(%)=46, P_L(%)=26--						
		--%Gravel=68.2--						
		--%Sand=18.0--						
		--%Silt=10.9--						
		--%Clay=2.9--						
		--A-2-7 (0)--			2	PUSH	NP	10
		--possible bedrock or cobble--						
	593.0	Boring terminated at 4.00 ft	5					
			10					
			15					
			20					

GENERAL NOTES

Begin Drilling **10-11-2021** Complete Drilling **10-11-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **Geoprobe HA**
Driller **R&A** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **1" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.25 ft**
At Completion of Drilling ▼ **3.75 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 2690201.GPJ WANGENG.GDT 12/20/21

Wang Engineering
wangeng@wangeng.com
1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG CUL-10-02

WEI Job No.: 269-02-01

Client **Mott MacDonald**
Project **Main Street Lemont from Wheeler RD to IL 83**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 608.29 ft
North: 1829011.00 ft
East: 1088858.71 ft
Station: 123+60.54
Offset: 10.12' LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	607.7	7-inch thick ASPHALT --PAVEMENT--						
	607.0	9-inch thick CONCRETE --PAVEMENT--						
		Soft to medium stiff, brown SILTY CLAY LOAM, little gravel; damp --RDR 2--			1	2 2 2	0.25 P	16
			5		2	2 2 7	0.75 P	24
	602.8	Medium dense, brown GRAVELLY LOAM; damp --RDR 2-3--			3	5 7 13	NP	11
			10		4	21 9 6	NP	5
		--Possible Cobbles and Boulders--			5	4 9 5	NP	12
	595.3	Very dense, gray weathered DOLOSTONE; dry to wet --Weathered BEDROCK-- -RDR 3-4--	15		6	38 50/6"	NP	9
		--Top of Possible Sound Bedrock--			7	50/2"	NP	
	591.3	Boring terminated at 17.00 ft	20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **10-13-2021** Complete Drilling **10-13-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **R&A** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **14.00 ft**
At Completion of Drilling ▼ **DRY**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

Wang Engineering
wangeng@wangeng.com
1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG CUL-10-03

WEI Job No.: 269-02-01

Client **Mott MacDonald**
Project **Main Street Lemont from Wheeler RD to IL 83**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 608.04 ft
North: 1828973.35 ft
East: 1088831.83 ft
Station: 123+24.46
Offset: 18.83' RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	607.4	8-inch thick, black SILTY CLAY LOAM						
		--TOPSOIL--						
		Soft, brown to dark brown SILTY CLAY LOAM, trace gravel; damp			1	1 2 2	0.25 P	11
		--FILL--						
		--RDR 1--						
			5		2	1 2 3	0.41 B	28
	602.5	Medium dense, brown GRAVELLY SILTY LOAM to SILTY LOAM; damp			3	5 5 8	NP	11
		--RDR 3--						
		--%Gravel=15.0--						
		--%Sand=35.2--						
		--%Silt=46.2--						
		--%Clay=3.6--						
		--A-4 (0)--			4	7 6 5	NP	16
			10					
	597.5	Medium dense, brown SILTY LOAM; wet			5	3 6 14	NP	20
		--RDR 3--						
	595.7	Very dense, brown Weathered DOLOSTONE fragments; dry						
		--Weathered BEDROCK--						
		--RDR 5--			6	10 50/2"	NP	17
			15					
					7	50/2"		
	589.0	--AUGER REFUSAL--			8	50/2" C		
		Strong, light greyish gray, poor rock mass quality, dry	20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		DOLOSTONE; moderately weathered rock and slightly weathered joints, closely spaced horizontal and oblique joints, with up to greater than 0.2-inch joint opening, hard joint wall, slicken to slightly rough joint wall surface, hard infill strength, and up to greater than 0.2-inch infill thickness.			1	CORE		
		-- Run 1: 19.0 to 29.0 feet--						
		--Recovery = 98%--25						
		--RQD = 49%--						
	579.0	Boring terminated at 29.00 ft						
			30					
			35					
			40					

GENERAL NOTES

Begin Drilling **10-05-2021** Complete Drilling **10-05-2021**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **R&H** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **12.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

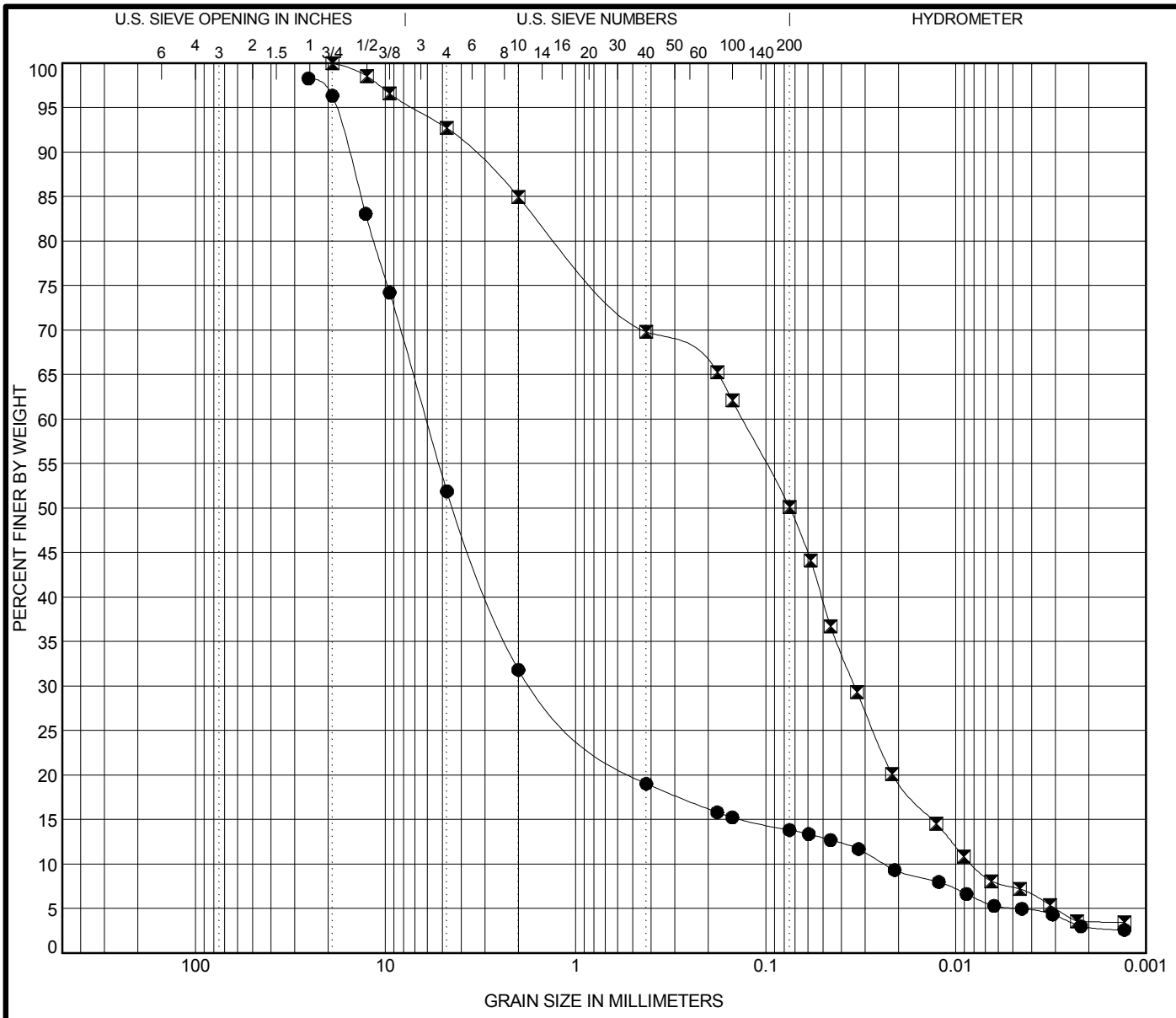
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 2690201.GPJ WANGENG.GDT 12/20/21

Wang Engineering

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

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● CUL-10-01#1	0.0 ft	**Gravelly Sandy Loam**	**46**	**26**	**20**	**17.71**	**257.29**
⊠ CUL-10-03#3	6.0 ft	**Gravelly Silty Loam**	**NP**	**NP**	**NP**	**1.06**	**16.20**

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● CUL-10-01#1	0.0 ft	**25.4**	**6.109**	**1.603**	**0.024**	**68.2**	**18.0**	**10.9**	**2.9**
⊠ CUL-10-03#3	6.0 ft	**19**	**0.133**	**0.034**	**0.008**	**15.0**	**35.2**	**46.2**	**3.6**

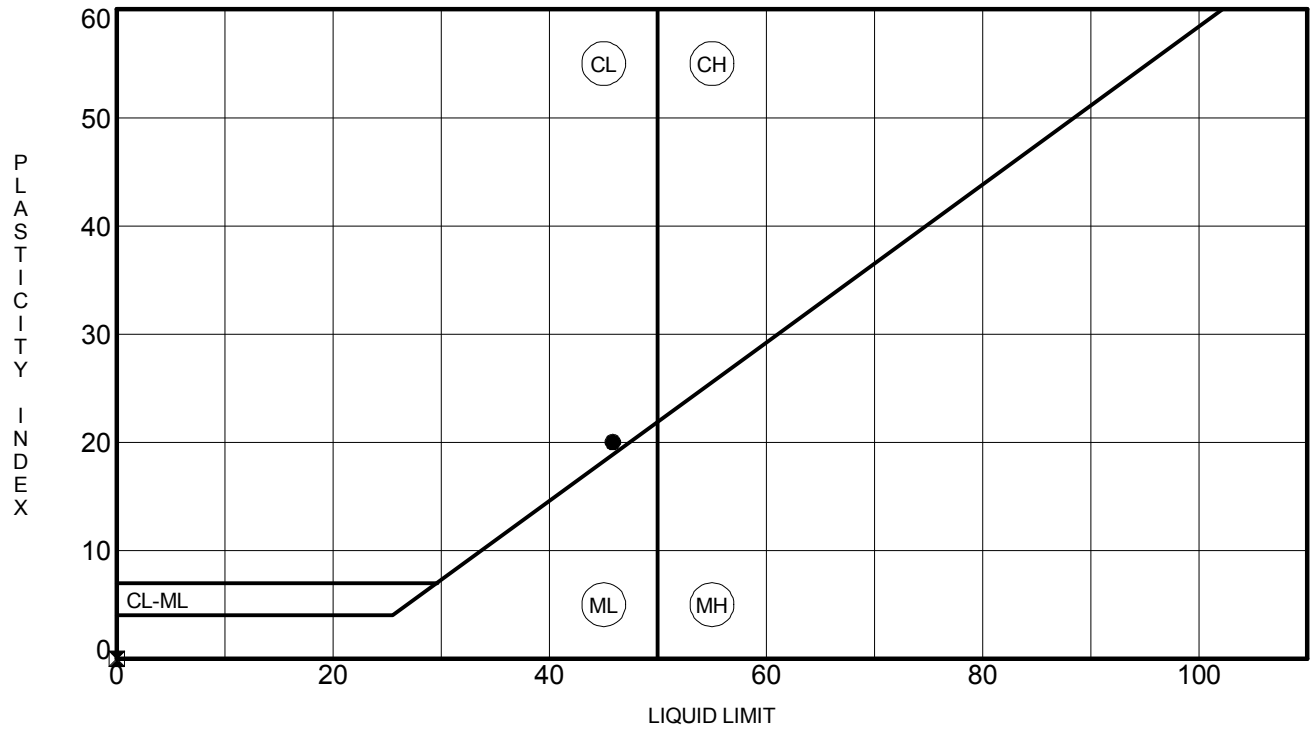
Wang Engineering, Inc.
1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

GRAIN SIZE DISTRIBUTION

Project: Main Street Lemont from Wheeler RD to IL 83

Location: Cook County, IL

Number: 269-02-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	CUL-10-01#1	0.0 ft	46	26	20	14	Gravelly Sandy Loam
⧓	CUL-10-03#3	6.0 ft	NP	NP	NP	50	Gravelly Silty Loam

Wang Engineering, Inc.
1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

ATTERBERG LIMITS' RESULTS

Project: Main Street Lemont from Wheeler RD to IL 83

Location: Cook County, IL

Number: 269-02-01

Unconfined Compressive Strength of Intact Rock Core Specimens

Project: Main Street Culverts

Client: Mott MacDonald

WEI Job No.: 269-02-01

Field Sample ID	Run #	Depth (ft)	Location	Sample Description	Length (in)		Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in^2)
					Before Capping	After Capping							
CUL-10-3	1	22.0	Lemont, IL	Dolostone	4.24	NA	2.06	44990	13551	3	11/15/21	MAC	3.32

*** Fracture Types:**

Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by:_____

Checked by: _____ 12/10/21

WANG ENGINEERING, INC.
1145 N. Main Street, Lombard. IL 60148

Wang Engineering

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

APPENDIX C

0 3 6 9 12 inches

Boring CUL-10-03
RUN #1, 19 to 29 feet
RECOVERY = 98%
RQD = 49%

BEDROCK CORE:MAIN STREET OVER I & M CANAL UNNAMED TRIBUTARY, CULVERT 10, STA. 123+40.39, COOK COUNTY, ILLILNOIS		
SCALE : GRAPHIC	APPENDIX C	DRAWN BY: RKC CHECKED BY: M. Seyhun
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR MOTT MCDONALD		269-02-01

Wang Engineering

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

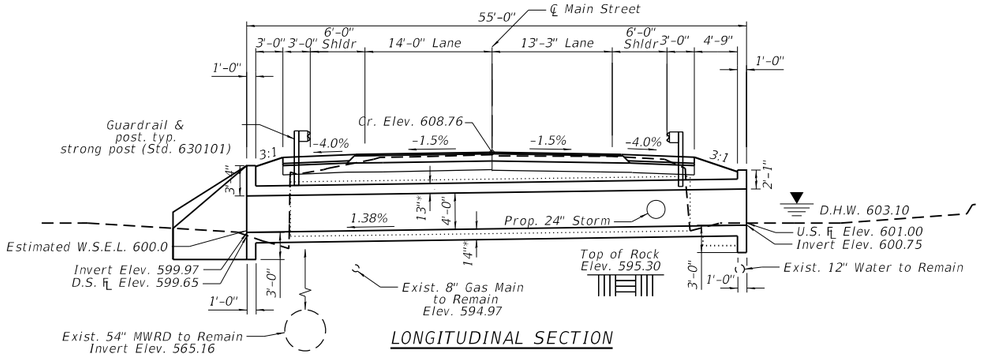
APPENDIX D

Benchmark: BM 0151. Survey disk in concrete headwall 437' west of ℄ end to Maley Road Industry Park and 21.9' north of ℄ Main St., El. 606.87

Existing Structure:
S.N. 016-0915 appears to have been constructed circa 1900. The original structure is a single cell 8ft x 6ft masonry arch culvert. The structure was extended at both ends with a CIP concrete arch culvert. The structure was again extended downstream with a CIP concrete box culvert. Plans for the original construction and widening are not available. Structure to be removed and replaced with a single-barrel box culvert. Road to be closed during construction.

Note: Precast alternate not allowed

No salvage



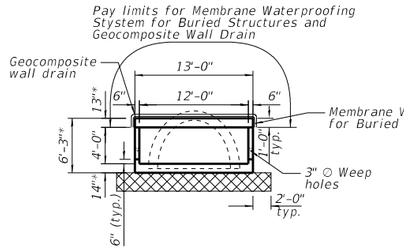
LONGITUDINAL SECTION

WATERWAY INFORMATION

Drainage Area = 0.5 sq. mi. Low Grade Elev. 608.6 = @ Sta. 123+00

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	124	18	26	602.2	1.3	0.2	603.5	602.4
Design	50	257	25	37	603.1	2.8	0.9	605.9	604.0
Base	100	322	27	41	603.4	3.9	1.3	607.3	604.7
Overtopping									
Max. Calc.									

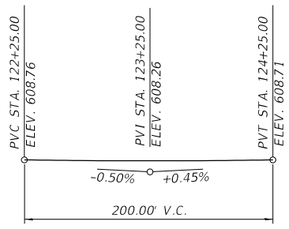
10-Year Velocity through Existing Structure = 9 ft/s
10-Year Velocity through Proposed Structure = 9 ft/s



SECTION THRU BARREL

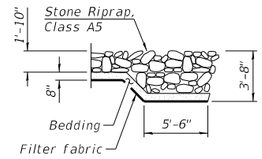
* Slab thickness may be refined in final design.

Note:
Geocomposite Wall Drain shall be according to Section 591 of the Standard Specifications, except that concrete nails shall not be used in areas where it overlaps Membrane Waterproofing System for Buried Structures.

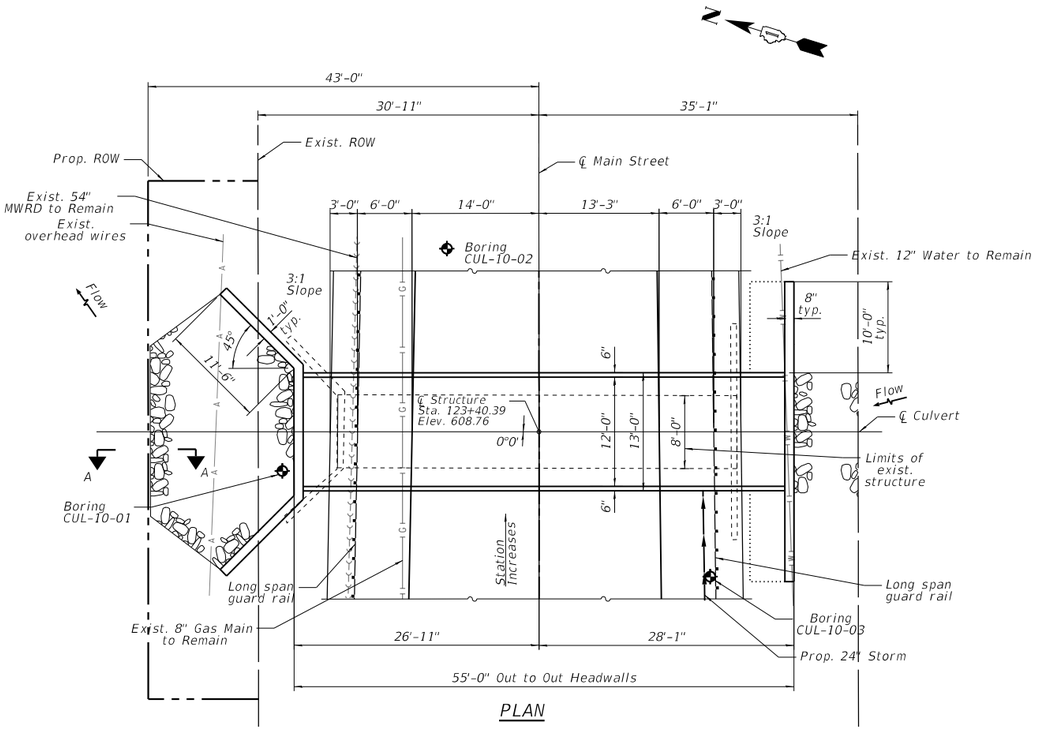


PROFILE GRADE

(Along ℄ Main Street)



SECTION A-A



PLAN

LEGEND

- Soil boring location
- Existing underground gas main
- Existing underground fiber optic
- Existing underground sanitary sewer
- Existing aerial line
- Existing underground water
- Proposed underground storm sewer
- Remove & replace unsuitable material

HIGHWAY CLASSIFICATION

FAU 3585 (Main Street)
Functional Class: Minor Arterial
ADT: 4,400 (2018); 11,300 (2030)
ADTT: 528 (2018); 1,356 (2030)
DHV: 1,130
Design Speed: 50 m.p.h.
Posted Speed: 40 m.p.h.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

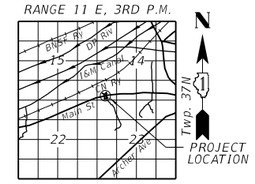
LOADING HL-93

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

DESIGN STRESSES

FIELD UNITS

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



LOCATION SKETCH

GENERAL PLAN & ELEVATION
MAIN STREET, OVER
UNNAMED TRIBUTARY TO I & M CANAL
FAU 3585 - SEC. 2020-142-C & DR
COOK COUNTY
STATION 123+40.39
STRUCTURE NO. 016-0915

MOTT MACDONALD
10 S. LaSalle St., #2520, Chicago, IL 60603

USER NAME = YAN97395	DESIGNED - MAR	REVISED -	
	DRAWN - MY	REVISED -	
PLOT SCALE = 16.6667 ' / in.	CHECKED - MAR	REVISED -	
PLOT DATE = 3/15/2023	DATE - 03/07/2023	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

MAIN STREET LEMONT FROM WHEELER RD TO IL 83
GENERAL PLAN AND ELEVATION OUTLET 10

SCALE: 1"=8.33' | SHEET OF SHEETS | STA. TO STA.

F.A.U RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3585	2020-142-C&DR	COOK	278	130
		CONTRACT NO. 62L30		
	ILLINOIS	FED. AID PROJECT		

MODEL: Default
FILE NAME: pw:\\mott-use-pw.bentley.com:mott-use-pw-20\Documents\507103006-I007-Lemont-Main Street\CAD Sheets\D19114920-sht-detailCulvert10.dgn