STRUCTURE GEOTECHNICAL REPORT
MANHATTAN-MONEE ROAD CULVERT
OVER DRAINAGE DITCH
STATION 70+01.53
WILL COUNTY, ILLINOIS

For
Quigg Engineering Inc.
111 S. Wacker Drive, Suite 3910
Chicago, IL 60606

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

Original Report: June 21, 2019
Revised Report: NA

Technical Report Documentation Page

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10. Prepared for Quigg Engineering Inc. 111 S. Wacker Drive, Suite 3910 Chicago, IL, 60606	**Design Engineer** Sapan Trivedi, Structural Designer Accurate Group, Inc.	**Contact** (847) 613-1100 ext. 508 sapant@accgi.com

11. Abstract

Several improvements are proposed to the site near the existing culvert carrying a drainage ditch under the Manhattan-Monee Road. The improvements include removing the existing culvert under the driveway on the south side of the Manhattan-Monee Road and replacing with a new 5-foot wide and 4-foot high box culvert, three new retaining walls, the existing gabion wall removal and abandoning in place the existing Manhattan-Monee Road culvert.

Beneath the pavement and topsoil, the general lithologic profile encountered during the investigation includes up to 3 feet of medium stiff to stiff silty clay to silty clay loam fill and buried topsoil over medium stiff to hard clay, silty clay to silty clay loam interbedded sand to sandy gravel. Groundwater was observed at elevations of 689 to 691 feet and measured at elevations of 671 to 689 feet.

With about the 30 inches of the unstable soils removal and replacement to elevation of 693 feet, it will be feasible to construct the culvert. Following the recommended treatment, the culvert barrel can be designed a factored bearing resistance of 4,000 psf. The long-term settlements are estimated to be 0.5 inches with a differential settlement of 0.5 inches or less.

We provided recommendations for the potential wingwall types including horizontal, precast apron end sections, cast-in-place T-type walls, and sheet pile walls.

Three new retaining walls are proposed to be sheet pile walls. We provide the recommended soil parameters for the wall design.

12. Path to archived file

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QUIGG ENGINEERING INC.

1.0 INTRODUCTION

This report presents the results of our subsurface investigations, laboratory testing, geotechnical evaluations, and recommendations to support the proposed improvements at the existing culvert, designated as SN 099-0441. The culvert site is located about 0.25 miles west of US Route 45 in Will County, Illinois. On the USGS *Manhattan Quadrangle 7.5 Minute Series* map, the project site is generally located at SE ¼ of Section 18, NE ¼ of Sec. 19, Township 34N, 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 improvements.

1.1 Proposed Improvements

Based on General Plan and Elevation (GPE) Drawing (Appendix D) dated June 5, 2019 and information provided by Accurate Group, Inc. (Accurate), Wang Engineering, Inc. (Wang) understands that the following improvements are proposed at the existing culvert, SN 099-0441:

- The existing culvert, SN 099-0441 currently has three plastic pipes inserted the length of the culvert barrel with grout filling voids around the pipes. This culvert will be filled with CLSM and abandoned in place;
- At the southeast corner of the existing culvert, SN 099-0441, there is an existing pipe culvert carrying the private driveway over the drainage ditch and running east to west direction. This pipe culvert will be removed and replaced with a new 5-foot wide and 4-foot high concrete box culvert with an out-to-out length of 39 feet. The proposed culvert will have invert elevations of 696.69 and 696.28 feet at upstream and downstream ends, respectively;

- A new retaining wall, designated as Wall No. 1 begins at proposed culvert northwest wingwall at Station 69+50 and ends at Station 69+73 running along south side of the Manhattan-Monee Road;
- A new retaining wall, designated as Wall No. 2 begins at the existing retaining wall at Station 69+84.75 and ends at Station 70+14.75 running along north side of the Manhattan Monee Road; and
- The existing gabion wall along north side of the Manhattan Monee Road will be removed and replaced with a new retaining wall, designated as Wall No.3. The new Wall No.3 begins at Station 70+86 and ends at Station 71+53.

1.2 Existing Structures

The existing culvert, SN 099-0441 is a single cell concrete box culvert currently having three 24 inches plastic pipes inserted for full length of culvert and grout filling the void around the pipes. The existing box culvert is 7-foot wide and 3-foot high with an out-to-out length of 33.9 feet along the centerline of culvert. There is a retaining wall running on the north side of Manhattan-Monee Road. The culvert carries one lane of traffic in each direction.

A 36-inches diameter pipe culvert carrying the private driveway over the drainage ditch is located at the southeast corner of existing culvert.

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 four structure borings, designated as CB-03, CB-04, RW-01 and RW-02 drilled from elevations 700.7 to 702.7 feet to a depth of 30 feet below ground surface (bgs). In addition, we have considered Boring B-4 drilled by others in 1990. The subsurface investigation performed by Wang was completed on April 19 and 22, 2019.

For the existing gabion wall replacement, the field investigation consisted of two structure borings, designated as 3-RWB-1 and 3-RWB-2 and two geoprobe borings, designated as 3-HA-1 and 3-HA-2 drilled from elevations 697.9 to 703.1 feet to depths of 10 to 35 feet bgs. The field investigation was performed by Wang on June 5, 2019.

The as-drilled coordinates and elevations were obtained with a mapping-grade GPS unit. Stations and offsets were provided by Accurate. As-drilled boring locations are presented in the *Boring Logs* (Appendix A) and the as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 2).

ATV and truck-mounted drilling rigs, equipped with hollow stem augers, were used to advance and maintain open boreholes. 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. Jackhammer driven Geoprobe samplers were used to continuously sample the soil in the hand auger borings. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examinations and laboratory testing.

Field boring logs, prepared and maintained by Wang geologist, include lithological descriptions, visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests (Q_u), 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. 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).

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

Borings CB-04 and RW-02, drilled on the roadway encountered 3 inches of asphalt over 9 inches of concrete. Borings 3-RWB-1 and 3-RWB-2, drilled on the roadway along the existing gabion wall encountered 14 and 15 inches of asphalt over sandy gravel aggregate base. Borings CB-03 and RW-01, drilled on the grassy area revealed 12 inches of topsoil at the surface. Geoprobe Borings 3-HA-1 and 3-HA-2, drilled in front of the gabion wall encountered running water at the surface over 6 inches of topsoil and stiff to hard silty clay. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); and 2) medium stiff to hard clay silty clay to silty clay loam.

1) Man-made ground (fill)

Beneath the pavement and topsoil, the borings encountered up to 3 feet of stiff, black and brown silty clay loam and silt fill. The soil has unconfined compressive strength (Q_u) values of 1.3 to 1.7 tsf and moisture content values of 15 to 26%. Boring CB-04 revealed 2 feet of medium dense gravel with N value of 16 blows per foot and moisture content of 27%.

At elevations of 699.2 to 701.2 feet, Borings CB-04, RW-02, and 3-RWB-1 encountered 1.6 to 3.3 feet of silty clay loam buried topsoil with unconfined compressive strength (Q_u) values of 1.0 and 3.0 tsf and moisture content values of 30 and 37%.

2) Medium stiff to hard clay, silty clay to silty clay loam

Beneath the fill and buried topsoil, at elevations of 695.9 to 700.1 feet, the borings encountered medium stiff to hard, orange, brown, and gray clay, silty clay to silty clay loam interbedded with water-bearing, loose to medium dense sand to sandy gravel. The unit has Q_u values generally between 0.9 and 4.8 tsf and moisture content values between 14 and 29%; Boring CB-03 recorded lower Q_u values between 0.4 and 0.8 tsf with moisture content values of 16 to 55%. Laboratory index testing on samples from this layer showed liquid limit (L_L) values of 25 to 48% and plastic limit (P_L) values of 14 to 22%.

The interbedded 2 to 5 feet thick sand to sandy gravel has N-values of 5 to 14 blows per foot and moisture content values of 10 to 22%.

3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 689 to 695 feet within the sand and gravel layer (3.0 to 11.8 feet bgs). At the completion of drilling, groundwater was measured at elevations of 671 to 689 feet (14 to 30 feet bgs).

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the proposed culvert, wingwalls, and retaining walls are included in the following sections.

4.1 Scour Considerations

The design scour elevation should be taken at the bottom of the cutoff wall (IDOT 2012). To prevent local erosion, we recommend placing stone riprap or a concrete apron at the ends of the proposed culvert. This will also prevent sediments from entering and accumulating in the culvert and minimize long term maintenance.

4.2 Culvert Foundation

Based on our subsurface investigation, the soils at the base of the culvert barrel are expected to be medium stiff silty clay with a Q_u value of 0.66 tsf and moisture content value of 55% followed by stiff to hard silty clay. Prior to placement of the culvert barrel, we recommend removing 2.5 feet of the medium stiff silty clay loam to an elevation of 693.0 feet. The replacement material should be the pay item "*Rockfill*" in accordance with the 2017 IDOT *Culvert Manual*. Rockfill material gradation and capping requirements should be as per IDOT District One Rockfill Special Provision, January 2010. The replacement material should extend a minimum of two feet beyond the edge of the box.

The soils at the culvert bearing level should be evaluated in the field to determine the actual undercut depth. The actual extent of the removal shall be determined in the field by a geotechnical soil inspector at the time of construction.

Following the recommended foundation treatment, the culvert barrel can be designed with a factored bearing resistance of 4,000 psf using a bearing resistance factor of 0.45 (AASHTO 2017).

4.3 Settlement

Following the recommended treatment as described in Section 4.2, we estimate the foundation soils will experience settlement up to 0.5 inches at the widening portion of the new culvert with the differential settlement of 0.5 inches or less. The settlement estimates are acceptable for the culvert structure.

4.4 Wingwalls

Based on the TSL plan, we understand the wingwalls at both culvert barrel ends will be horizontal cantilever wingwalls with a length of 7′-3″. Other wingwall types suitable for this culvert include precast apron end sections, cast-in-place T-type or sheet pile walls.

Horizontal cantilever wingwalls should be designed based on the structural guidelines provided in Section 4.2 of the IDOT Culvert Manual (2017). Horizontal cantilever wingwalls should be founded at a minimum depth of 3.0 feet below the culvert invert elevations.

If precast apron end sections are selected, they should be as per IDOT Basesheet dated 2/17/2017 "*SCB-AES, Precast Concrete Box Culvert Apron End Section Details"* and constructed based on IDOT Standard Specifications.

If sheet pile wingwalls are selected, they can be designed based on our recommendations as described in Section 4.6 for the Retaining Wall No. 1.

For the cast-in-place T-type wingwalls, the footings should be established at a depth such that they would be at least 4 feet below culvert barrel invert elevation. Footings will be established at elevations 692.3 and 692.7 feet. Based on subsurface investigation, stiff to hard silty clay is expected to be encountered at the footing elevation. The T-type wingwalls can be designed based on a factored resistance of 4,000 psf and the information and typical sections shown in IDOT Section 4.4 (IDOT 2017).

4.5 Cast-In-Place or Precast Culvert Considerations

The results of the settlement evaluations indicate that both cast-in-place and precast culvert options are appropriate and feasible at the site. Following the recommended foundation treatment as described in Section 4.2, the differential settlement will be about 0.5 inches, which will not cause excessive separation of the precast sections.

4.6 Retaining Walls

Based on the TSL plan provided by Accurate, the proposed Retaining Walls No. 1 and No.2 will have out-to-out lengths of 23 and 30 feet, respectively. Based on the preliminary cross-section drawings, we estimate the Walls No.1 and No.2 will have approximate maximum retained heights of 2 and 5 feet, respectively. The existing gabion wall will be removed and replaced with Wall No.3. The proposed Wall No.3 will have out-to-out length of 67 feet and a maximum retained height of 5.5 feet. The walls are proposed to be sheet pile type with 2-foot concrete cap on the top.

We do not recommend the gravity wall types such as a cast-in-place cantilever concrete and Mechanically Stabilized-Earth walls due to the flowing surface water in ditches and the need of foundation excavations for wall construction. Thus, we provide recommendations for the design of flexible wall types including sheet pile wall.

We recommend the soil parameters shown in Tables 1 through 3 to be used for the design of the flexible/sheet pile walls. The embedment depth for the wall should be designed in accordance with the 2017 AASHTO LRFD guidelines considering a horizontal earth pressure load factor of 1.50 and a passive resistance factor of 0.75. In developing the design lateral pressure, the lateral pressure due to construction equipment surcharge load and traffic surcharge should be added to the lateral earth pressure. The active and passive earth pressure coefficients are provided for straight backfill behind and in front of the wall.

Table 1: Geotechnical Parameters for Design of Wall No.1

Reference Borings: CB-03 and RW-02

Soil Description / Elevation Range	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients[(1)]	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
M Stiff to Stiff SI CLAY FILL Surface to 696.5 feet	120	100	30	0.33	3.00
M Stiff SI CLAY EL 696.5 to 692.5 feet	115	0	28	0.36	2.77
Stiff to Hard SI CLAY EL 692.5 to 689.0 feet	120	100	30	0.33	3.00

Soil Description / Elevation Range	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients[1]	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
M Dense SAND to GRAVEL EL 689.0[2] to 686.5 feet	58[3]	0	31	0.32	3.12
Stiff SI CLAY EL 686.5 to 670.7 feet	58[3]	100	30	0.33	3.00

[1]Straight slope; [2]Groundwater elevation; [3]Submerged Unit Weight

Table 2: Geotechnical Parameters for Design of Wall No. 2

Reference Borings: RW-01, RW-02, and B-04

Soil Description / Elevation Range	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients[1]	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
Stiff SI CL LOAM FILL Surface to 696.5 feet	120	100	30	0.33	3.00
Stiff SI CLAY EL 696.5 to 690.5 feet	120	100	30	0.33	3.00
SAND EL 690.5[2] to 689.0 feet	58[3]	0	30	0.33	3.00
M Stiff SI CLAY EL 689.0 to 687.5 feet	53[3]	0	28	0.36	2.77
Stiff to V Stiff SI CLAY EL 687.5 to 670.8 feet	58[3]	100	30	0.33	3.00

[1]Straight slope; [2]Groundwater elevation; [3]Submerged Unit Weight

Table 3: Geotechnical Parameters for Design of Wall No. 3
Reference Borings: 3-HA-1, 3-HA-2, 3-RW-1, and 3-RW-2

Soil Description Elevation Range	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients[(1)]	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
Stiff to Hard SI CLAY Surface to 694.8 feet	120	100	30	0.33	3.00
SAND and SANDY GRAVEL EL 694.8[(1)] to 690.2 feet	53[(2)]	0	30	0.33	3.00
M Stiff to Stiff SI CLAY EL 690.2 to 682.1 feet	53[(2)]	0	29	0.35	2.88
Stiff to V Stiff SI CLAY EL 687.5 to 670.8 feet	58[(2)]	100	30	0.33	3.00

[(1)]Straight slope; [(2)]Groundwater elevation; [(3)]Submerged Unit Weight

The lateral deformation of the wall should also include deflection control at the top of flexible wall. The evaluations should be performed using the parameters shown in Tables 4 through 6 via p-y curve (COM624P, LPILE, and any other programs) method.

Table 4: Recommended Parameters for Lateral Load Analysis of Wall No. 1
Reference Borings: CB-03 and RW-02

Soil Description Elevation Range	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Stiff to Stiff SI CLAY FILL Surface to 696.5 feet	120	1500	0	400	0.75
M Stiff SI CLAY EL 696.5 to 692.5 feet	115	700	0	100	1.20
Stiff to Hard SI CLAY EL 692.5 to 689.0 feet	120	1500	0	400	0.75

Soil Description Elevation Range	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Dense SAND to GRAVEL EL 689.0[(1)] to 686.5 feet	58[(2)]	0	31	60	--
Stiff SI CLAY EL 686.5 to 670.7 feet	58[(2)]	1100	0	200	0.95

[(1)]Groundwater elevation; [(2)]Submerged Unit Weight

Table 5: Recommended Parameters for Lateral Load Analysis of Wall No. 2

Reference Borings: RW-01, RW-02, and B-04

Soil Description Elevation Range	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Stiff SI CL LOAM FILL Surface to 696.5 feet	120	1400	0	400	0.80
Stiff SI CLAY EL 696.5 to 690.5 feet	120	1600	0	500	0.75
SAND EL 690.5[(1)] to 689.0 feet	58[(2)]	0	30	50	--
M Stiff SI CLAY EL 689.0 to 687.5 feet	53[(2)]	900	0	200	1.05
Stiff to V Stiff SI CLAY EL 687.5 to 670.8 feet	58[(2)]	1300	0	300	0.85

[(1)]Groundwater elevation; [(2)]Submerged Unit Weight

Table 6: Recommended Parameters for Lateral Load Analysis of Wall No. 3
Reference Borings: 3-HA-1, 3-HA-2, 3-RW-1, and 3-RW-2

Soil Description Elevation Range	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Stiff to Hard SI CLAY Surface to 694.8 feet	120	1500	0	400	0.80
SAND and SANDY GRAVEL EL 694.8[(1)] to 690.2 feet	53[(2)]	0	30	30	--
M Stiff to Stiff SI CLAY EL 690.2 to 682.1 feet	53[(2)]	1100	0	300	0.95
Stiff to V Stiff SI CLAY EL 687.5 to 670.8 feet	58[(2)]	1400	0	350	0.80

[(1)]Groundwater elevation; [(2)]Submerged Unit Weight

4.7 Global Stability

We have analyzed the global stability of embankment behind the Retaining Wall No.1 at the most critical location where weaker soil layers were encountered with a maximum retained height of 10 feet. The analyses were performed with *Slide v6.0* and the results of the evaluations are provided in *Slope Stability Analysis* (Appendix C). We estimate the wall with an embedment depth of 4 feet has an undrained Factor of Safety (FOS) of 6.08 (Appendix C-1) and a drained FOS of 2.54 (Appendix C-2), satisfying the minimum FOS requirement of 1.7 (IDOT 2015); however, the wall designer should perform other analyses to determine the required embedment depth.

Considering similar soil conditions along Retaining Wall No. 2, Retaining Wall No.3, and wingwalls, we do not anticipate global stability concerns.

4.8 Stage Construction

Based on the TSL plan, Manhattan-Monee Road will be detoured and only open for local traffic during construction. The access to the private property driveway will be a temporary runaround during culvert replacement.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

The existing vegetation, surface topsoil, pavement, and debris should be cleared and stripped where the culvert and walls 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, structures, and utilities should be considered during construction. Any excavation that cannot be sloped 1:2 (V:H) should be properly shored with temporary sheet piling or temporary soil retention systems.

The groundwater was encountered at elevations of 689 to 691 feet, about 4 to 6 feet below the culvert base elevation. However, during our site visit, the surface water was observed in the ditches as well as in the culvert. Depending upon prevailing climate conditions and the time of the year when culvert construction take place, control runoff and maintenance of existing flows may require temporary water diversion and control. Any water that accumulates in open excavations by seepage or runoff should be immediately removed.

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 2019 Supplemental Specifications and Recurring Special Provisions, *Granular Backfill of Structures.*

5.4 Retaining Walls

The walls should be constructed as per IDOT Section 522 and in particular in accordance with 522.06. Difficulty in sheet pile driving should be expected between elevations 690 and 695 feet.

5.5 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.

The retaining wall should be constructed according to the current IDOT Standard Specifications for Road and Bridge Construction (2016). 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 Quigg Engineering Inc and Accurate Group, Inc. this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

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Corina T. Farez, P.G, P.E.
Vice President

Nesam S. Balakumaran, P.Eng.
Project Geotechnical Engineer

REFERENCES

AASHTO (2017) *LRFD Bridge Design Specificaitons*. Washington, D.C., American Asssociaiton of State Highway and Transportation Officials.

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

IDOT (2019) *Supplemental Specifications and Recurring Special Provisions.* Illinois Department of Transportation

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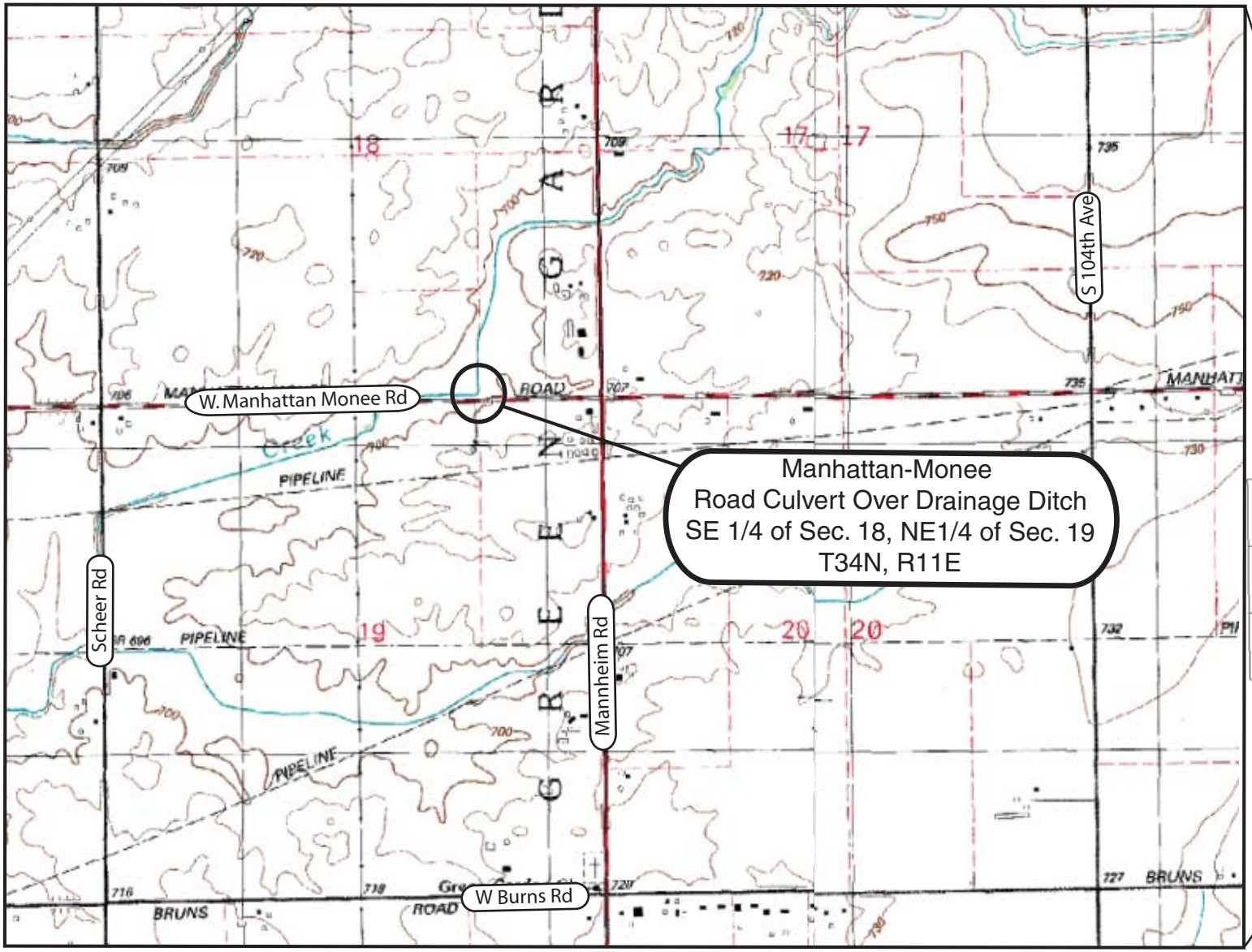
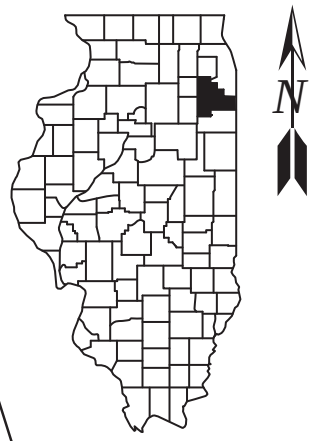
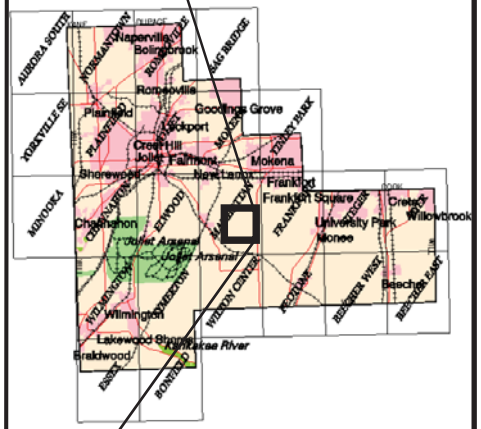
EXHIBITS







Will County

Scale

0 0.5 1.0 Mile

SITE LOCATION MAP: MANHATTAN-MONEE ROAD CULVERT OVER DRAINAGE DITCH, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: RKC CHECKED BY: M. Kothawala

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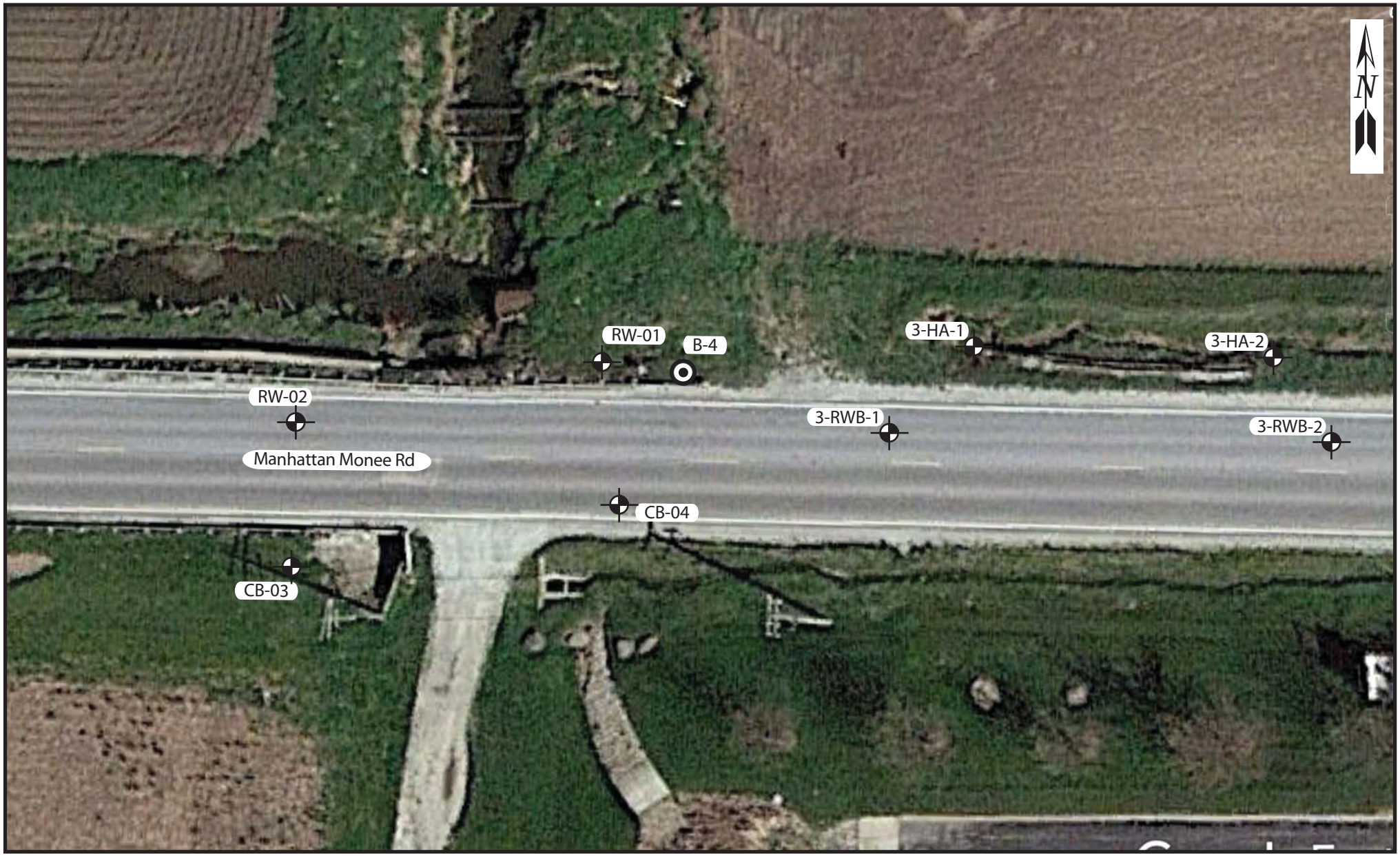
FOR QUIGG ENGINEERING, INC. 199-02-08



Legend

- Soil Borings -Wang
- Soil Borings -Others

Scale

0 — 50 — 100 Feet

BORING LOCATION PLAN: MANHATTAN-MONEE RETAINING WALL REPLACEMENT, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2-1	DRAWN BY: RKC CHECKED BY: NSB

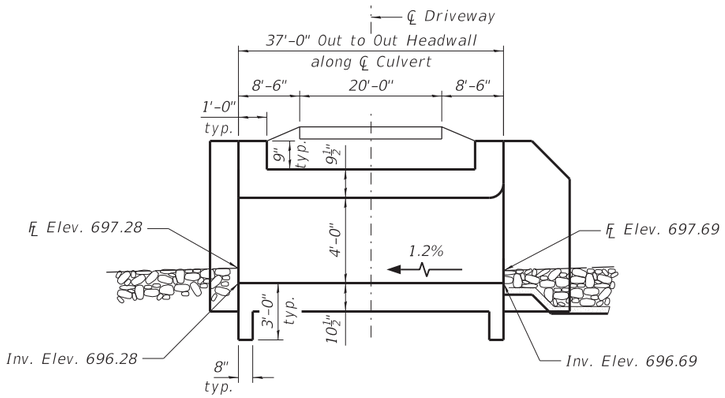
Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR ACCURATE GROUP, INC. | 199-02-09

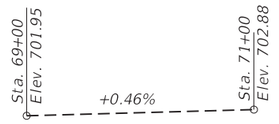
Benchmark:

Existing Structure: The Structure No. 099-0441 carrying Manhattan-Monee Rd. over a ditch is a single barrel reinforced concrete box culvert with 15 degree left ahead skew. Three 24 inch corrugated plastic pipes inserted for the full length of the barrel with grout filling the void around the pipes. The barrel dimensions are 7'W x 3'H and 33'-11" out to out length along the ℄ culvert. There is also a corrugated metal pipe culvert running east-west below the private driveway at the southeast corner of the Stucture No. 099-0441. The pipe culvert is 36" ○ and 30'-0" long. Manhattan-Monee Rd. will be detoured and only open for local traffic during construction. Driveway to the private property will have a temporary runaround during culvert replacement

No salvage.



LONGITUDINAL SECTION

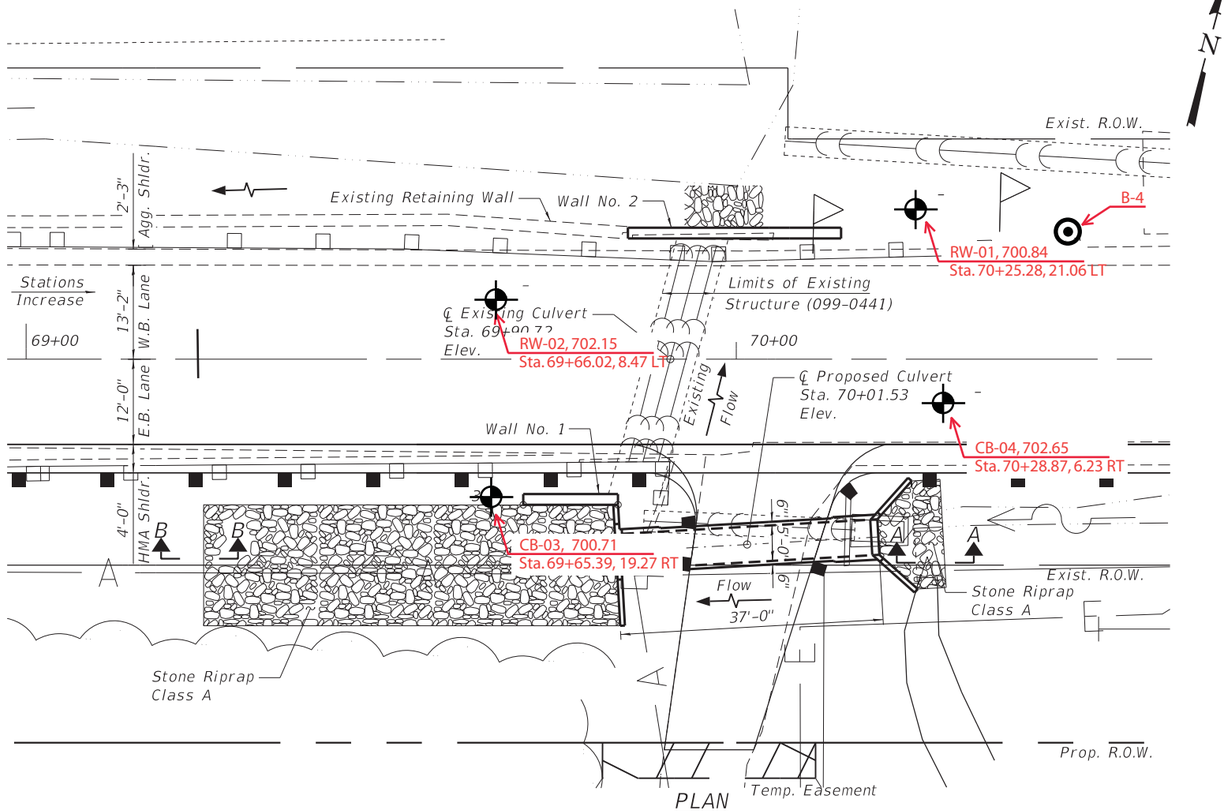


PROFILE GRADE

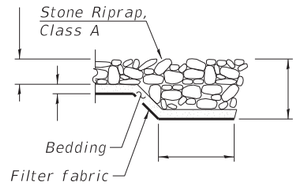
(Along ℄ Manhattan-Monee Rd.)

SCOPE OF WORK:

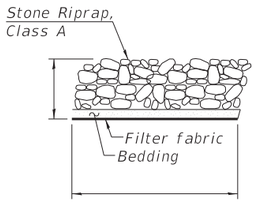
1. Construct a temporary runaround for the driveway just east of Structure No. 099-0441.
2. Remove the pipe culvert under the driveway.
3. Construct proposed Box Culvert under the driveway.
4. Construct proposed ditch on the south side of Manhattan-Monee Road.
5. Remove existing wingwalls and headwalls for existing Structure No. 099-0441 at both upstream and downstream ends.
6. Construct the Retaining wall at north and south side of Manhattan-Monee Road.
7. Drill holes in the roadway through the pipes and fill existing pipes with CLSM for Structure No. 099-0441.



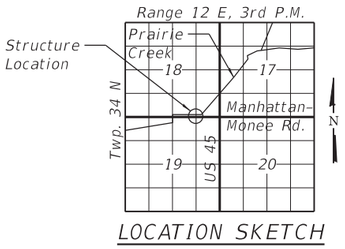
PLAN



SECTION A-A



SECTION B-B



LOCATION SKETCH

GENERAL PLAN
MANHATTAN-MONEE ROAD CULVERT
OVER DRAINAGE DITCH
WILL COUNTY
STATION 70+01.53

Legend

- Soil Borings -Wang
- Soil Borings -Others

BORING LOCATION PLAN: MANHATTAN-MONEE ROAD CULVERT OVER DRAINAGE DITCH, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2-2	DRAWN BY: RKC CHECKED BY: M. Kothawala

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

FOR ACCURATE GROUP, INC. | 199-02-08

Accurate GROUP, INC.

USER NAME = sapant		DESIGNED - SAT		REVISED -	
		CHECKED - JMT		REVISED -	
PLOT SCALE = 21.3333 ' / in.		DRAWN - JN		REVISED -	
PLOT DATE = 5/6/2019		CHECKED - SPS		REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET OF SHEETS

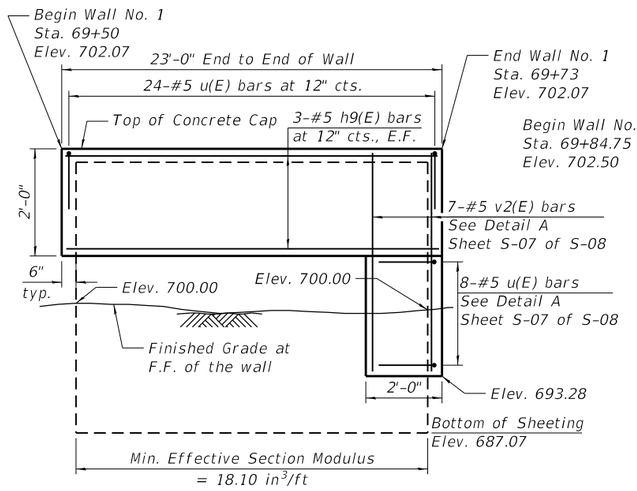
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
531	2018-063-CR&D	WILL		
		CONTRACT NO. 62G85		
		ILLINOIS	FED. AID PROJECT	

MODEL: Default
FILE NAME: Q:\Engineering\LiveProjects\13043_IDOT DUR AES\Work Order 15 - 62G85\CADD\CADD Sheets\Structural\62G85-GPE.dgn
5/6/2019 12:32:47 PM

Benchmark: Cut "X" in top of the concrete cap for sheet pile wall, west of box culvert.
Elevation 702.49.

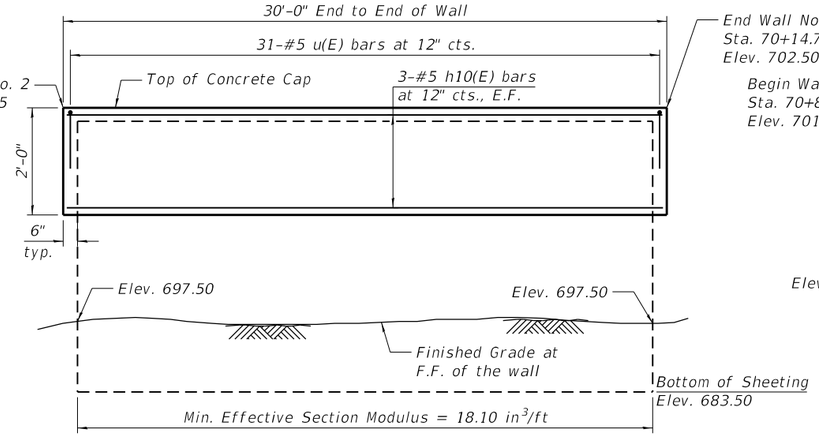
Existing Structure: The existing structure is a retaining wall located at station 71+03. The retaining wall is approximately 50'-0" long and average exposed height of the retaining wall is 4'-6". The existing wall is a gabion wall and will be removed and replaced with a proposed wall.

No salvage.



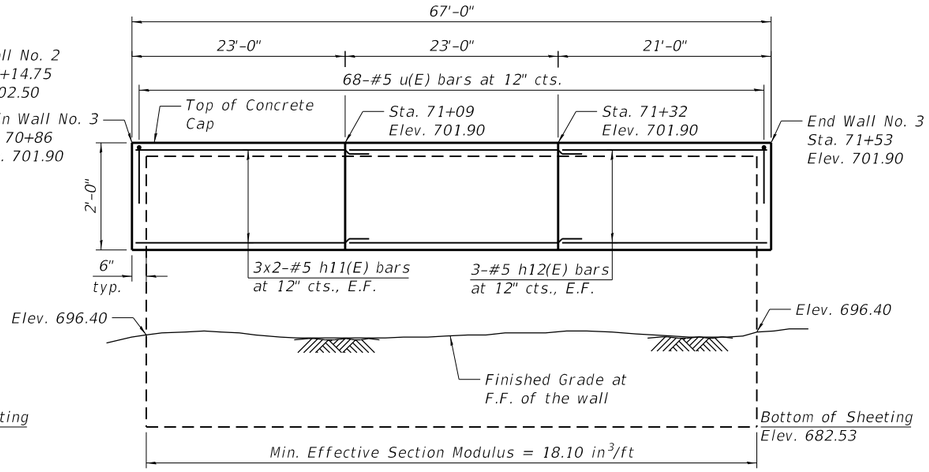
ELEVATION-WALL NO. 1

(Looking at F.F. of wall)



ELEVATION-WALL NO. 2

(Looking at B.F. of wall)

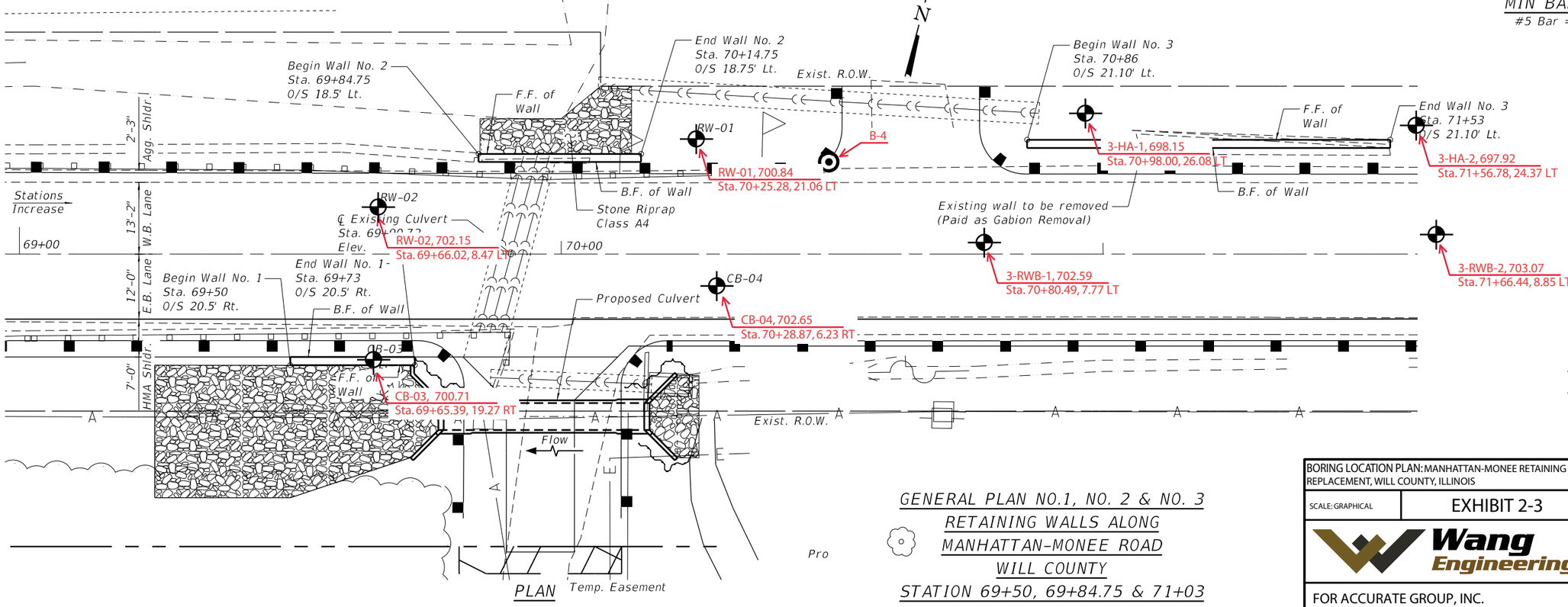


ELEVATION-WALL NO. 3

(Looking at B.F. of wall)

MIN BAR LAP

#5 Bar = 3'-7"



PLAN

LEGEND

- Soil Borings
- F.F. Front Face
- B.F. Back Face

GENERAL PLAN NO.1, NO. 2 & NO. 3
RETAINING WALLS ALONG
MANHATTAN-MONEE ROAD
WILL COUNTY
STATION 69+50, 69+84.75 & 71+03

Pro

BORING LOCATION PLAN: MANHATTAN-MONEE RETAINING WALL REPLACEMENT, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 2-3 | DRAWN BY: RKC | CHECKED BY: NSB

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

FOR ACCURATE GROUP, INC. | 199-02-09

Accurate GROUP, INC.

USER NAME = johnn	DESIGNED - SAT	REVISED -	
	CHECKED - JMT	REVISED -	
PLOT SCALE = 21.3333 ' / in.	DRAWN - JN	REVISED -	
PLOT DATE = 6/5/2019	CHECKED - SPS	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET S-06 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
531	2018-063-CR&D	WILL	82	52
		CONTRACT NO. 62G85		
		ILLINOIS	FED. AID PROJECT	

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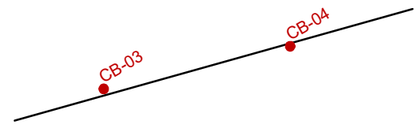
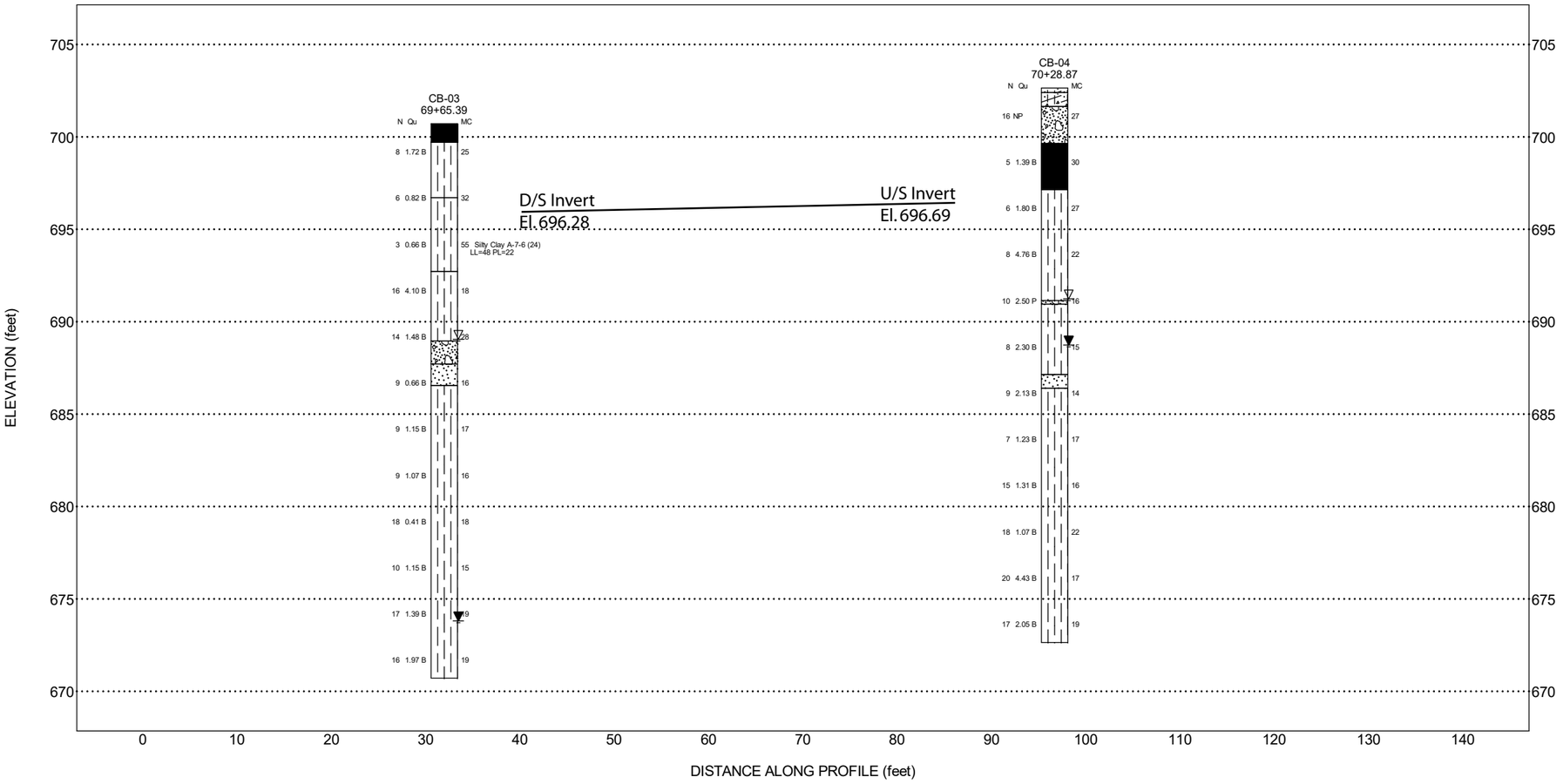


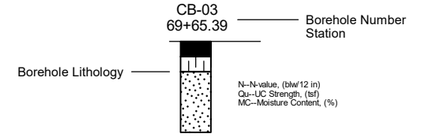


Lithology Graphics

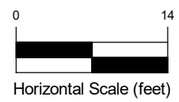
- Topsoil
- Pavement
- IDH Silty Clay, Silty Clay Loam
- Gravelly sand, sandy gravel
- IDH Sand, Sandy Loam

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



Vertical Exaggeration: 2x

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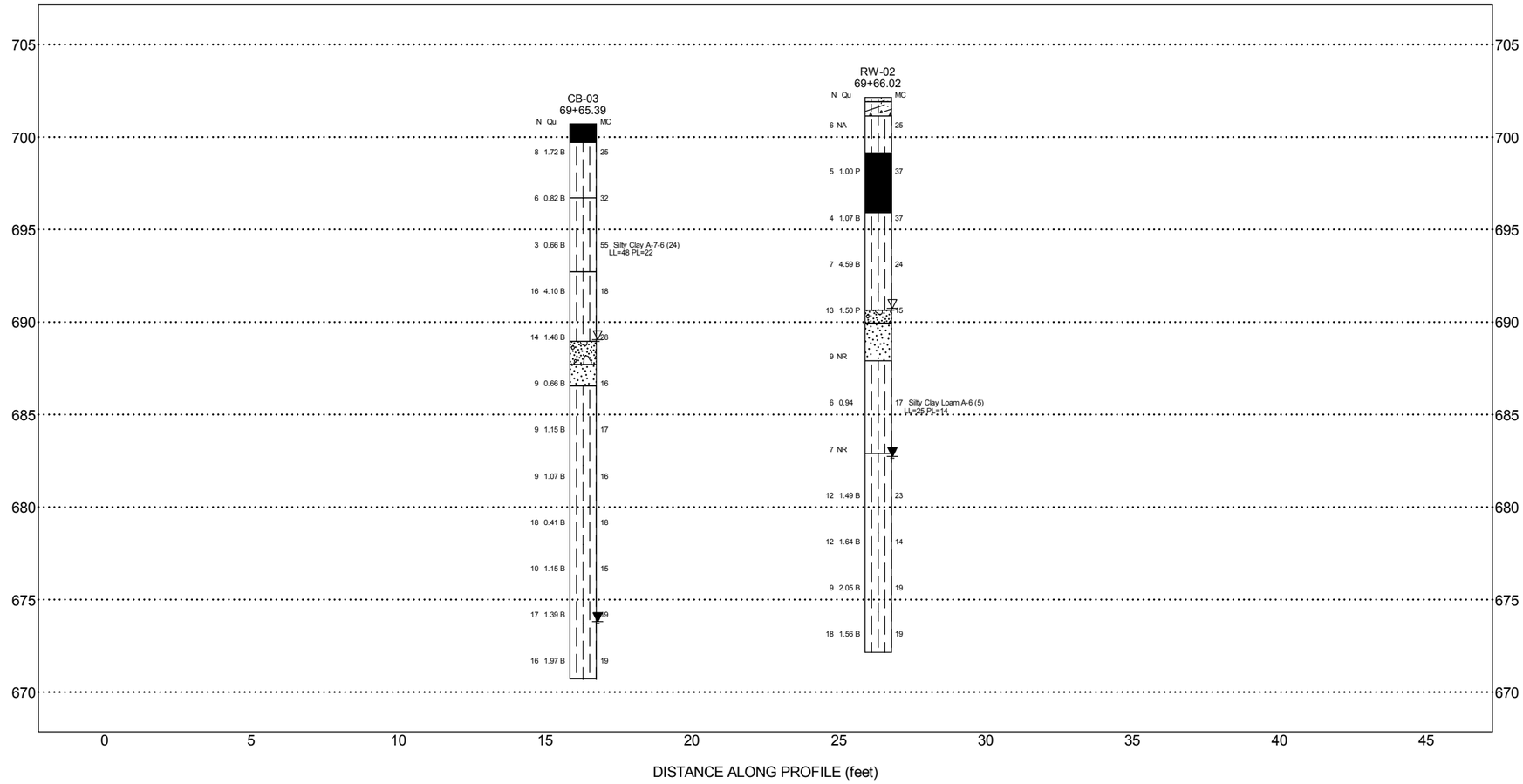
Lombard, IL 60148

Subsurface Data Profile
Drainage Ditch Culvert at Station 70+01.53

WEI SINCE 1982

Manhattan-Monee Culverts
Replacement
Will County, Illinois

JOB NUMBER	PLATE NUMBER
199-02-08	EXHIBIT 3-1



Lithology Graphics

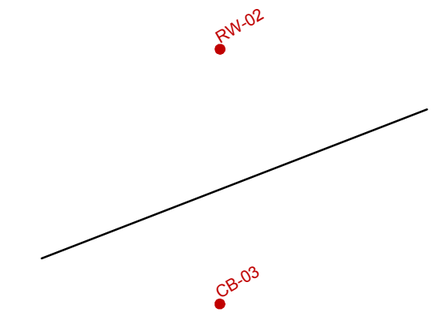
Topsoil

Pavement

IDH Silty Clay, Silty Clay Loam

Gravelly sand, sandy gravel

IDH Sand, Sandy Loam



Site Map Scale 1 inch equals 15 feet

Explanation:

CB-03
69+65.39 — Borehole Number Station

Borehole Lithology

N--N-value, (blw/12 in)
Qu--UC Strength, (tsf)
MC--Moisture Content, (%)

Water Level Reading at time of drilling.

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

0 5

Horizontal Scale (feet)

Vertical Exaggeration: 0.5x

Wang Engineering, Inc.
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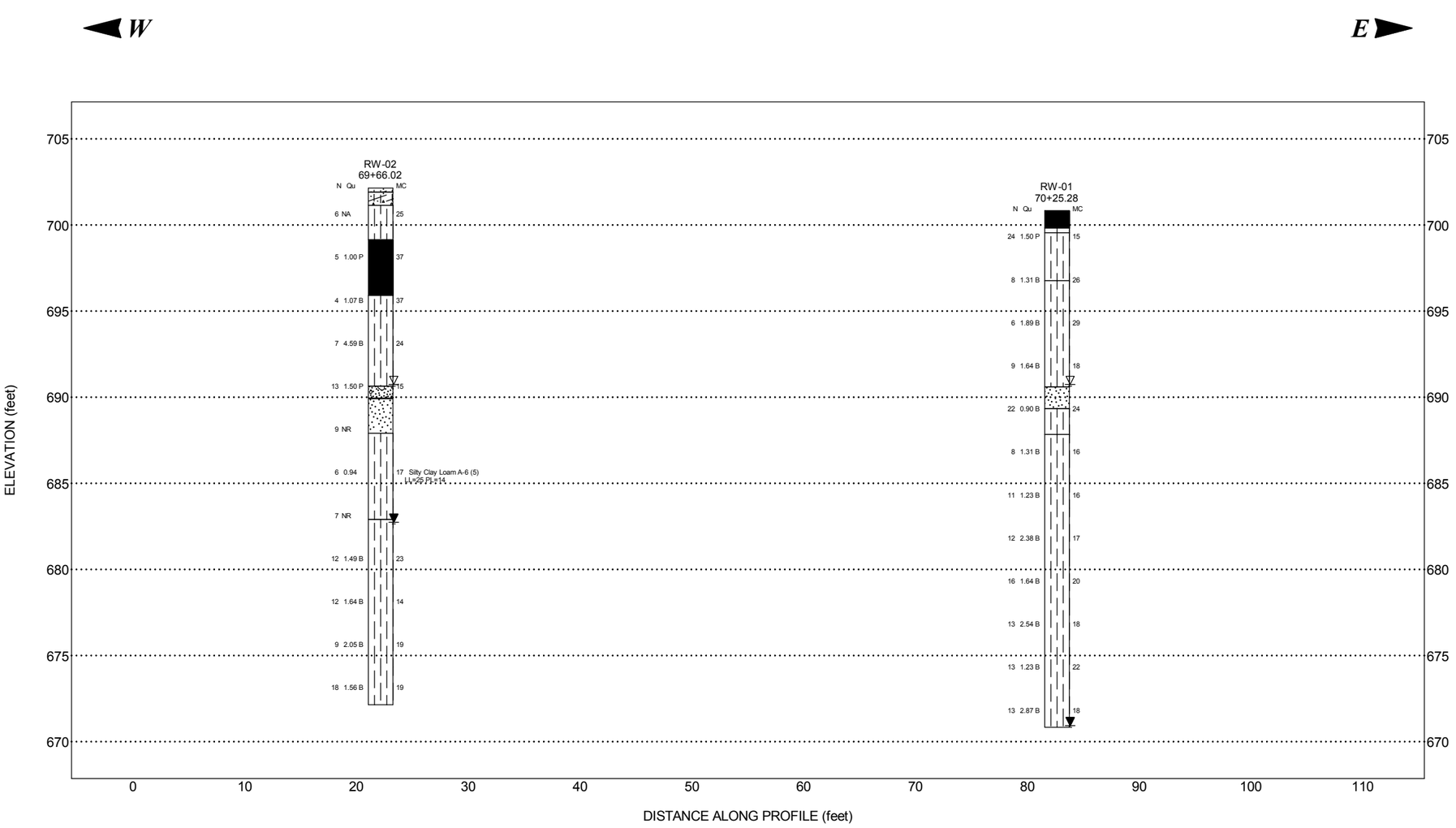
Lombard, IL 60148

Subsurface Data Profile
Retaining Wall No. 1

WEI SINCE 1982

Manhattan-Monee Culverts Replacement
Will County, Illinois

JOB NUMBER	PLATE NUMBER
199-02-08	EXHIBIT 3-2



Lithology Graphics

Topsoil

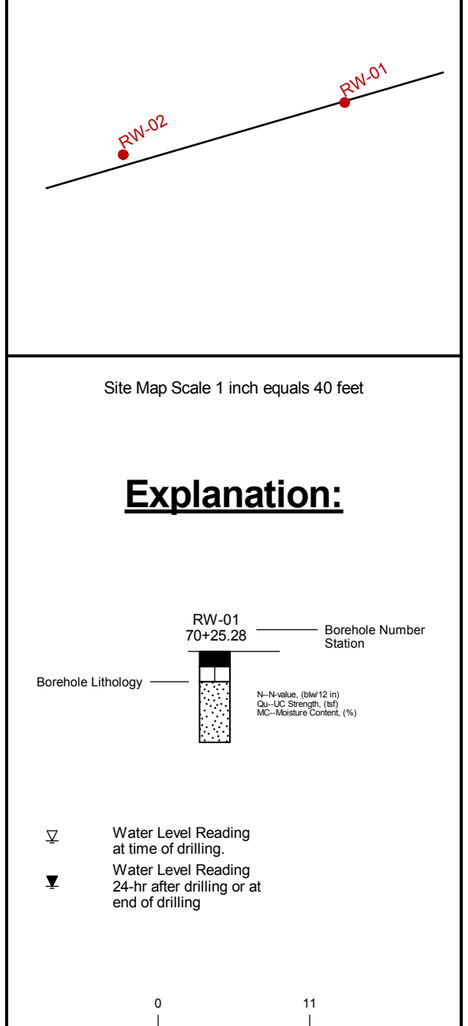
IDH Silt, Silty Loam

IDH Silty Clay, Silty Clay Loam

IDH Sand, Sandy Loam

Pavement

Gravelly sand, sandy gravel



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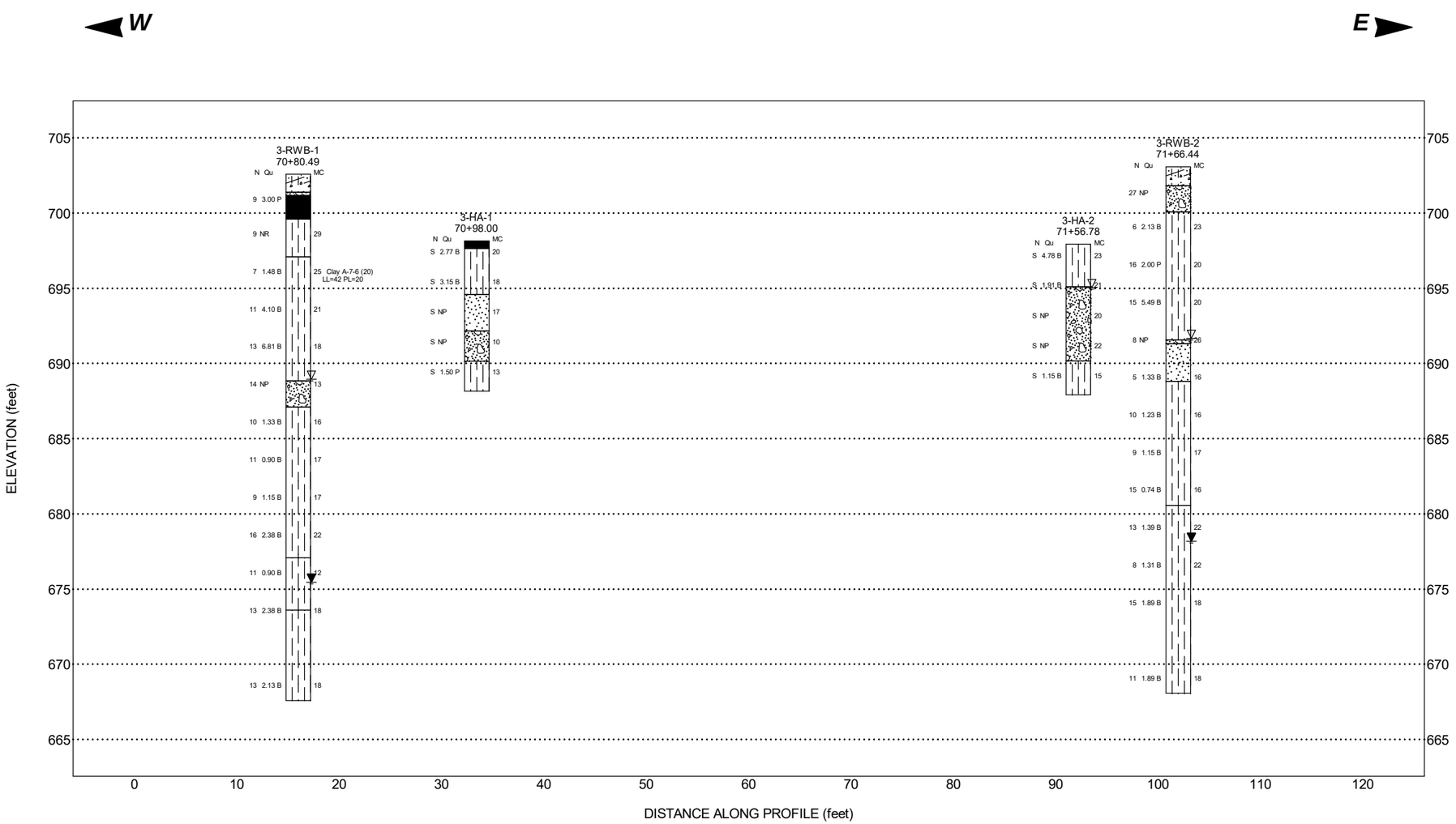
Lombard, IL 60148

Subsurface Data Profile
Retaining Wall No. 2

WEI SINCE 1982

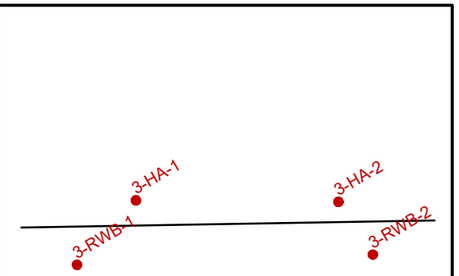
Manhattan-Monee Culverts
Replacement
Will County, Illinois

JOB NUMBER	PLATE NUMBER
199-02-08	EXHIBIT 3-3



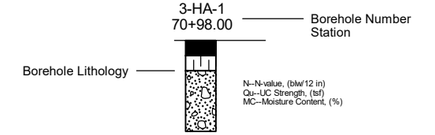
Lithology Graphics

- Topsoil
- Pavement
- IDH Silty Clay, Silty Clay Loam
- IDH Sand, Sandy Loam
- Gravelly sand, sandy gravel



Site Map Scale 1 inch equals 45 feet

Explanation:



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

0 12

Horizontal Scale (feet)

Vertical Exaggeration: 1.5x

Wang Engineering, Inc.
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Lombard/IL/60148

Subsurface Data Profile
Retaining Wall No. 3

Manhattan-Monee Retaining Wall Replacement
Will County, IL

JOB NUMBER	PLATE NUMBER
199-02-09	EXHIBIT 3-4

WEI 11X17 1990209.GPJ BEARING-TRIAL.GDT 6/20/19

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

APPENDIX A

Wang Engineering

BORING LOG LEGEND

Relative Drilling Resistance		
RDR	**Term**	**Criter**
1	Very Easy	No chatter, very little resistance, very fast and steady drill advance
2	Easy	No chatter, some resistance, fast and steady drill advance rate
3	Moderate	Some chatter, firm drill resistance, moderate advance
4	Hard	Frequent chatter, variable drill resistance, slow advance rate
5	Very Hard	Constant chatter, variable and very slow drill advance, nearly refusal

Proportional Terms (%)	
Trace	1-10
Little	10-20
Some	20-35
And	35-50

Coarse Gradation	
Boulder	>200mm
Cobble	200mm to 75mm
Gravel	75mm to 2mm

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

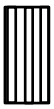
Soil Moisture Conditions	
Term	**Appearance and Feel**
Dry	Soil sample looks and feels powdery or dusty; no indication of moisture. Free-running granular soils.
Damp	Cohesive soils cannot be molded easily without adding water. Granular soil may not flow very easily.
Moist	Soil is near the optimum moisture content. Cohesive soils are near the plastic limit. Soil changes color slightly when exposed to air for a short period.
Wet	One may feel a high degree of moisture, yet no free water is visible. Water may become visible if the sample is squeezed. Cohesive soil appears weak and sticks to and/or stains hands. Granular soils tend to cohere.
Saturated	Applied to granular soils that have free surface water; water drains freely from the sample.

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

Sample Type Symbols


Split Spoon (SS)


Shelby Tube (ST)


No Recovery (NR)


In-situ Vane Shear Test


Auger Cuttings


Geoprobe


Rock Core

Drill Rig:
TMR = Truck Mouted Rig
ATV = All Terrain Vehicle Rig
[--%] = SPT Hammer Efficiency

SPT = Standard Penetration Test
Q_u = Unconfined Compressive Strength Test
P = Pocket Penetrometer
S = Shear failure (Rimac)
B = Bulge failure (Rimac)
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
N-Value (N-Blows/12 inches) is the sum of the second and the third SPT values

05/14/2018 (V05)

Wang Engineering
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Telephone: 630-953-9928
Fax: 630-953-9938

BORING LOG CB-03

WEI Job No.: 199-02-08

Client: **Quigg Engineering Inc.**
Project: **Manhattan-Monee Culverts Replacement**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 700.71 ft
North: 1733502.21 ft
East: 1106240.81 ft
Station: 69+65.39
Offset: 19.27 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	699.7	12-inch thick, brown and black SILTY CLAY LOAM, trace gravel; moist						
		--TOPSOIL--						
		Medium stiff to stiff, brown and black SILTY CLAY, trace gravel; damp to moist			1	3 4 4	1.72 B	25
		--FILL--						
		--RDR 2--						
	696.7	Medium stiff, brown and gray SILTY CLAY, trace gravel, organic matter; moist to wet	5		2	2 3 3	0.82 B	32
		--RDR 2--						
		--L_L(%)=48, P_L(%)=22--						
		--%Gravel=2.6--						
		--%Sand=9.0--			3	2 1 2	0.66 B	55
		--%Silt=52.6--						
		--%Clay=35.8--						
	692.7	Stiff to hard, brown SILTY CLAY, trace gravel; damp to moist						
		--RDR 2--	10		4	2 7 9	4.10 B	18
	689.0	▽			5	4 7 7	1.48 B	28
		Medium dense, gray GRAVEL; saturated						
	687.7	Loose, gray SAND; saturated						
	686.6	Soft to stiff. gray SILTY CLAY, trace gravel; damp to moist	15		6	7 5 4	0.66 B	16
		--RDR 2--			7	3 3 6	1.15 B	17
			20		8	3 4 5	1.07 B	16

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--wet--			9	5 8 10	0.41 B	18
		--2-inch sandy gravel lens; saturated--	25		10	8 4 6	1.15 B	15
		▽			11	6 5 12	1.39 B	19
	670.7		30		12	3 5 11	1.97 B	19
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **04-22-2019** Complete Drilling: **04-22-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D25 ATV [93%]**
Driller: **N&A** Logger: **E. Yim** Checked by: **J. Rowells**
Drilling Method: **2.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽: **11.75 ft**
At Completion of Drilling ▼: **27.00 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.

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Fax: 630-953-9938

BORING LOG CB-04

WEI Job No.: 199-02-08

Client: **Quigg Engineering Inc.**
Project: **Manhattan-Monee Culverts Replacement**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 702.65 ft
North: 1733516.64 ft
East: 1106303.98 ft
Station: 70+28.87
Offset: 6.23 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	702.4	3-inch thick ASPHALT --PAVEMENT--						
	701.7	9-inch thick CONCRETE --PAVEMENT--						
		Medium dense, gray GRAVEL; damp			1	8 9 7	NP	27
	699.7	--BASE COURSE--						
		Stiff, black SILTY CLAY LOAM, trace gravel; damp to moist						
		--BURIED TOPSOIL--			2	3 2 3	1.39 B	30
	697.2		5					
		Stiff to hard, brown, black and gray SILTY CLAY, trace gravel; damp to moist						
		--RDR 2--			3	2 3 3	1.80 B	27
					4	2 3 5	4.76 B	22
			10					
	691.2			▽				
	691.0	SANDY GRAVEL; saturated			5	3 4 6	2.50 P	16
		Very stiff, gray SILTY CLAY LOAM, trace to some gravel; damp to moist						
		--RDR 2--		▽	6	4 4 4	2.30 B	15
			15					
	687.2							
		Medium dense, gray SAND,						
	686.4	trace gravel; saturated						
		Stiff to hard, brownish gray to gray SILTY CLAY, trace gravel; damp to moist			7	3 2 7	2.13 B	14
		--RDR 2--						
					8	2 3 4	1.23 B	17
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--silt lenses--			9	4 6 9	1.31 B	16
			25		10	3 10 8	1.07 B	22
					11	6 9 11	4.43 B	17
					12	6 7 10	2.05 B	19
	672.7		30					
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **04-19-2019** Complete Drilling: **04-19-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B57 TMR [100%]**
Driller: **N&A** Logger: **E. Yim** Checked by: **J. Rowells**
Drilling Method: **2.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **11.50 ft**
At Completion of Drilling ▼ **14.00 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 1990208.GPJ WANGENG.GDT 5/20/19

Wang Engineering
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BORING LOG RW-01

WEI Job No.: 199-02-08

Client: **Quigg Engineering Inc.**
Project: **Manhattan-Monee Culverts Replacement**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 700.84 ft
North: 1733543.84 ft
East: 1106299.79 ft
Station: 70+25.28
Offset: 21.06 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	699.8	12-inch thick, brown to black SILTY CLAY LOAM, trace gravel; moist						
	699.5	--TOPSOIL--/						
		Gray SILT, trace gravel; damp			1	4 12 12	1.50 P	15
		--FILL--						
		Stiff, brown to black SILTY CLAY LOAM, trace to little gravel; damp to moist						
	696.8	--FILL--			2	4 4 4	1.31 B	26
		--RDR 3 to 4--	5					
		Stiff, orange, brown and gray SILTY CLAY, trace gravel; damp to moist						
		--RDR 2 to 3--			3	2 3 3	1.89 B	29
		--little gravel--						
		--moist to wet--			4	3 4 5	1.64 B	18
		--rig chatter--	10	▽				
	690.6	SAND; saturated						
	689.3	Medium stiff, gray SILTY CLAY, trace gravel; moist			5	22 16 6	0.90 B	24
	687.8	Stiff to very stiff, gray SILTY CLAY, trace gravel; damp to moist						
		--RDR 2--			6	5 3 5	1.31 B	16
			15					
					7	4 5 6	1.23 B	16
					8	3 5 7	2.38 B	17
			20					
		--<0.5-inch silty loam lens; saturated--	25		10	5 5 8	2.54 B	18
					11	6 5 8	1.23 B	22
					12	4 5 8	2.87 B	18
	670.8		30	▽				
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **04-22-2019** Complete Drilling: **04-22-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D25 ATV [93%]**
Driller: **N&A** Logger: **E. Yim** Checked by: **J. Rowells**
Drilling Method: **2.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.20 ft**
At Completion of Drilling ▼ **30.00 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.

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BORING LOG RW-02

WEI Job No.: 199-02-08

Client: **Quigg Engineering Inc.**
Project: **Manhattan-Monee Culverts Replacement**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 702.15 ft
North: 1733529.95 ft
East: 1106240.82 ft
Station: 69+66.02
Offset: 8.47 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	701.9	3-inch thick ASPHALT						
	701.2	9-inch thick CONCRETE						
		Black SILTY CLAY LOAM --FILL--			1	8 3 3	NA	25
	699.2	Stiff, black SILTY CLAY LOAM, trace gravel and organics; moist --BURIED TOPSOIL--	5		2	2 2 3	1.00 P	37
	695.9	Stiff to hard, brown and gray SILTY CLAY, trace gravel; damp to wet --RDR 2--			3	1 2 2	1.07 B	37
			10		4	2 3 4	4.59 B	24
	690.7	SANDY GRAVEL; saturated			5	3 4 9	1.50 P	15
	690.0	Possible SANDY GRAVEL to SAND; saturated						
	687.9	Medium stiff, gray SILTY CLAY LOAM, trace gravel; moist to wet --RDR 2--	15		6	5 5 4	NR	
		--L_L(%)=25, P_L(%)=14-- --%Gravel=7.3-- --%Sand=20.6-- --%Silt=49.6-- --%Clay=22.4--			7	2 3 3	0.94	17
	682.9	Stiff to very stiff, gray to brownish	20		8	2 3 4	NR	
		gray SILTY CLAY, trace gravel; moist to wet --RDR 2--			9	3 5 7	1.49 B	23
			25		10	3 6 6	1.64 B	14
					11	5 3 6	2.05 B	19
	672.2		30		12	4 6 12	1.56 B	19
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling: **04-19-2019** Complete Drilling: **04-19-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B57 TMR [100%]**
Driller: **N&A** Logger: **E. Yim** Checked by: **J. Rowells**
Drilling Method: **2.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **11.50 ft**
At Completion of Drilling: **19.50 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 3-HA-1

WEI Job No.: 199-02-09

Client: **Quigg Engineering, Inc.**
Project: **Manhattan-Monee Retaining Wall Replacement**
Location: **Will County, IL**

Datum: NAVD 88
Elevation: 698.15 ft
North: 1733550.46 ft
East: 1106372.39 ft
Station: 70+98.00
Offset: 26.08 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	697.7	6-inch thick, dark brown SILTY CLAY LOAM, organic matter --TOPSOIL-- --Running water on surface--			1	PUSH	2.77 B	20
		Very stiff, brown, damp SILTY CLAY			2	PUSH	3.15 B	18
	694.6	Gray, fine to medium, saturated SAND --interbedded clay layer--	5		3	PUSH	NP	17
	692.2	Gray, saturated SANDY GRAVEL			4	PUSH	NP	10
	690.2	Stiff, gray, damp SILTY CLAY			5	PUSH	1.50 P	13
	688.2	Boring terminated at 10.00 ft	10					
			15					
			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: **06-05-2019** Complete Drilling: **06-05-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **GEOPROBE**
Driller: **M&I** Logger: **I. Nenn** Checked by: **Nesam. B**
Drilling Method: **1" IDA Pneumatic Geoprobe LB Sampler**

WATER LEVEL DATA

While Drilling: **DRY**
At Completion of Drilling: **NA**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 3-HA-2

WEI Job No.: 199-02-09

Client: **Quigg Engineering, Inc.**
Project: **Manhattan-Monee Retaining Wall Replacement**
Location: **Will County, IL**

Datum: NAVD 88
Elevation: 697.92 ft
North: 1733550.04 ft
East: 1106431.19 ft
Station: 71+56.78
Offset: 24.37 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Stiff to hard, brown, damp SILTY CLAY			1	PUSH	4.78 B	23
		--Running water on surface--						
	695.1							
		Saturated SANDY GRAVEL			2	PUSH	1.91 B	21
		--RDR 2--	5		3	PUSH	NP	20
					4	PUSH	NP	22
	690.2							
		Stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel			5	PUSH	1.15 B	15
		--RDR 2--						
	687.9		10					
		Boring terminated at 10.00 ft						
			15					
			20					

GENERAL NOTES

Begin Drilling: **06-05-2019** Complete Drilling: **06-05-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **GEOPROBE**
Driller: **M&I** Logger: **I. Nenn** Checked by: **Nesam. B**
Drilling Method: **1" IDA Pneumatic Geoprobe LB Sampler**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **NA**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 3-RWB-1

WEI Job No.: 199-02-09

Client: **Quigg Engineering, Inc.**
Project: **Manhattan-Monee Retaining Wall Replacement**
Location: **Will County, IL**

Datum: NAVD 88
Elevation: 702.59 ft
North: 1733531.77 ft
East: 1106355.28 ft
Station: 70+80.49
Offset: 7.77 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	701.4	14-inch thick ASPHALT --PAVEMENT--						
	701.2	Medium dense, light brown SANDY GRAVEL --AGGREGATE BASE--			1	9 5 4	3.00 P	
	699.6	Very stiff, black and gray, damp SILTY CLAY, organic soil --BURIED TOPSOIL-- --RDR 3--			2	5 4 5	NR	29
		Black and gray SILTY CLAY, trace organic matter	5					
	697.1	--augur cuttings-- --RDR 2--						
		Stiff to hard, brown and gray, damp SILTY CLAY to CLAY, trace gravel --RDR 2-- --L_L(%)=42, P_L(%)=20-- --%Gravel=0.9-- --%Sand=12.0-- --%Silt=47.0-- --%Clay=40.1--			3	2 3 4	1.48 B	25
			10		4	3 5 6	4.10 B	21
					5	5 6 7	6.81 B	18
	688.8	Medium dense, gray, saturated SANDY GRAVEL --RDR 2--	15		6	3 6 8	NP	13
	687.1	Medium stiff to very stiff, gray, moist to damp SILTY CLAY, trace gravel --RDR 2--			7	3 4 6	1.33 B	16
			20		8	3 4 7	0.90 B	17
	677.1	Medium stiff, gray, damp SILTY CLAY LOAM, trace to little gravel --RDR 2--	25		9	2 4 5	1.15 B	17
					10	5 8 8	2.38 B	22
					11	3 4 7	0.90 B	12
	673.6	Very stiff, gray SILTY CLAY, trace gravel --RDR 2--	30		12	4 6 7	2.38 B	18
	667.6	Boring terminated at 35.00 ft	35		13	4 5 8	2.13 B	18
			40					

GENERAL NOTES

Begin Drilling: **06-05-2019** Complete Drilling: **06-05-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D50 TMR [78%]**
Driller: **J&M** Logger: **I. Nenn** Checked by: **Nesam. B**
Drilling Method: **3.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **13.75 ft**
At Completion of Drilling: **27.25 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 3-RWB-2

WEI Job No.: 199-02-09

Client: **Quigg Engineering, Inc.**
Project: **Manhattan-Monee Retaining Wall Replacement**
Location: **Will County, IL**

Datum: NAVD 88
Elevation: 703.07 ft
North: 1733534.73 ft
East: 1106441.19 ft
Station: 71+66.44
Offset: 8.85 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		15-inch thick, ASPHALT --PAVEMENT--						
	701.8							
		Medium dense, light brown SANDY GRAVEL --AGGREGATE BASE--			1	19 21 6	NP	
	700.1							
		Very stiff to hard, brown and gray, damp SILTY CLAY, trace gravel --RDR 2--	5		2	6 3 3	2.13 B	23
					3	5 7 9	2.00 P	20
			10		4	4 6 9	5.49 B	20
	691.6			▽				
	691.3	Loose, gray, saturated GRAVEL			5	4 5 3	NP	26
		Loose, gray, saturated SAND						
	688.8							
		Medium stiff to stiff, brown and gray, damp to moist SILTY CLAY LOAM --RDR 2--	15		6	3 3 2	1.33 B	16
					7	4 4 6	1.23 B	16
			20		8	3 4 5	1.15 B	17
	680.6							
		Stiff, gray, damp SILTY CLAY --RDR 2--			9	5 6 9	0.74 B	16
			25	▽	10	3 4 9	1.39 B	22
					11	3 3 5	1.31 B	22
			30		12	4 7 8	1.89 B	18
	668.1		35		13	4 5 6	1.89 B	18
		Boring terminated at 35.00 ft						
			40					

GENERAL NOTES

Begin Drilling: **06-05-2019** Complete Drilling: **06-05-2019**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D50 TMR [78%]**
Driller: **J&M** Logger: **I. Nenn** Checked by: **Nesam. B**
Drilling Method: **3.25" HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽: **11.50 ft**
At Completion of Drilling ▼: **25.00 ft**
Time After Drilling: **NA**
Depth to Water ▼: **NA**

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SN 099-0441

Professional Service Industries, Inc.
A & H Flood Engineering

Sh. 1 of 1 Sh.

PSI

FOUNDATION BORING LOG

PROJECT 152-05020 Date March 28, 1990
ROUTE Manhattan-Monee Road Bored By
SEC. STA. 94+72 11' Left Checked By
COUNTY Will
Boring No. B-4
Station 94+72
Offset 11' Left

Surface Water El.
Groundwater El. at Completion -9.0'
After Hours

Description	Elevation	Blows	Qu t/s.f.	w(%)
Ground Surface	101.70			
4"± Asphalt over 6"± crushed stone	100.87			
Stiff to very stiff black CLAY with gravel and organics		10 11 12	3.5p 1.8b	35
	97.20			
Very stiff black, orange-brown and gray silty CLAY with gravel and organics	-5	4 6 7	2.5p 2.0s	21
	94.70			
Very stiff black, greenish-gray and brown silty CLAY		4 4 5	2.5p	25
	92.20			
Hard brown silty CLAY	-10	5 10 14	4.5+P 5.0s	21
	89.70			
Very stiff to hard gray silty CLAY		8 12 16	3.5p 4.8s	16
	87.20			
Very stiff to hard grayish brown silty clay	-15	5 9 8	4.5+P 3.2b	17
	84.70			
Stiff gray CLAY		5 7 8	2.0p 1.1b	18
	-20			
		9 7 7	1.0p	20
Stiff gray CLAY		6 9 11	1.5p 1.6b	
	-25			
		3 1 4	1.0p	
		9 11 13	/	
	-30			
		7 8 11	1.0p 1.3b	
	69.70			
Stiff to very stiff grayish brown silty CLAY		8 11 15	1.5p 2.5b	
	67.20			
	-35			
Stiff gray silty CLAY		7 9 11	1.0p 1.0b	
	65.20			
Boring terminated at 36.5' below existing grade				
	-40			
	-45			

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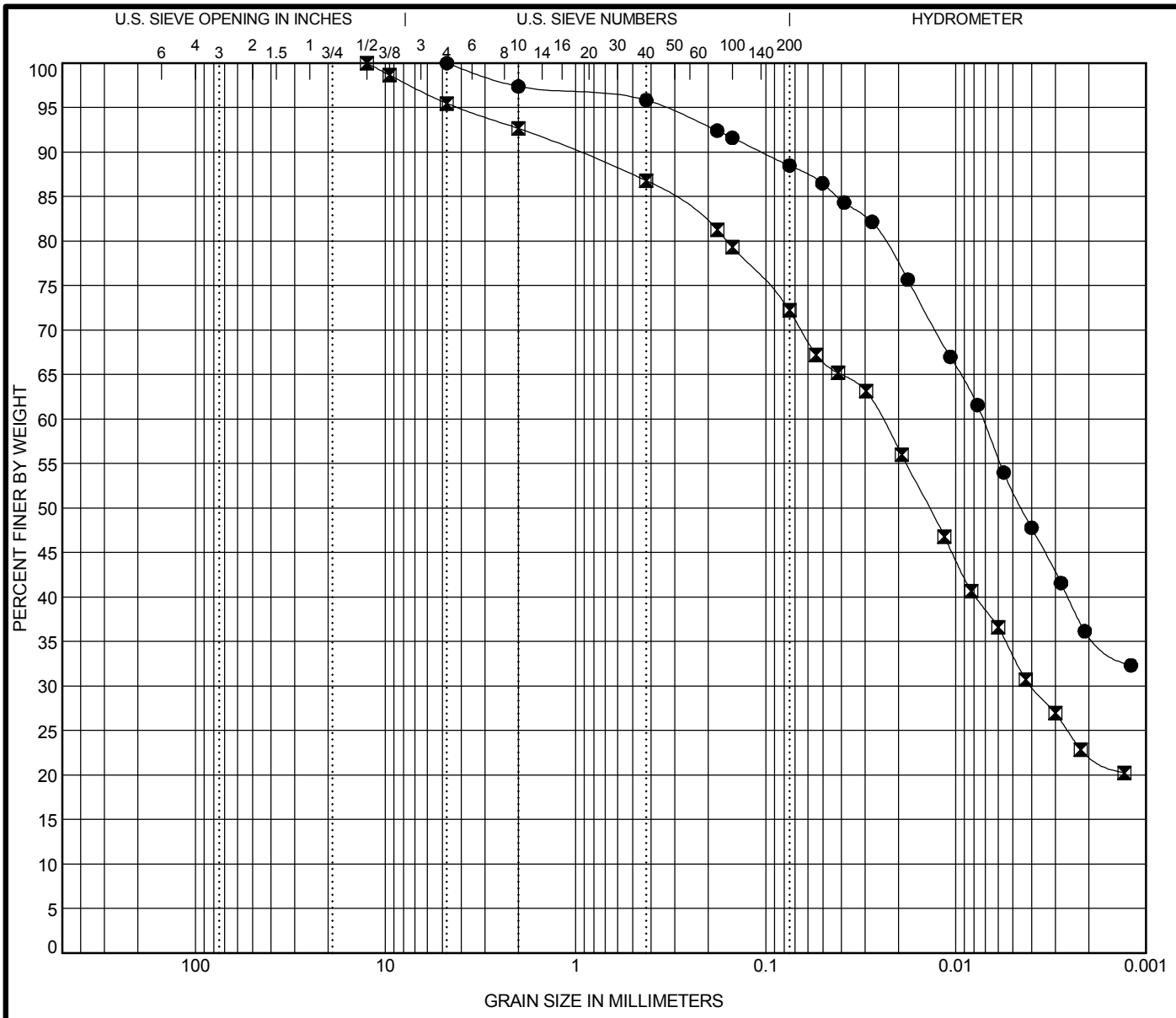
APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	CB-03#3	6.0 ft	**Silty Clay**	**48**	**22**	**26**		
⊠	RW-02#7	16.0 ft	**Silty Clay Loam**	**25**	**14**	**11**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	CB-03#3	6.0 ft	**4.75**	**0.007**			**2.6**	**9.0**	**52.6**	**35.8**
⊠	RW-02#7	16.0 ft	**12.5**	**0.025**	**0.004**		**7.3**	**20.6**	**49.6**	**22.4**

WEI SINCE 1982

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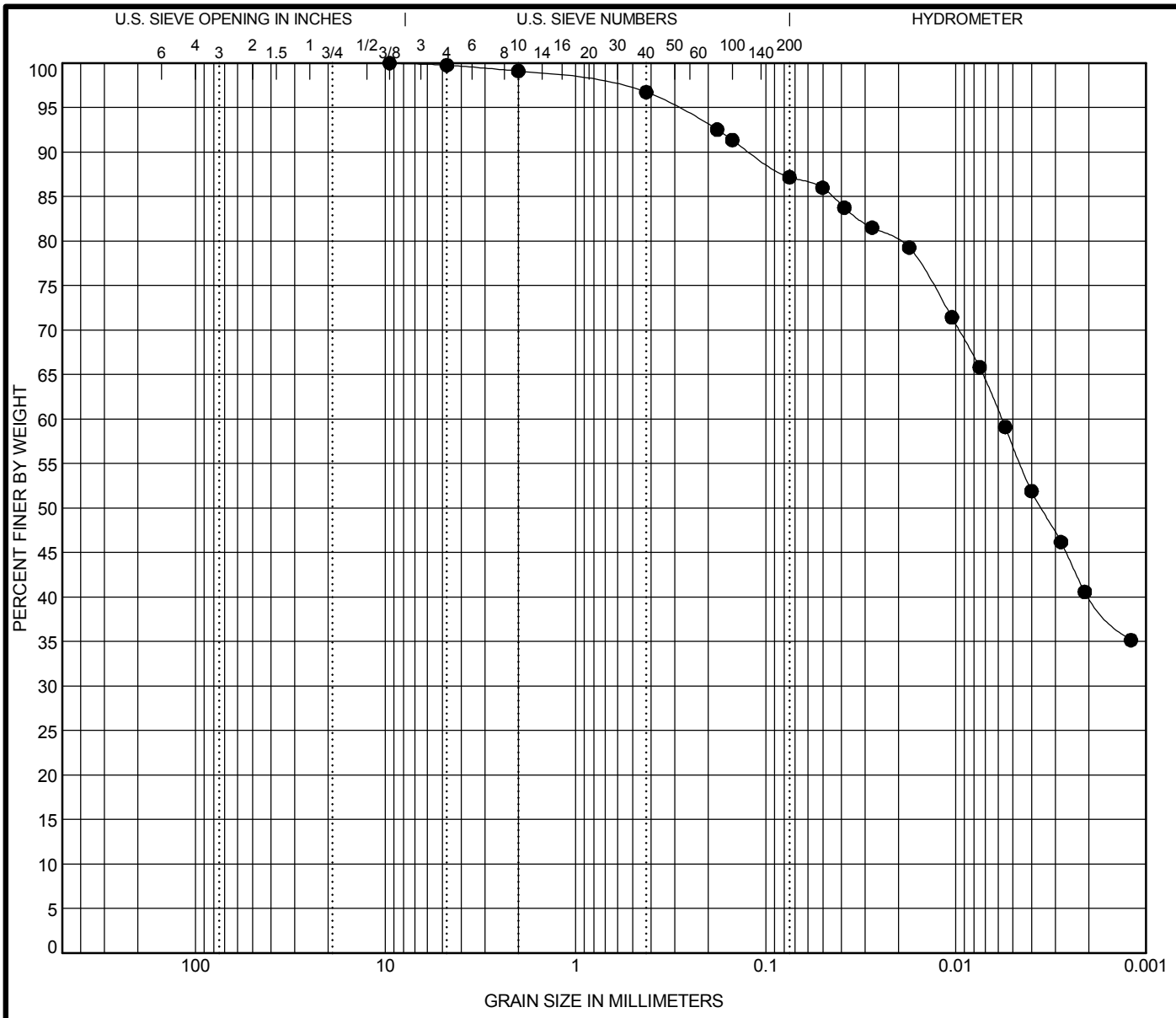
GRAIN SIZE DISTRIBUTION

Project: Manhattan-Monee Culverts Replacement

Location: Will County, Illinois

Number: 199-02-08



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● **3-RWB-1#3**	**6.0 ft**	**Clay**	**42**	**20**	**22**		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **3-RWB-1#3**	**6.0 ft**	**9.5**	**0.006**			**0.9**	**12.0**	**47.0**	**40.1**

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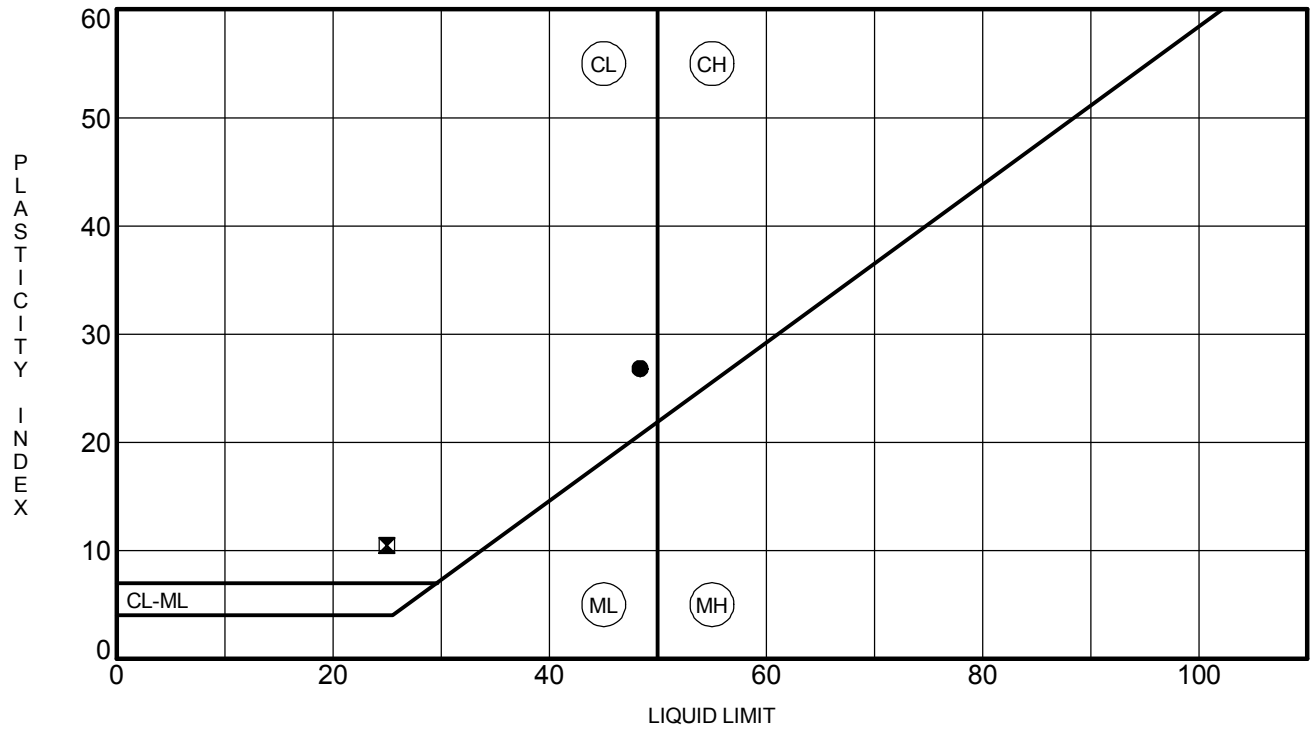
GRAIN SIZE DISTRIBUTION

Project: Manhattan-Monee Retaining Wall Replacement

Location: Will County, IL

Number: 199-02-09



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**CB-03#3**	**6.0 ft**	**48**	**22**	**26**	**88**	**Silty Clay**
⊠	**RW-02#7**	**16.0 ft**	**25**	**14**	**11**	**72**	**Silty Clay Loam**

WEI SINCE 1982

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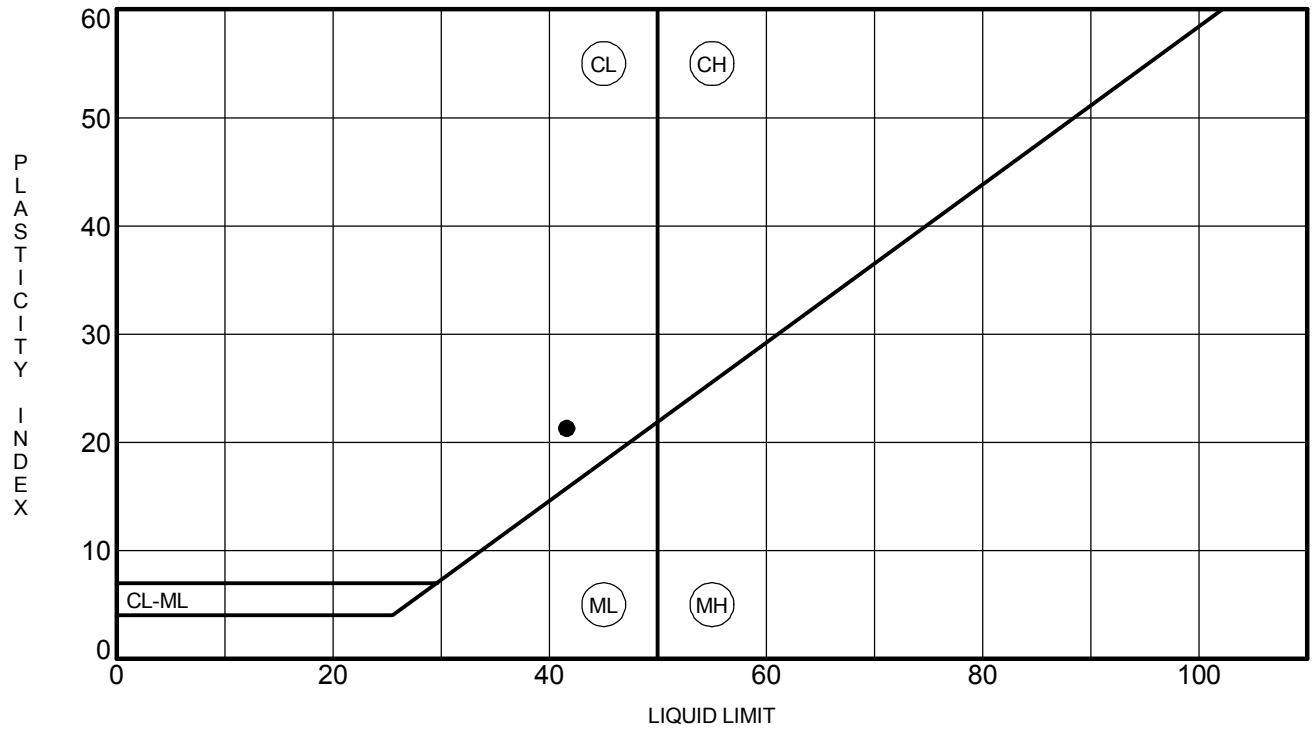
ATTERBERG LIMITS' RESULTS

Project: Manhattan-Monee Culverts Replacement

Location: Will County, Illinois

Number: 199-02-08



Specimen Identification		LL	PL	PI	Fines	IDH Classification
● **3-RWB-1#3**	**6.0 ft**	**42**	**20**	**22**	**87**	**Clay**

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ATTERBERG LIMITS' RESULTS

Project: Manhattan-Monee Retaining Wall Replacement

Location: Will County, IL

Number: 199-02-09

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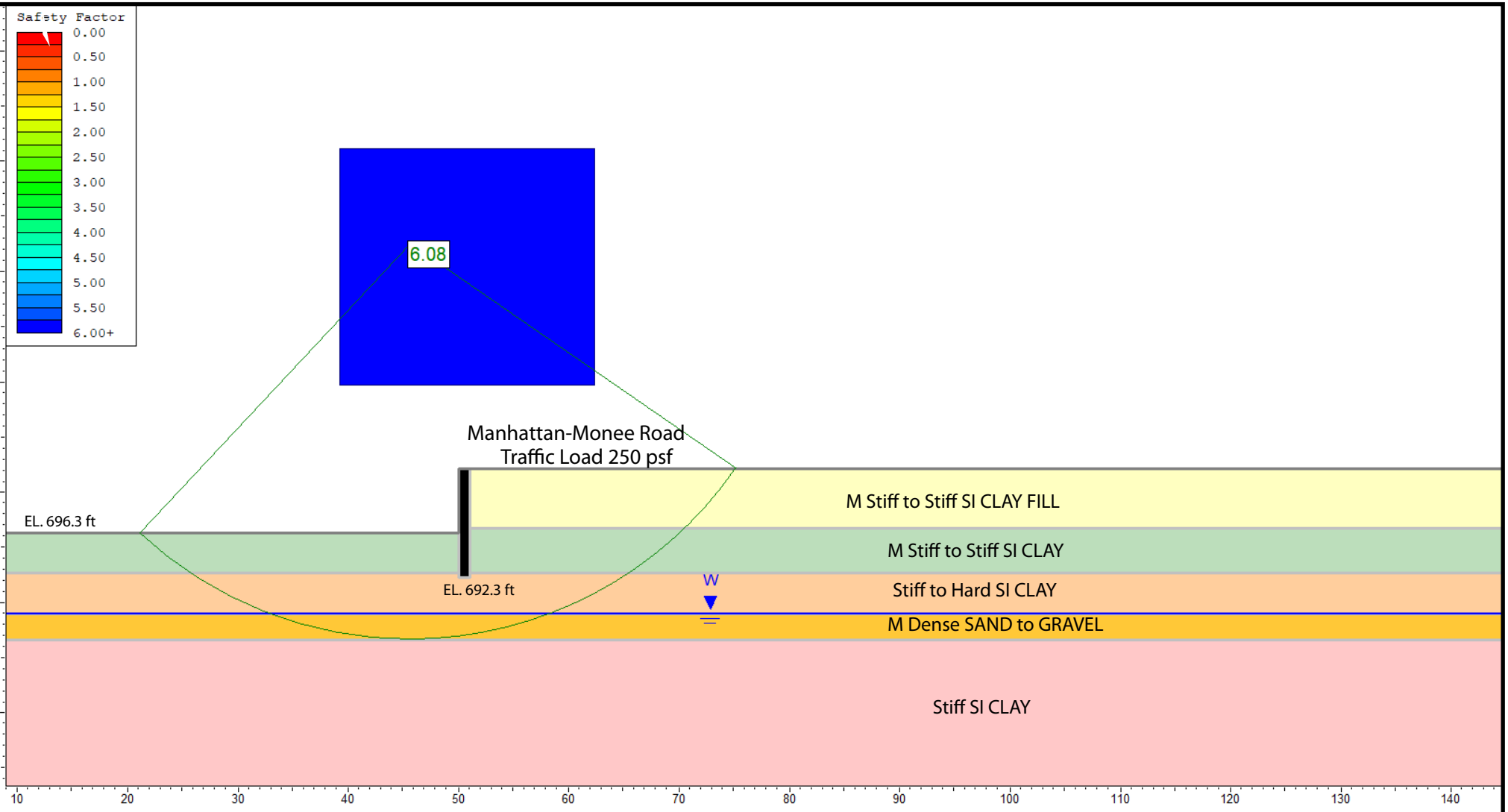
APPENDIX C



Undrained Analysis, Retaining Wall No. 1, Ref Borings: CB-03 and RW-02

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Medium Stiff to Stiff SI Clay (Fill)	120	1300	0
2	Medium Stiff SI Clay	115	700	0
3	Stiff to Hard SI Clay	120	1500	0
4	M Dense SA to Gravel	115	0	30
5	Soft to Stiff SI Clay	120	1100	0

GLOBAL STABILITY ANALYSIS: MANHATTAN-MONEE ROAD CULVERT OVER DRAINAGE DITCH, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	APPENDIX C-1	DRAWN BY: RKC CHECKED BY: M. Kothawala

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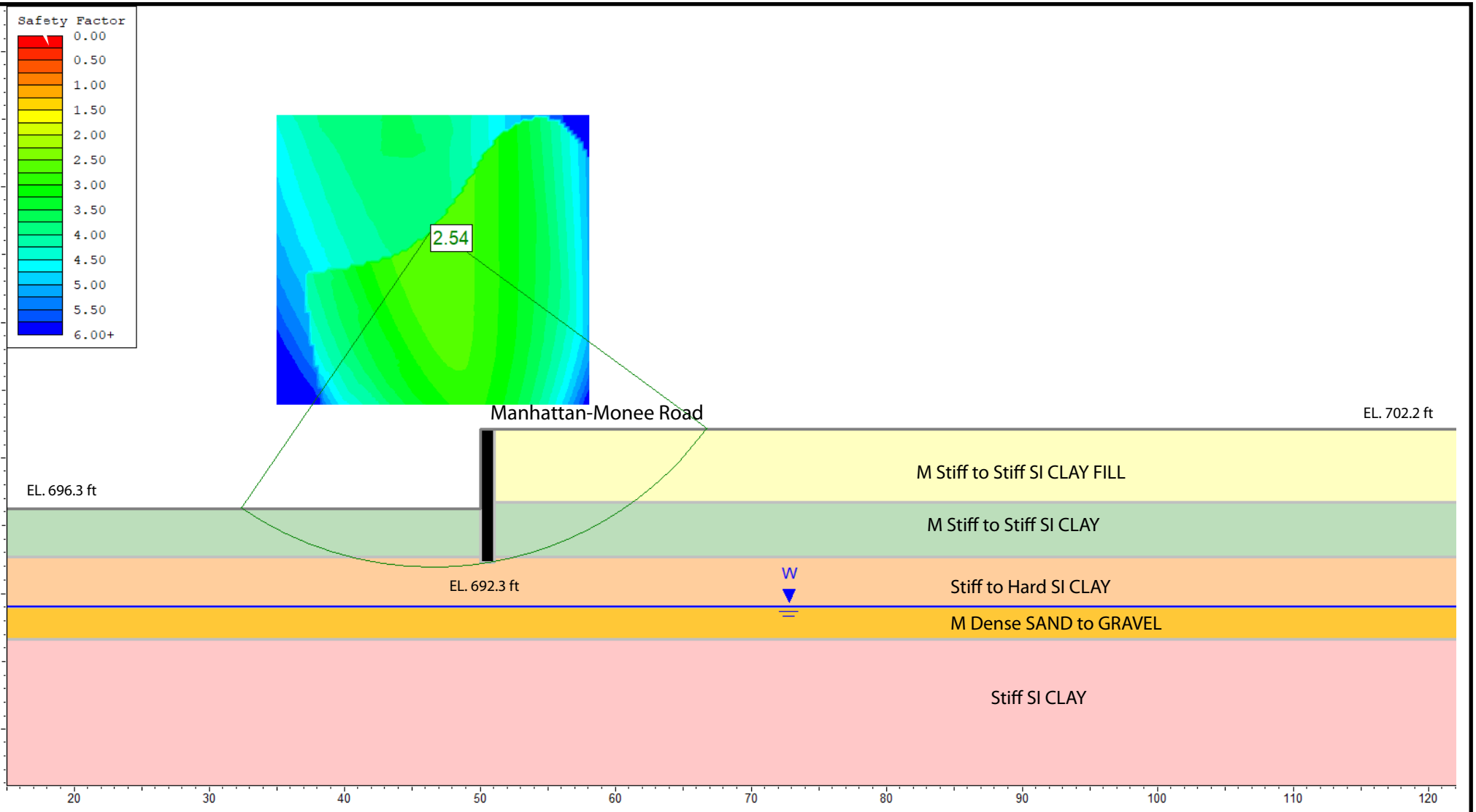
FOR ACCURATE GROUP, INC. | 199-02-08



Drained Analysis, Retaining Wall No. 1, Ref Borings: CB-03 and RW-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Medium Stiff to Stiff SI Clay (Fill)	120	100	30
2	Medium Stiff SI Clay	115	0	28
3	Stiff to Hard SI Clay	120	100	30
4	M Dense SA to Gravel	120	0	30
5	Soft to Stiff SI Clay	120	100	30

GLOBAL STABILITY ANALYSIS: MANHATTAN-MONEE ROAD CULVERT OVER DRAINAGE DITCH, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: RKC | CHECKED BY: M. Kothawala

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FOR ACCURATE GROUP, INC. | 199-02-08

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APPENDIX D

Benchmark: Cut "X" in top of the concrete cap for sheet pile wall, west of box culvert. Elevation 702.49.

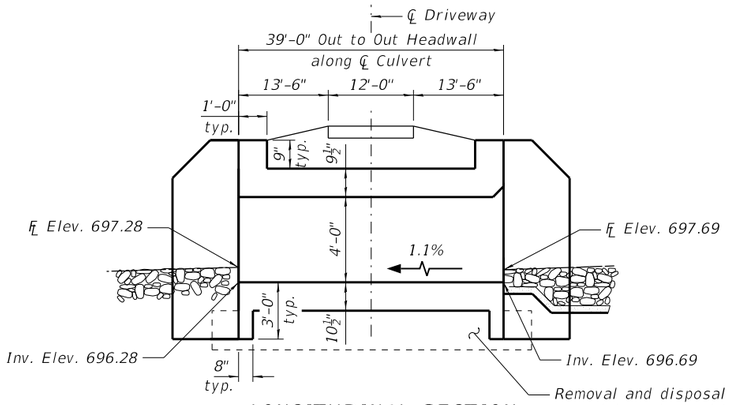
Existing Structure: The Structure No. 099-0441 carrying Manhattan-Monee Rd. over a ditch is a single barrel reinforced concrete box culvert with 15 degree left ahead skew. Three 24 inch corrugated plastic pipes inserted for the full length of the barrel with grout filling the void around the pipes. The barrel dimensions are 7'W x 3'H and 33'-11" out to out length along the ℄ culvert. There is also a corrugated metal pipe culvert running east-west below the private driveway at the southeast corner of the Stucture No. 099-0441. The pipe culvert is 36" ∅ and 30'-0" long. Manhattan-Monee Rd. will be detoured and only open for local traffic during construction. Driveway to the private property will have a temporary runaround during culvert replacement

No salvage.

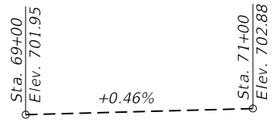
INDEX OF SHEETS

SCOPE OF WORK:

1. Construct a temporary runaround for the driveway just east of Structure No. 099-0441.
2. Remove the pipe culvert under the driveway.
3. Install Temporary Sheet Piling as shown on the plans.
4. Construct proposed Box Culvert under the driveway.
5. Construct proposed ditch on the south side of Manhattan-Monee Road.
6. Remove existing wingwalls and headwalls of existing Structure No. 099-0441 at both upstream and downstream ends.
7. Construct the Retaining wall along north and south side of Manhattan-Monee Road.
8. Fill 3 pipes of Structure No. 099-0441 with CLSM.



LONGITUDINAL SECTION



PROFILE GRADE

(Along ℄ Manhattan-Monee Rd.)

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications, 8th Edition

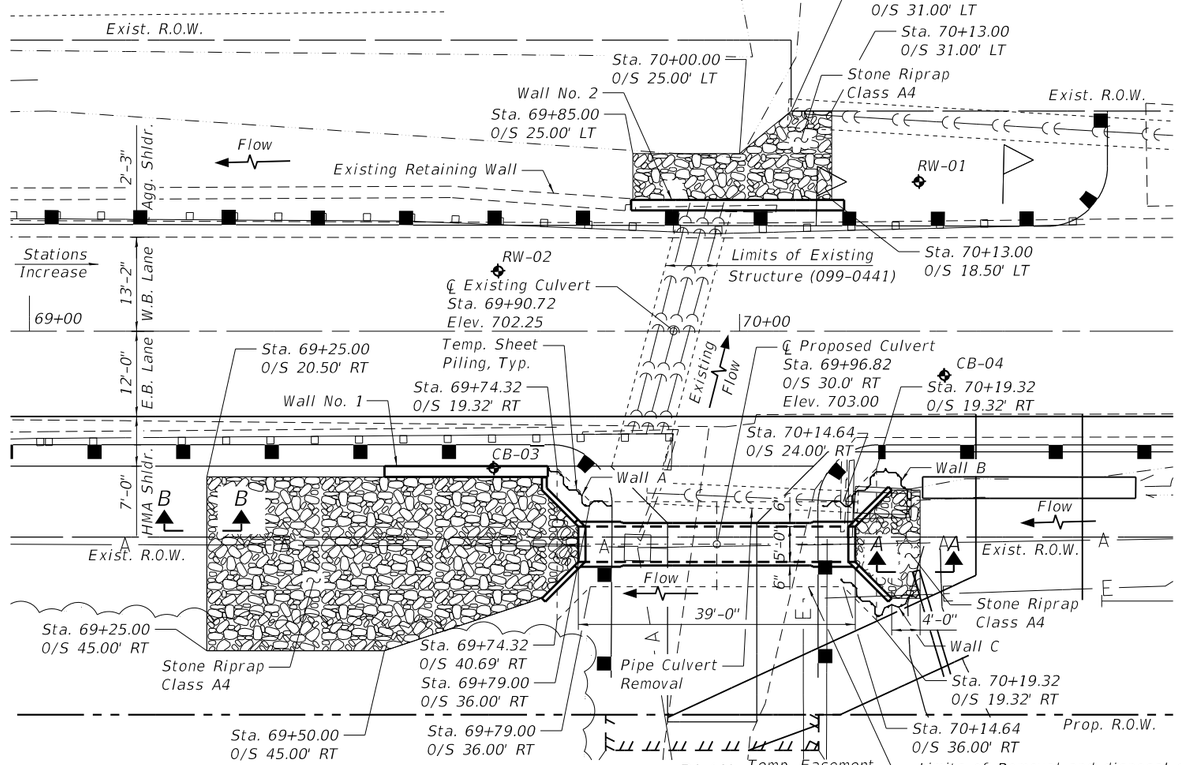
DESIGN STRESSES

FIELD UNITS

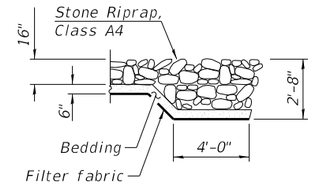
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)

PRECAST UNITS

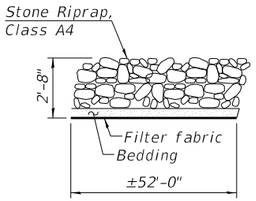
f'c = 5,000 psi
fy = 60,000 psi (Reinforcement)
fy = 65,000 psi (Welded Wire Fabric)



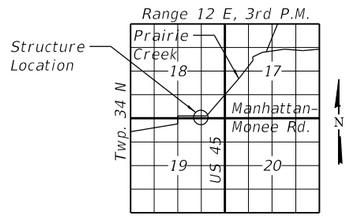
PLAN



SECTION A-A



SECTION B-B



LOCATION SKETCH

LEGEND

◈ Soil Borings

GENERAL PLAN
MANHATTAN-MONEE ROAD
DRIVEWAY CULVERT
OVER DRAINAGE DITCH
WILL COUNTY
STATION 69+96.82

LOADING HL-93

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

MODEL: Default
FILE NAME: c:\Engineering\LiveProjects\13043_IDOT DUR AES\Work Order 15 - 62G85\CADD\CADD Sheets\Structural\62G85-01-GPE_Culvert.dgn

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET S-01 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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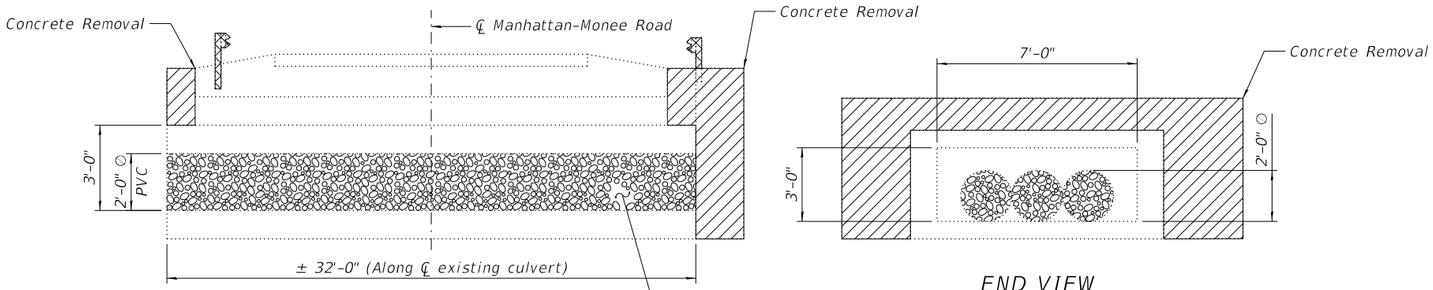
		CONTRACT NO. 62G85		
	ILLINOIS FED. AID PROJECT			



LONGITUDINAL SECTION

(Looking East)

END VIEW

Fill existing PVC pipes with CLSM after construction of proposed ditch on the south side of the Manhattan–Monee Rd.

GENERAL NOTES

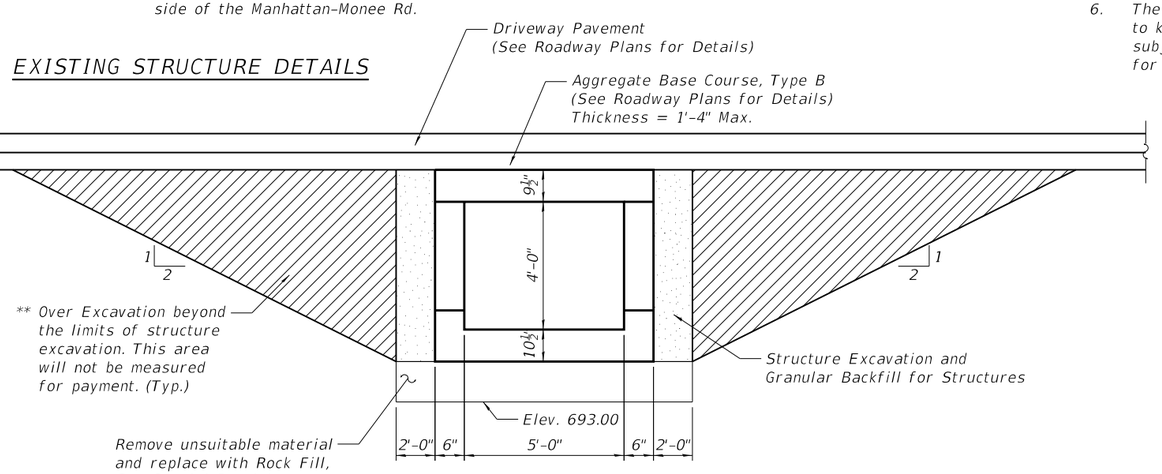
1. All excavation required for construction of the culvert as shown in these plans and in accordance with the Standard Specifications shall be included in the cost for Concrete Box Culverts.
2. Reinforcement bars designated (E) shall be epoxy coated.
3. Layout of the slope protection system may be varied to suit ground conditions in the field as directed by the Engineer.
4. Concrete Sealer shall be applied to the top and outside face of the horizontal cantilever wingwalls and to the exposed concrete for the concrete cap of the sheet pile wall.
5. Plan dimensions and details relative to existing plans are subject to nominal construction variations. The Contractor shall field verify existing dimensions and details affecting new construction and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.
6. The Contractor shall be responsible to divert the stream flow during construction to keep construction area free of water. The method of water diversion shall be subject to the approval of the Engineer and the cost shall be included in the cost for Concrete Box Culverts.

LEGEND

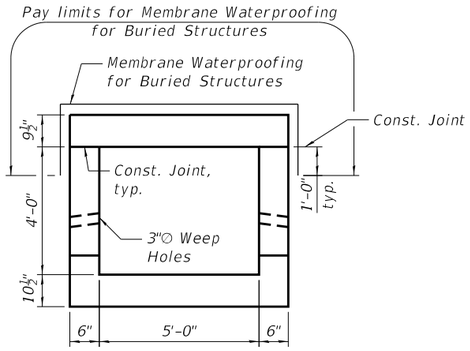
Concrete Removal

Guardrail Removal
(See Roadway Plans for quantity)

EXISTING STRUCTURE DETAILS

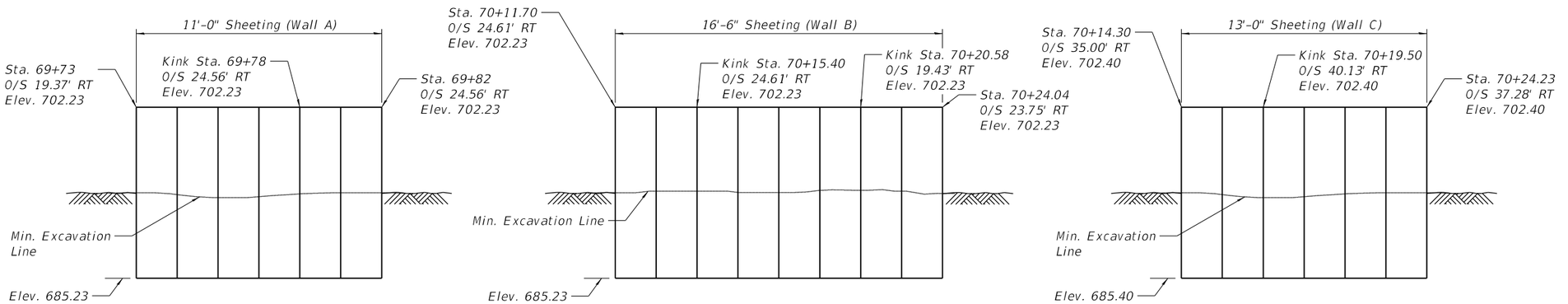


SECTION THRU CULVERT



SECTION THRU CULVERT

** Backfill the over excavation beyond the limits of structure excavation with material specified for roadway embankment per Section 205 of Standard Specifications.



TEMPORARY SHEET PILING DETAILS

Minimum Section Modulous = 4.63 in^3/ft

TOTAL BILL OF MATERIAL

(Culvert and Retaining Walls)

ITEM	UNIT	TOTAL
Stone Riprap, Class A4	Sq Yd	164
Filter Fabric	Sq Yd	164
Concrete Removal	Cu Yd	19.7
Pipe Culvert Removal	Foot	30
Structure Excavation	Cu Yd	32.8
Removal and Disposal of Unsuitable Material for Structures	Cu Yd	45
Concrete Structures	Cu Yd	12.9
Stud Shear Connectors	Each	234
Reinforcement Bars, Epoxy Coated	Pound	6,640
Temporary Sheet Piling	Sq Ft	689
Permanent Sheet Piling	Sq Ft	2,135
Concrete Box Culverts	Cu Yd	27.5
Granular Backfill for Structures	Cu Yd	32.8
Concrete Sealer	Sq Ft	614
Controlled Low Strength Material	Cu Yd	12
Membrane Waterproofing System for Buried Structures	Sq Yd	42
Gabion Removal	Cu Yd	29
Rock Fill	Cu Yd	45

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL NOTES AND TOTAL BILL OF MATERIAL
MANHATTAN-MONEE ROAD OVER UN-NAMED DITCH

SHEET S-02 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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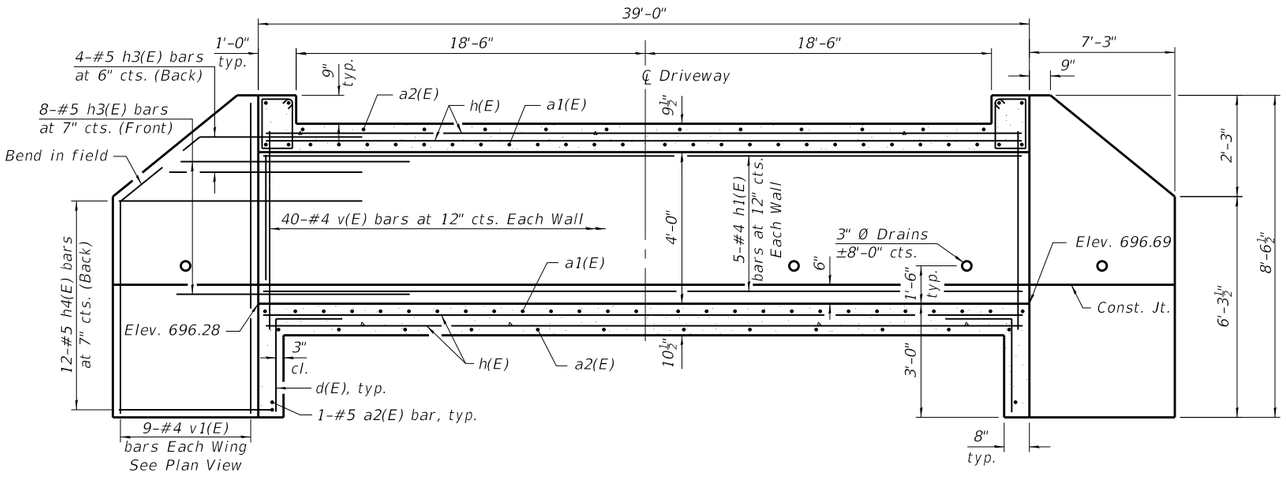
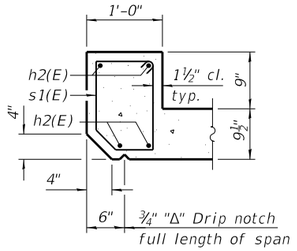
		CONTRACT NO. 62G85		
	ILLINOIS	FED. AID PROJECT		



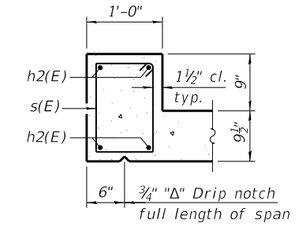
SE WINGSWALL
(Showing Reinforcement)
SW Wingwall Similar

LONGITUDINAL SECTION

SW WINGWALL
(Showing Dimensions)
SE Wingwall Similar

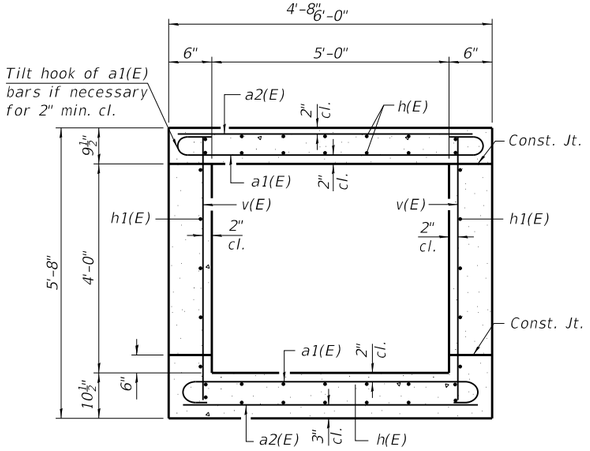


UPSTREAM

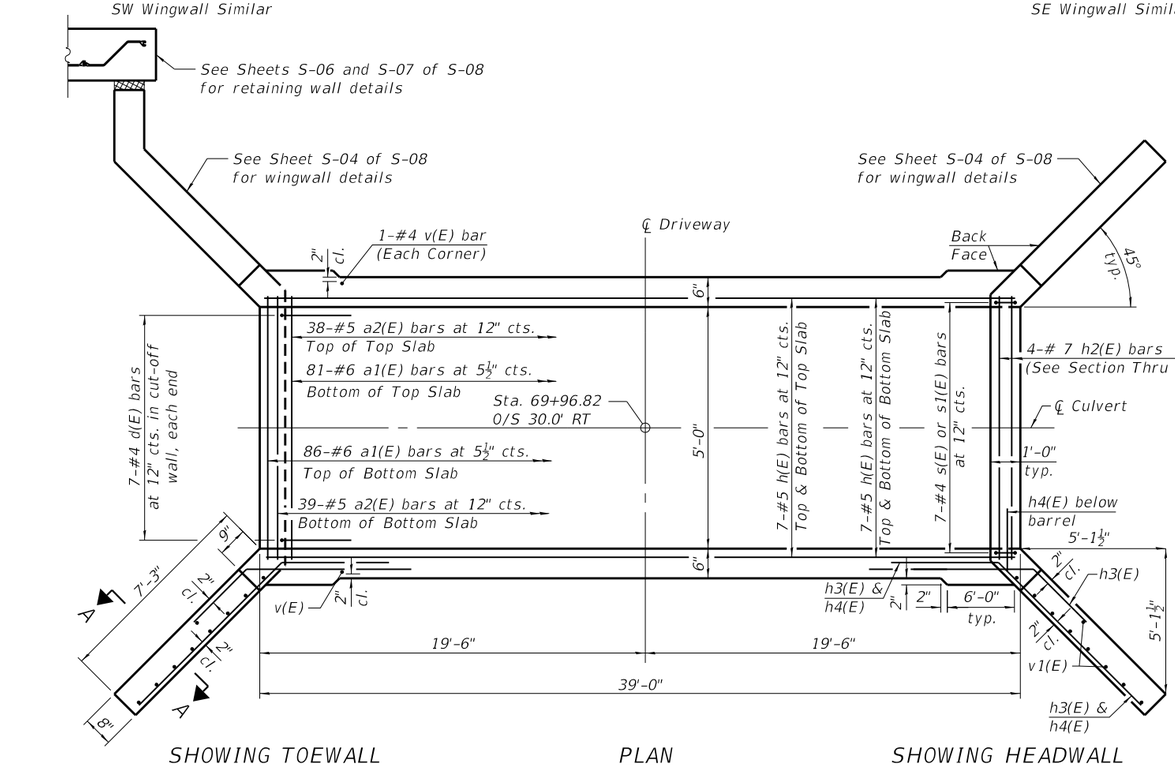


DOWNSTREAM

SECTION THRU HEADWALL



SECTION THRU BARREL

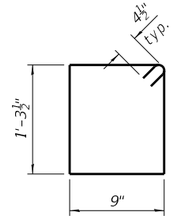


SHOWING TOEWALL

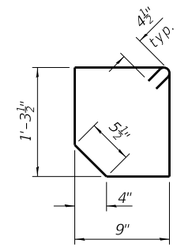
PLAN

SHOWING HEADWALL

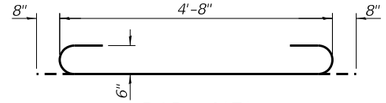
SECTION A-A



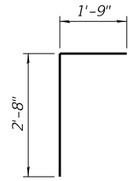
BAR s(E)



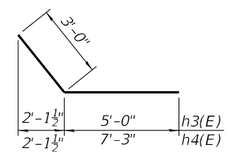
BAR s1(E)



BAR a1(E)



BAR d(E)



BARS h3(E) & h4(E)

Notes:
A distance of half the length of the wingwall but not less than six feet of the barrel shall be poured monolithically with the wingwalls.

MODEL: Default
FILE NAME: Q:\Engineering\LiveProjects\13043_IDOT DUR AES\Work Order 15 - 62G85\CADD\CADD Sheets\Structural\62G85-03-Culvert Details.dgn

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DEPARTMENT OF TRANSPORTATION

CULVERT DETAILS
MANHATTAN-MONEE ROAD OVER UN-NAMED DITCH
SHEET S-03 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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		CONTRACT NO. 62G85		
		ILLINOIS	FED. AID PROJECT	

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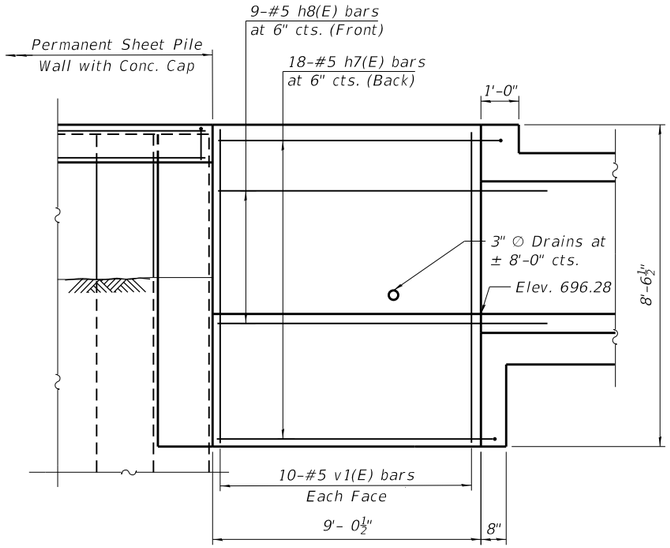
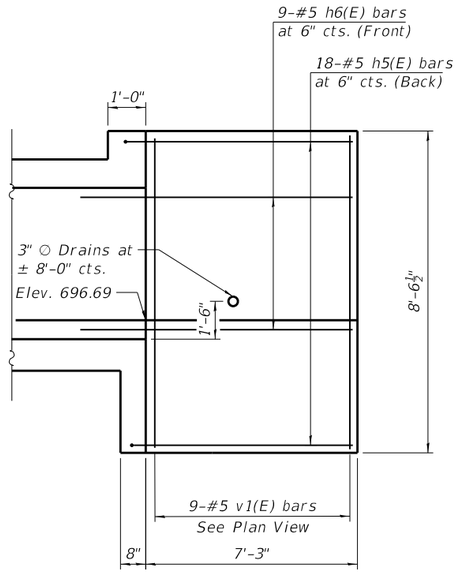


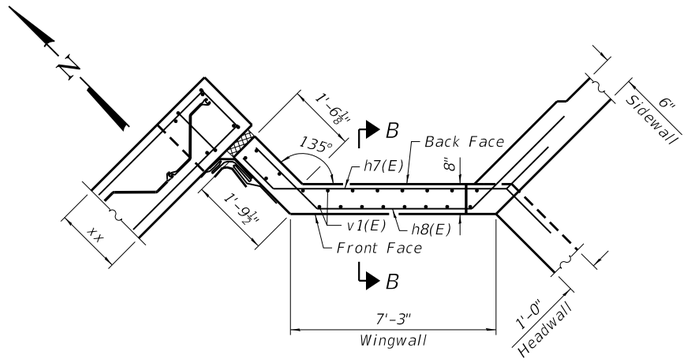
NW WINGWALL ELEVATION



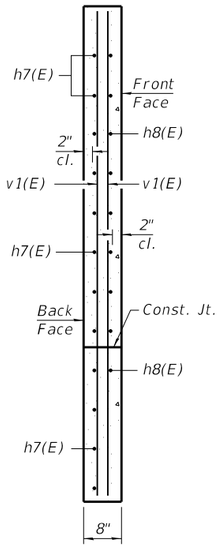
NE WINGWALL ELEVATION

BILL OF MATERIAL

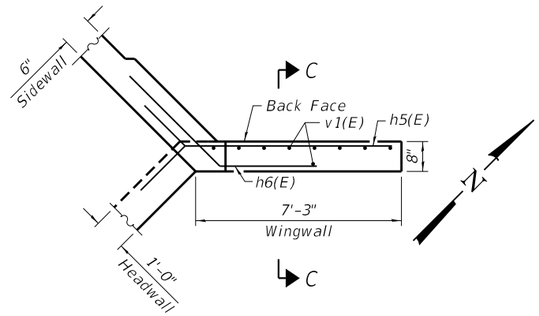
Bar	No.	Size	Length	Shape
a1(E)	167	#6	6'-0"	
a2(E)	79	#5	5'-8"	
d(E)	14	#4	4'-5"	
h(E)	28	#5	38'-8"	
h1(E)	10	#4	38'-8"	
h2(E)	8	#7	5'-8"	
h3(E)	24	#5	8'-0"	
h4(E)	24	#5	10'-6"	
h5(E)	8	#5	10'-3"	
h6(E)	9	#5	8'-0"	
h7(E)	18	#5	11'-9"	
h8(E)	9	#5	13'-3"	
s(E)	7	#4	4'-10"	
s1(E)	7	#4	4'-8"	
v(E)	84	#4	5'-4"	
v1(E)	59	#4	8'-3"	
Concrete Box Culverts			Cu. Yd.	27.5
Reinforcement Bars, Epoxy Coated			Pound	5,140
Concrete Sealer			Sq. Ft.	164



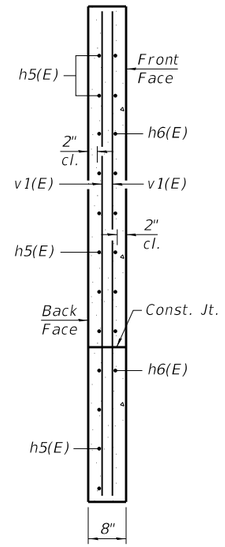
NW WINGWALL PLAN



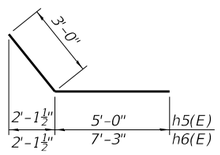
SECTION B-B



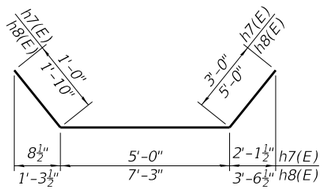
NE WINGWALL PLAN



SECTION C-C



BARS h5(E) & h6(E)



BARS h7(E) & h8(E)

Notes:
See Sheet S-03 of S-08 for culvert details, SE and SW wingwall details.
See Sheets S-06 and S-07 of S-08 for Permanent Sheet Pile Details.

MODEL: Default
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

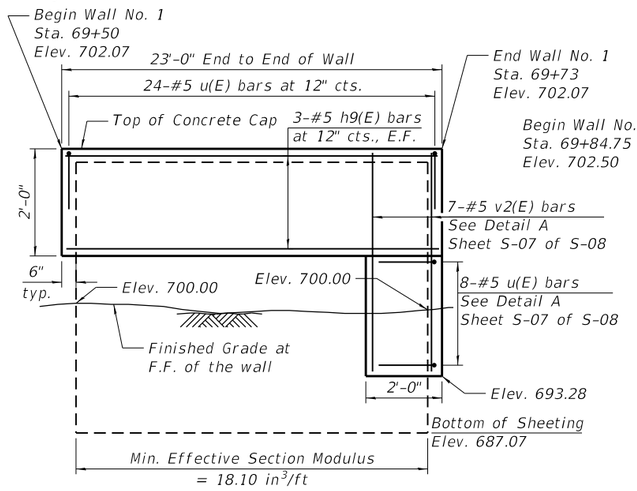
WINGWALL DETAILS
MANHATTAN-MONEE ROAD OVER UN-NAMED DITCH
SHEET S-04 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
531	2018-063-CR&D	WILL	82	50
		CONTRACT NO. 62G85		
		ILLINOIS	FED. AID PROJECT	

Benchmark: Cut "X" in top of the concrete cap for sheet pile wall, west of box culvert.
Elevation 702.49.

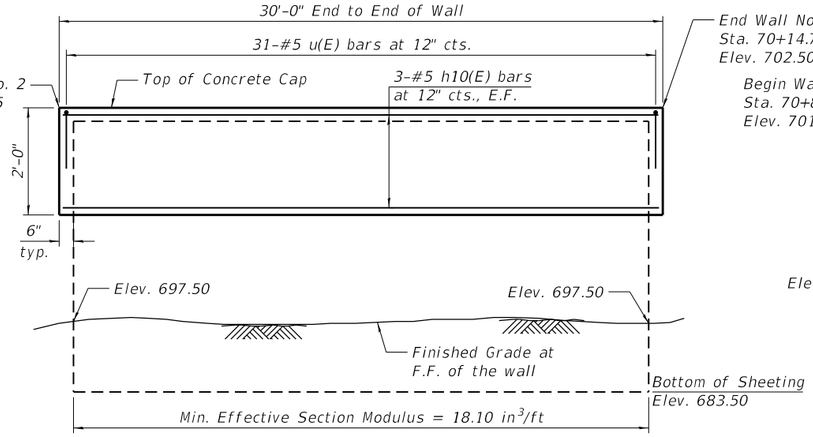
Existing Structure: The existing structure is a retaining wall located at station 71+03. The retaining wall is approximately 50'-0" long and average exposed height of the retaining wall is 4'-6". The existing wall is a gabion wall and will be removed and replaced with a proposed wall.

No salvage.



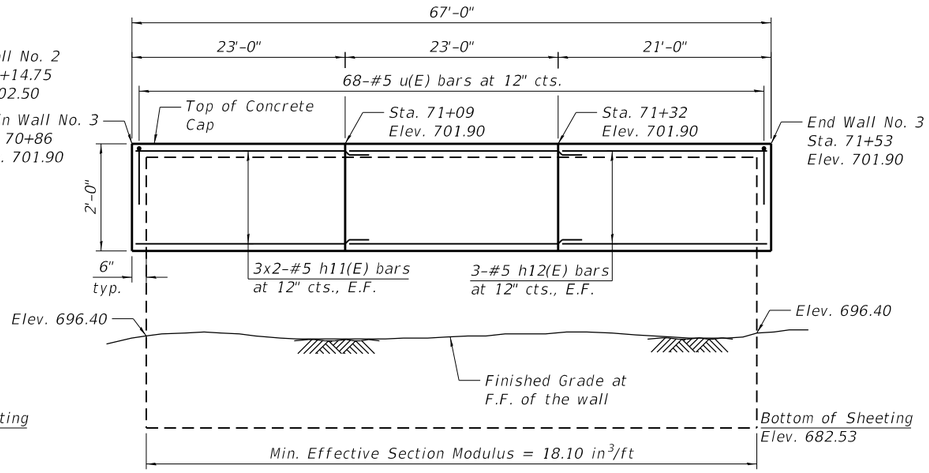
ELEVATION-WALL NO. 1

(Looking at F.F. of wall)



ELEVATION-WALL NO. 2

(Looking at B.F. of wall)

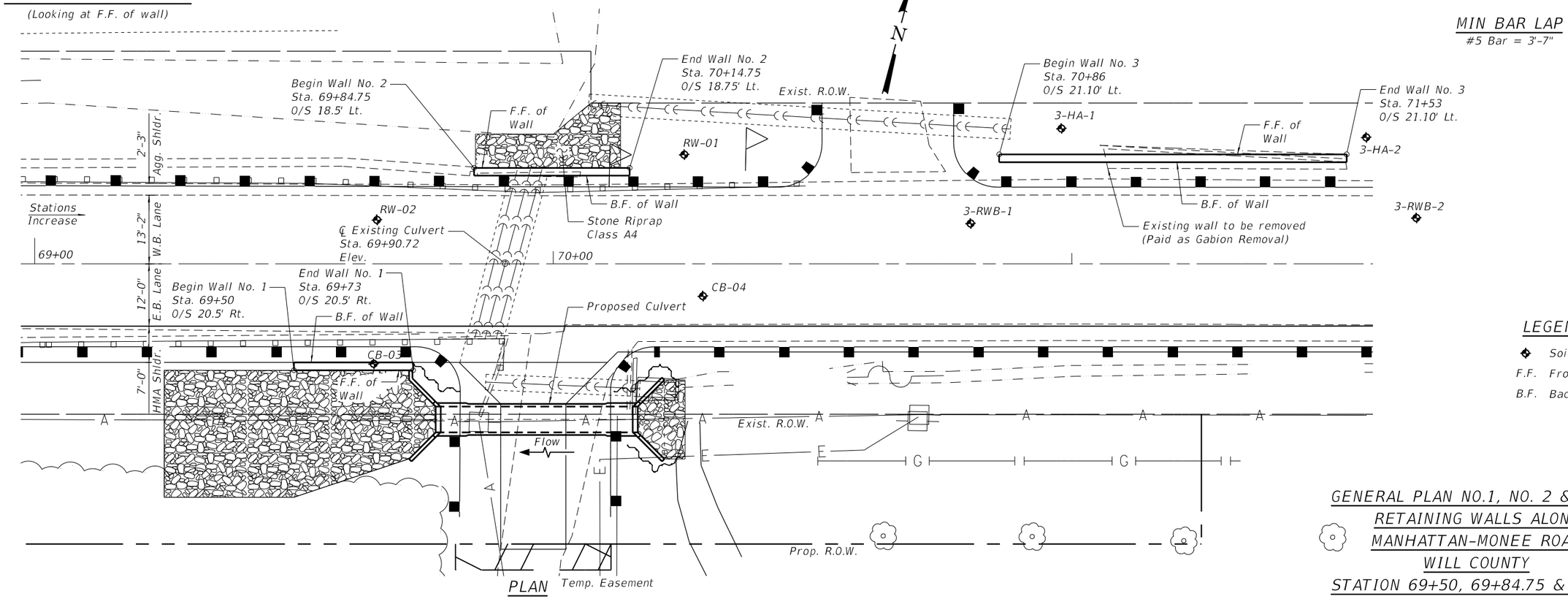


ELEVATION-WALL NO. 3

(Looking at B.F. of wall)

MIN BAR LAP

#5 Bar = 3'-7"



PLAN

LEGEND

- Soil Borings
- F.F. Front Face
- B.F. Back Face

GENERAL PLAN NO.1, NO. 2 & NO. 3
RETAINING WALLS ALONG
MANHATTAN-MONEE ROAD
WILL COUNTY
STATION 69+50, 69+84.75 & 71+03

MODEL: Default
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET S-06 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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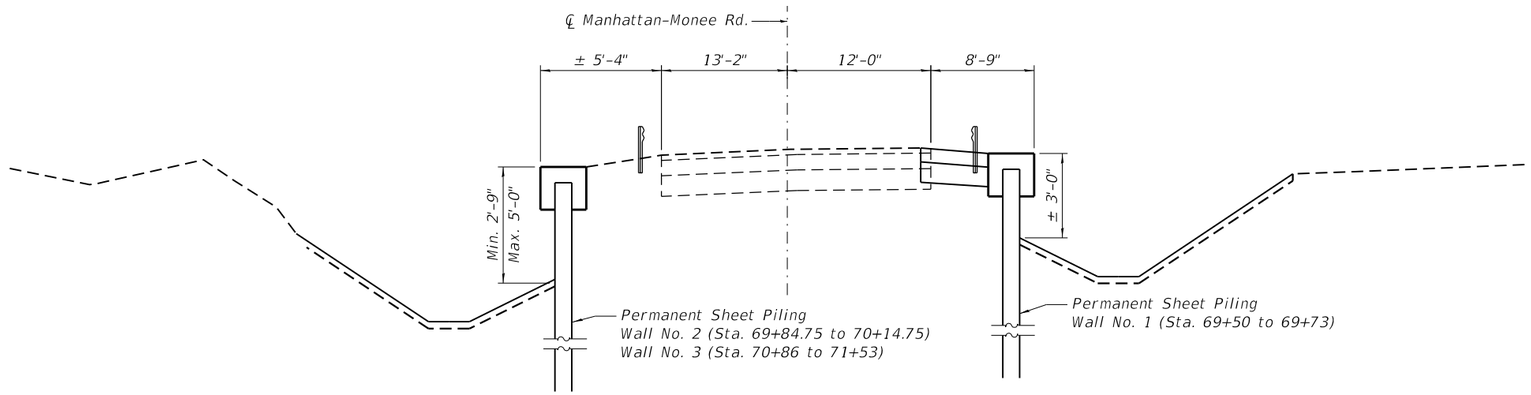
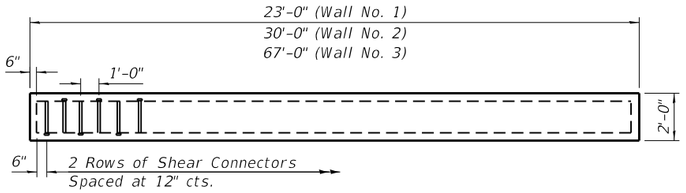
		CONTRACT NO. 62G85		
		ILLINOIS	FED. AID PROJECT	

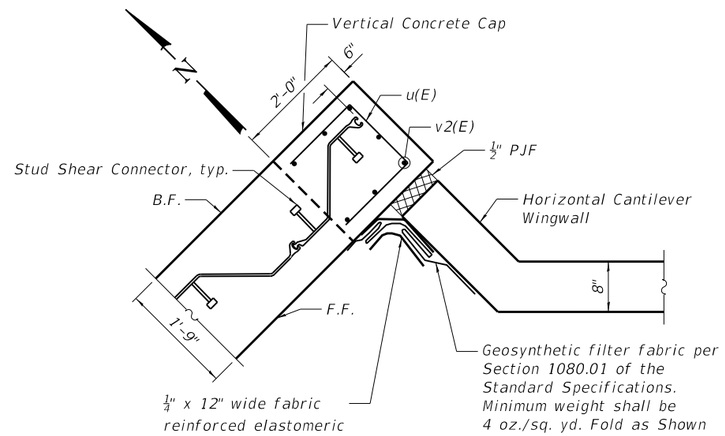


PROPOSED TYPICAL SECTION

(Looking East)

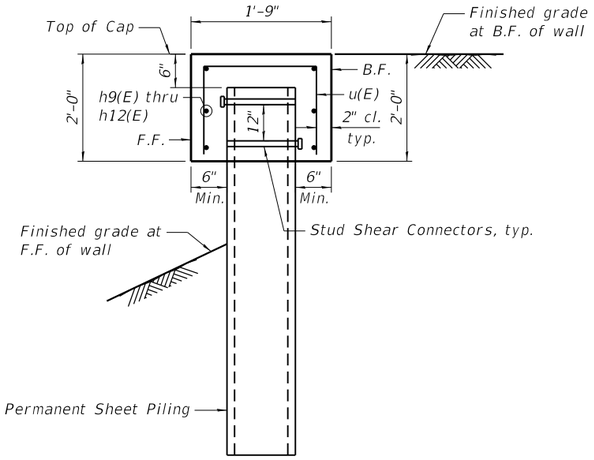


PLAN VIEW SHEAR STUDS



DETAIL A

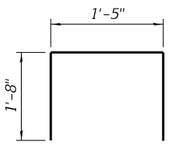
Note: The cost of the Fabric Reinforced Elastomeric Mat, Geosynthetic Filter Fabric and ½" PJF is included in the cost of Concrete Structures.



TYPICAL SECTION THRU WALL

GENERAL NOTES:

1. Bars indicated thus 3x2-#5 etc. indicates 3 lines of bars with 2 lengths per line.
2. See Sheet S-06 of S-08 for reinforcement layout for concrete cap.
3. Wall stations, offsets and dimensions are measured at front face of wall.
4. Shear Connectors shall be ¾" ○ x 8" long granular or solid flux filled headed connectors automatically end welded in field to sheet piling.
5. The details for the concrete cap, reinforcement and required number of shear connectors are based on Section PZ 22 sheet piling. If the Contractor choses to use any other section, the Contractor shall submit revised configuration for approval by the Engineer. Such changes shall not be cause for additional compensation.
6. For Boring Logs see sheets S-05 and S-08 of S-08.



BAR u(E)

NOTE:

B.F. denotes Back Face
F.F. denotes Front Face

BILL OF MATERIAL

Bar	No.	Size	Length	Shape
h9(E)	6	#5	22'-8"	———
h10(E)	6	#5	29'-8"	———
h11(E)	12	#5	26'-5"	———
h12(E)	6	#5	20'-8"	———
u(E)	114	#5	4'-9"	⊓
v(E)	7	#5	8'-4"	———
Concrete Structures			Cu. Yd.	12.9
Stud Shear Connectors			Each	234
Reinforcement Bars, Epoxy Coated			Pound	1,500
Permanent Sheet Piling			Sq. Ft.	2,135
Concrete Sealer			Sq. Ft.	450

MODEL: Default
FILE NAME: c:\Engineering\LiveProjects\13043_IDOT DUR AES\Work Order 15 - 62G85\CADD\CADD Sheets\Structural\62G85-07-Retaining Wall Details.dgn
6/19/2019 11:56:04 AM

Accurate GROUP, INC.

USER NAME = sapant		DESIGNED - SAT		REVISED -	
		CHECKED - JMT		REVISED -	
PLOT SCALE = 21.3333 ' / in.		DRAWN - JN		REVISED -	
PLOT DATE = 6/19/2019		CHECKED - SPS		REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL DETAILS
MANHATTAN-MONEE ROAD OVER UN-NAMED DITCH
SHEET S-07 OF S-08 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
531	2018-063-CR&D	WILL	82	53
		CONTRACT NO. 62G85		
	ILLINOIS FED. AID PROJECT			