

MED-CR99-0.80

Shaw Road Bridge No. 5 Replacement

Addendum #1

Date: 11/21/2019

1.) Clarification; **Bid Items 42 and 43** refer to Steel Pile being HP 10x42, when in fact they are HP 12x53 Steel Piles. All plan sheets correctly call out the HP 12x53 piles with the exception of the summary sheets. A new **sheet 24** has been included with this addendum, as well as a new **proposal sheet 4 of 4** to be inserted into your bid document.

2.) Clarification; The sub surface investigation report has been included with this addendum for the bidders reference.

ESTIMATED QUANTITIES									
ITEM	ITEM EXT.	PLAN SPLITS	TOTAL	UNIT	DESCRIPTION	ABUT.	SUPER	GEN.	SEE SHEET
		01/BRO/BR							
202	11201	LS	LS		PORTIONS OF STRUCTURE REMOVED, AS PER PLAN			LS	1/14
202	23500	190	190	SY	WEARING COURSE REMOVED			190	
503	11100	LS	LS		COFFERDAMS AND EXCAVATION BRACING			LS	
503	21300	LS	LS		UNCLASSIFIED EXCAVATION			LS	
505	11100	LS	LS		PILE DRIVING EQUIPMENT MOBILIZATION	LS			
507	00200	1350	1350	FT	STEEL PILES HP12X53, FURNISHED	1,350			
507	00250	1260	1260	FT	STEEL PILES HP12X53, DRIVEN	1,260			
509	10000	12,223	12,223	LB	EPOXY COATED REINFORCING STEEL	3,161	9,062		
511	31611	64	64	CY	CLASS OC2 CONCRETE, SUPERSTRUCTURE, AS PER PLAN		64		2/14
511	43510	50	50	CY	CLASS OC1 CONCRETE, ABUTMENT INCLUDING FOOTING	50			
512	10050	460	460	SY	SEALING OF CONCRETE SURFACES (NON-EPOXY)		460		
512	10100	88	88	SY	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	17	71		
515	12090	8	8	EACH	PRESTRESSED CONCRETE COMPOSITE BOX BEAM BRIDGE MEMBERS, LEVEL 1, CB33-48		8		
516	13600	33	33	SF	1" PREFORMED EXPANSION JOINT FILLER		33		
516	14020	77	77	FT	SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL		77		
516	43200	32	32	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES ONLY (NEOPRENE)		32		
517	70000	178	178	FT	RAILING (TWIN STEEL TUBE)		178		
518	21200	93	93	CY	POROUS BACKFILL WITH GEOTEXTILE FABRIC		93		
518	22300	204	204	FT	SPECIAL - STEEL DRIP STRIP		204		
518	40000	87	87	FT	6" PERFORATED CORRUGATED PLASTIC PIPE		87		
518	40010	36	36	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS		36		
526	15000	143	143	SY	REINFORCED CONCRETE APPROACH SLABS (T=13')			143	
526	90010	64	64	FT	TYPE A INSTALLATION			64	
601	32204	27	27	CY	ROCK CHANNEL PROTECTION, TYPE C WITH GEOTEXTILE FABRIC			27	
611	99710	4	4	EACH	PRECAST REINFORCED CONCRETE OUTLET	4			

MED-CR99-0.80

REF NO.	ITEM NUMBER	ITEM EXTENSION	ESTIMATED QUANTITY	UNIT	ITEM DESCRIPTION	WORK TYPE	UNIT PRICE BID DOLLARS CTS	TOTAL AMOUNT BID DOLLARS CTS
42	507	00100	1350	FT	STEEL PILES HP12x53, FURNISHED	53		
43	507	00150	1260	FT	STEEL PILES HP12X53, DRIVEN	53		
44	509	10000	12,223	LB	EPOXY COATED REINFORCING STEEL	23		
45	511	31611	64	CY	CLASS QC2 CONCRETE, SUPERSTRUCTURE, AS PER PLAN	20		
46	511	43510	50	CY	CLASS QC1 CONCRETE, ABUTMENT INCLUDING FOOTING	20		
47	512	10050	460	SQ. YD.	SEALING OF CONCRETE SURFACES (NON EPOXY)	57		
48	512	10100	88	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY URETHANE)	57		
49	515	12090	8	EACH	PRESTRESSED CONCRETE COMPOSITE BOX BEAM BRIDGE MEMBERS, LEVEL 1, CB33-48	20		
50	516	13600	33	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER	27		
51	516	14020	77	FT	SEMI INTEGRAL ABUTMENT EXPANSION JOINT SEAL	27		
52	516	43200	32	EACH	ELASTOMERIC BEARING WITH INTEGRAL LAMINATES ONLY (NEOPRENE)	27		
53	517	70000	178	FT	RAILING (TWIN STEEL TUBE)	36		
54	518	21200	93	CU.YD.	POROUS BACKFILL WITH GEOTEXTILE FABRIC	20		
55	518	22300	204	FT	SPECIAL – STEEL DRIP EDGE	20		
56	518	40000	87	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	35		
57	518	40010	36	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS	35		
58	526	15000	143	SQ. YD.	REINFORCED CONCRETE APPROACH SLABS (T=13")	17		
59	526	90010	64	FT	TYPE A INSTALLATION	17		
60	601	32204	27	CU.YD.	ROCK CHANNEL PROTECTION, TYPE C WITH GEOTEXTILE FABRIC	35		
61	611	99710	4	EACH	PRECAST REINFORCED CONCRETE OUTLET	35		
STRUCTURE TOTAL:								
					INCIDENTALS			
62	614	11000	1	LS	MAINTAINING TRAFFIC	NR		
63	623	10000	1	LS	CONSTRUCTION LAYOUT STAKES AND SURVEYING	NR		
64	624	10000	1	LS	MOBILIZATION	NR		
INCIDENTALS TOTAL:								
GRAND TOTAL BID:								

SUBSURFACE INVESTIGATION
FOR THE
SHAW ROAD AT BLACK RIVER BRIDGE REPLACEMENT
MEDINA COUNTY, OHIO

Prepared for Medina County Engineers

January 10, 2017

January 10, 2017

Medina County Engineer
791 West Smith Road
Medina, Ohio 44258

Attention: Andy Conrad, P.E., P.S.

SUBJECT: Shaw Road at Black River Bridge Replacement,
Chatham Township, Medina County, Ohio;
TGG# 161186

Gentlemen:

This report presents the results of a subsurface investigation performed for the subject project. The purposes of our investigation were to define the general subsurface conditions for the new bridge, and to provide soil parameters for use by others for design and construction of the foundation.

PROJECT DESCRIPTION

The existing bridge is located on Shaw Road, approximately 2000 feet east of Congress Road, in Chatham Township, Medina County, Ohio. The project consists of reconstruction of the bridge and adjacent roadways. The existing bridge is approximately 100 feet long and 25 feet wide and spans over a stream. The creek is approximately 25 feet below the bridge deck. The roadway entering the bridge is at an elevation of approximately 871 feet on the east region and 865 feet on the west according to Google Earth.

FIELD INVESTIGATION

The investigation included advancing two (2) test borings on December 9 and 14, 2016 using a medium capacity rotary drill rig. The boring locations were selected and field staked by our personnel as shown on the attached Location Plan.

Standard penetration sampling was performed at the depth intervals shown on the attached Test Boring Logs, with all samples visually classified in the field, and delivered to our office.

FIELD INVESTIGATION, continued

The samples were again examined by one of our geotechnical engineers, with the resulting descriptions appearing on the logs. Water level readings and hole depth soundings were made on completion of each boring, followed by backfilling the holes. Further information pertaining to field testing and sampling procedures is attached.

LABORATORY TESTING

After examination of the recovered samples by an engineer, the laboratory testing program was developed. Tests were performed as follows:

Test	ASTM #	Quantity
Moisture Content	D-2216	15
Atterberg Limits	D-4318	2
Sieve Analysis	D-422	2

Laboratory results are shown on the attached test boring logs.

SUBSURFACE CONDITIONS

Test boring data collected at the site indicate the subsurface to be composed of a mixture of silt, sand and clay soils. These can be described for engineering purposes as the following:

In both borings, approximately 4 inches of asphalt and 8 to 11 inches of granular base was present for the roadway.

Underlying the pavement section and continuing to termination depth of 70 feet were various mixtures of silt, sand and clay. In general the clayey soils were damp to moist and stiff to hard with the granular soils being medium dense to dense. In Boring B-4, very loose sand and silt was present in the 8.5 to 10.0 foot sample, and soft clay soils were present in the 13.5 to 15.0 foot sample, and again from about 32 to 47 feet.

The subsurface conditions indicated that the groundwater elevation is at approximately 23 feet below the roadway at Boring B-3 and 18.5 feet in Boring B-4.

RECOMMENDATIONS

Based on our analysis of the subsurface conditions encountered at the locations indicated, and the assumption that conditions across the construction site are similar to those known, we offer the following for your consideration:

RECOMMENDATIONS, continued

Design Soil Parameters

Boring B-3

Depth, Feet	Undrained Cohesion	Internal Friction Angle	Modulus of Subgrade Reaction*	Unit Weight
0-3	---	35°	300 pci	125 pcf
3-6	2,000 psf	--	400 pci	125 pcf
6-13	1,000 psf	--	200 pci	125 pcf
13-18	2,000 psf	--	400 pci	125 pcf
18-27	3,000 psf	--	600 pci	130 pcf
27-39	---	36°	350 pci	130 pcf
39-56	1,500 psf	--	300 pci	125 pcf
56-70	---	36°	350 pci	130 pcf

* Modulus of subgrade reaction values are for use in "Lpile" computer analyses, and for lateral resistance determinations only.

** Groundwater table is estimated to be at an elevation of 23.5 feet below the roadway or at an estimated elevation of 847.5 feet.

Boring B-2

Depth, Feet	Undrained Cohesion	Internal Friction Angle	Modulus of Subgrade Reaction*	Unit Weight
0-3	---	35°	300 pci	125 pcf
3-7	1,000 psf	--	200 pci	125 pcf
7-22	---	26°	50 pci	120 pcf
22-27	1,000 psf	--	200 pci	125 pcf
27-32	---	30°	100 pci	125 pcf
32-47	200 psf	--	50 pci	125 pcf
47-56	1,500 psf	--	300 pci	125 pcf
56-59	---	32°	200 pci	125 pcf
59-66	4,000 psf	--	800 pci	130 pcf
66-69	---	38°	500 pci	130 pcf
69-70	4,000 psf	--	800 pci	130 pcf

* Modulus of subgrade reaction values are for use in "Lpile" computer analyses, and for lateral resistance determinations only.

RECOMMENDATIONS, continued

Boring B-2, continued

** Groundwater table is estimated to be at an elevation of 18 feet below the roadway or at an estimated elevation of 847 feet.

Foundations

The strength of the soil profile from the east and west bridge abutment is considerably different. Due to the anticipated loadings on the bridge, both abutments will need to be supported by driven piles.

The bridge foundations should be designed to be supported by a deep foundation system that is end bearing into hard clay or medium dense to dense sand. The piles should consist of HP 10X42 H-piles. The installed piles should be dynamic load tested (CMS 523) to verify pile design and to aid in reducing the risk of pile damage during installation.

East Abutment Foundation (Boring B-3)

Pile Size	Tip Elevation Feet	Nominal Pile Side Resistance R_s (Kips)	Nominal Tip Resistance R_p (Kips)	Ultimate Bearing Value R_{ndr}
HP10X42	±810	125	70	195

West Abutment Foundation (Boring B-4)

Pile Size	Tip Elevation Feet	Nominal Pile Side Resistance R_s (Kips)	Nominal Tip Resistance R_p (Kips)	Ultimate Bearing Value R_{ndr}
HP10X42	±805	76	70	146

The bearing resistance factor Φ_{stat} should be 0.45 for design. The piles should be spaced center to center not less than 30 inches.

The uplift resistance of a single pile should be taken as the Nominal Pile Side Resistance with a Resistance factor Φ_{up} of 0.25 feet. It should be noted that the length of the production piles

RECOMMENDATIONS, continued

West Abutment Foundation (Boring B-4), continued

may be less than the anticipated embedment length given and should be accounted for in the final uplift design.

Seismic Considerations

Based upon the typical subsurface soil profile found in the test borings, combined with our knowledge of the geology of the site, an earthquake site class definition "D" should be used for design of the structure.

Construction Considerations

The available test boring data indicate that groundwater may become a significant problem for the project. At both test locations wet sand soils were encountered. On the west side, the exposed subgrade soils will be in a very loose or soft condition. Rock fill may be required to create a working platform on the wet subgrade soils.

Excavations should either be sloped back or shored in accordance with Occupational Safety & Health Administration (OSHA) regulations and any other applicable local codes. Parameters for design of temporary shoring are included in those regulations. With respect to excavation side slopes, the site soils should be classified as Type "C" per OSHA, and thus excavations should be cut back to a slope no steeper than a 1½:1 (horizontal:vertical). Steeper cut slopes may be acceptable as determined by an on-site qualified person.

LIMITATIONS

The conclusions and recommendations presented herein are based on the project information being as presented. Should any of this information be incorrect, our recommendations would be invalidated until we have reviewed such changes as they pertain to the subsurface conditions.

The recommendations given above also assume a uniformity of soil and rock conditions between and away from the test positions. If during construction, any conditions different from those found in this investigation are evident, we should be immediately notified. After observing the exposed conditions, we will advise you of any modifications to our conclusions and recommendations deemed necessary.

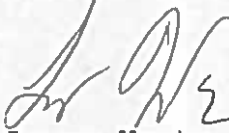
Medina County Engineer
January 10, 2017
Page 6


LIMITATIONS, continued

Any conclusions drawn by others from the data presented in this report are their responsibility.

We hope you will find this report satisfactory. Kindly contact our office with any questions you might have regarding this submittal, or if we may be of further service.

Respectfully submitted,


Leroy Wertz, P.E.


Delbert J. Channels, P.E.
Reviewing Engineer



LOCATION PLAN



PROJECT: Medina Co. Road Bridges

PROJECT NUMBER: 161186

LOCATION: Shaw Road, Chatham Twp., Medina County, Ohio

DATE: 1/6/17



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Not to Scale

2685 Gilchrist Road ♦ Akron, Ohio 44305 ♦ (330) 733-6748

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FIELD DRILLING AND SAMPLING PROCEDURE

All test borings were advanced using a medium capacity truck mounted rotary drill. The boring method and hole diameter are so indicated on the respective Test Boring Logs.

Disturbed samples, designated "SS", were obtained using a 2-inch O.D. by 1-3/8 inch I.D. split spoon sampler. Driving of the sampling device was performed in accordance with ASTM D-1586, in which a 140 lb. hammer is freely dropped from a height of 30 inches. Recovery of the samples was also in accordance with ASTM D-1586.

The three numbers recorded in the 'Blows/6"' column on the Test Boring Logs were obtained during sampling and refer to the Standard Penetration Tests (ASTM D-1586). These numbers are the number of blows of the 140 lb. hammer per above required to penetrate each 6 inches (unless otherwise indicated) of the sample length with the split spoon sampler. The sum of the blows required to penetrate the second and third 6-inch intervals is termed the Standard Penetration Resistance "N", which is indicative of the relative density or consistency of the soil penetrated. The first 6-inch "seating penetration" is normally disregarded for engineering purposes.

Undisturbed samples, where taken are represented on the Test Boring Logs by "ST". A thinwall sampler was pushed into the soil, and the resulting sample sealed within the tube. Procedures followed in undisturbed sampling are outlined in ASTM D-1587.

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ABBREVIATIONS AND SYMBOLS USED ON TEST BORING LOGS

Sampling Method Abbreviations

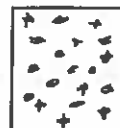
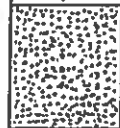

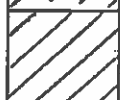
SS: Split spoon sampler, 2" O.D. by 1-3/8" I.D. (ASTM D-1586)*
 ST: Shelby tube sampler, 3" O.D. by 2-7/8" I.D. (ASTM D-1587)
 ST2: Shelby tube sampler, 2" O.D. by 1-7/8" I.D. (ASTM D-1587)
 NX: Rock core, 2-1/8" diameter (ASTM D-2113)




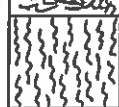



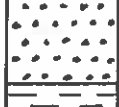


* ASTM D-1586, the Standard Penetration Test, utilizes a 140 lb. hammer dropped 30" to drive the split spoon sampler.

Miscellaneous Abbreviations

: Groundwater level at completion of boring
 Rec: Recovered length of sample
 Wn: Natural moisture content, ratio of the weight of water to the weight of solids in the sample (ASTM D-2216)
 ATV: All-terrain vehicle
 RQD: Rock Quality Designation, sum of core pieces 4" in length or greater, divided by the recovered core length

Soil Particle Sizes and Graphic Symbols

	Gravel: Coarse = 3/4" to 3" Fine = 4.76 mm to 3/4"
	Sand: Coarse = 2.0 to 4.76mm Medium = 0.42 to 2.00mm Fine = 0.074 to 0.42mm
	Silt: 0.005 to 0.074mm
	Clay: Finer than 0.005mm

	Sand and Gravel		Miscellaneous Fill
	Silty Sand		Peat and Organics
	Sandy Silt		Organic Silt
	Silty Clay		Sandstone
	Clayey Silt		Shale

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BORING NUMBER: B-3
PAGE 1 OF 2
DATE STARTED: 12-9-16
DATE COMPLETED: 12-9-16

2685 Gilchrist Road ♦ Akron, Ohio 44305 ♦ (330) 733-6748

TEST BORING LOG

PROJECT: Medina Co. Road Bridges
LOCATION: Shaw Rd at Black River Bridge
BORING METHOD: 3 1/4" I.D. Hollow Stem Auger
SAMPLER USED: 2.0" O.D. Split Spoon
REMARKS: Stream bottom ±25.0'
WATER ENCOUNTER DEPTH: 23.5' WATER DEPTH ON COMPLETION: 35.0' HOLE DEPTH: 55.0

PROJECT NUMBER: 161186
DRILLER: J. Teter
DRILL USED: CME 75
WEATHER: Snowing, 25°
GROUND ELEVATION: ±871'

DEPTH	SAMPLE		BLOWS/6"	REC	LOG	DESCRIPTION OF MATERIALS & REMARKS
	NO	DEPTH TYPE				
0---						±4" ASPHALT, ±8" Base.
--	1.0					Damp, medium dense, brown, fine to coarse SAND
--	1	2.5 SS	10-6-5	11"		& GRAVEL.
--	3.5					±3.0'
--	2	3.5 SS	5-6-8	9"		Damp, stiff, brown, silty CLAY, trace of
5---	5.0					organics. Wn=16.6%
--	6.0					
--	3	7.5 SS	2-3-4	13"		Damp, medium stiff, gray, silty CLAY. Wn=26.6%
--	8.5					
--	4	8.5 SS	2-4-4	14"		Damp, medium stiff, gray, silty CLAY. Wn=25.6%
10---	10.0					
--						
--	13.5					
--	5	13.5 SS	3-6-9	15"		Damp, very stiff, gray, silty CLAY. Wn=12.0%
15---	15.0					
--						
--	18.5					
--	6	18.5 SS	6-10-12	16"		Damp, very stiff, gray, silty CLAY, minor sand.
20---	20.0					Wn=12.8%
--						
--	23.5					
--	7	23.5 SS	12-23-33	19"		Damp, hard, gray, clayey SILT. Wn=13.6%
25---	25.0					PI=12.9% LL=20.9%
--						
--	27.0					±27.0'
--	8	28.5 SS	N/A	14"		Wet, gray, fine to coarse SAND, trace of
30---	30.0					gravel.
--						
--	33.5					
--	9	33.5 SS	9-18-18	11"		Wet, dense, gray, fine to coarse SAND, trace of
35---	35.0					gravel.
--						
--	38.5					
--	10	38.5 SS	4-7-9	18"		±39.0'
40---	40.0					Moist, stiff, gray, silty CLAY, trace of sand.
						Wn=28.0%



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BORING NUMBER: B-3
 PAGE 2 OF 2
 DATE STARTED: 12-9-16
 DATE COMPLETED: 12-9-16

2685 Gilchrist Road ♦ Akron, Ohio 44305 ♦ (330) 733-6748

PROJECT: Medina County Bridges				PROJECT NUMBER: 161186		
DEPTH	SAMPLE		BLOWS/6"	REC	LOG	DESCRIPTION OF MATERIALS & REMARKS
	NO	DEPTH TYPE				
40---						

---	11	43.5	SS	4-5-4	17"	Moist, stiff, gray, silty CLAY. Wn=30.9%
45---		45.0				

---	12	48.5	SS	4-5-5	17"	Wet, stiff, gray, silty CLAY. Wn=27.4%
50---		50.0				

---	13	53.5	SS	4-8-13	13"	Moist, very stiff, gray, silty CLAY. Wn=21.8%
55---		55.0				
---						±56.0'

---	14	58.5	SS	9-10-11	14"	Wet, medium dense, gray, medium to fine SAND & SILT, minor sand.
60---		60.0				

---	15	63.5	SS	5-10-12	16"	Wet, medium dense, gray, fine SAND & SILT, minor clay.
65---		65.0				

---	16	68.5	SS	12-22-37	16"	Wet, very dense, fine SAND & SILT.
70---		70.0				

75---						

80---						Boring terminated at 70.0 feet.

85---						

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BORING NUMBER: B-4
 PAGE 1 OF 2
 DATE STARTED: 12-14-16
 DATE COMPLETED: 12-14-16

2685 Gilchrist Road ♦ Akron, Ohio 44305 ♦ (330) 733-6748

TEST BORING LOG

PROJECT: Medina Co. Road Bridges
 LOCATION: Shaw Rd at Black River Bridge
 BORING METHOD: 3 1/4" I.D. Hollow Stem Auger
 SAMPLER USED: 2.0" O.D. Split Spoon
 REMARKS: Stream bottom ±14.0'
 WATER ENCOUNTER DEPTH: 18.5' WATER DEPTH ON COMPLETION: 20.0' HOLE DEPTH: 61.0

PROJECT NUMBER: 161186
 DRILLER: J. Teter
 DRILL USED: CME 75
 WEATHER: Clear, 14°
 GROUND ELEVATION: ±865'

DEPTH	SAMPLE		BLOWS/6"	REC	LOG	DESCRIPTION OF MATERIALS & REMARKS
	NO	DEPTH TYPE				
0---						±4" ASPHALT, ±11" Base.
--	1.0					
--	1	2.5 SS	10-22-19	14"		Damp, dense, brown, medium to coarse SAND & GRAVEL.
--	3.5					±3.0'
--	2	3.5 SS	4-5-5	9"		Damp, stiff, brown, silty CLAY, minor gravel.
5---	5.0					Wn=20.7%
--						±7.0'
--	8.5					
--	3	8.5 SS	2-1-2	12"		Damp, very loose, brown, fine SAND & SILT.
10---	10.0					
--						±13.0'
--	13.5					
--	4	13.5 SS	2-1-2	14"		Damp, soft, brown, silty CLAY.
15---	15.0					
--						
--	18.5					
--	5	18.5 SS	1-2-4	14"		Wet, loose, gray, fine to coarse SAND, minor silt.
20---	20.0					
--						
--	23.5					
--	6	23.5 SS	4-4-11	13"		Damp, stiff, gray, clayey SILT, minor sand. Wn=15.5% PI=16.8% LL=23.0%
25---	25.0					
--						±27.0'
--	28.5					
--	7	28.5 SS	5-6-7	12"		Wet, medium dense, gray, fine to coarse SAND, minor silt.
30---	30.0					
--						±32.0'
--	33.5					
--	8	33.5 SS	3-2-2	11"		Wet, soft, gray, clayey SILT, minor sand.
35---	35.0					
--						
--	38.5					
--	9	38.5 SS	0*/12"-2	18"		*Sampler sank under static weight of hammer. Wet, soft, gray, clayey SILT, trace of sand.
40---	40.0					



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BORING NUMBER: B-4
 PAGE 2 OF 2
 DATE STARTED: 12-9-16
 DATE COMPLETED: 12-9-16

2685 Gilchrist Road ♦ Akron, Ohio 44305 ♦ (330) 733-6748

PROJECT: Medina County Bridges				PROJECT NUMBER: 161186		
DEPTH	SAMPLE		BLOWS/6"	REC	LOG	DESCRIPTION OF MATERIALS & REMARKS
	NO	DEPTH TYPE				
40---						
43.5	10	SS	0*/12"-2	5"		Wet, soft, gray, clayey SILT.
45---						
48.5	11	SS	4-5-9	18"		Moist, stiff, gray, silty CLAY, trace of sand. Wn=12.8%
50---						
53.5	12	SS	4-5-6	13"		Wet, stiff, gray, silty CLAY. Wn=27.8%
55---						
56.0						±56.0'
58.5	13	SS	10-19-19	13"		Wet, dense, gray, medium to fine SAND & SILT. ±59.0'
60---						
60.0						Wet, hard, gray, silty CLAY, trace of sand. Wn=28.6%
63.5	14	SS	7-20-24	11"		Moist, hard, gray, silty CLAY, trace of sand. Wn=26.8%
65---						
65.0						±66.0'
68.5	15	SS	12-22-27	18"		Moist, dense, gray, medium to fine SAND & SILT. ±69.0'
70---						
70.0						Moist, hard, gray, silty CLAY. Wn=24.5%
75---						
80---						Boring terminated at 70.0 feet.
85---						

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Atterberg Limits

Date Received: 12/10/16 Project: Medina Bridges
Project #: 161184 Location: Shaw Rd at Black River Bridge
Sample ID: 16264 Boring #: B-3:S-7
Source: TGG Drilling Depth: 23.5'-25.0'

ASTM D-2487, Unified Soils Classification System
Cl.

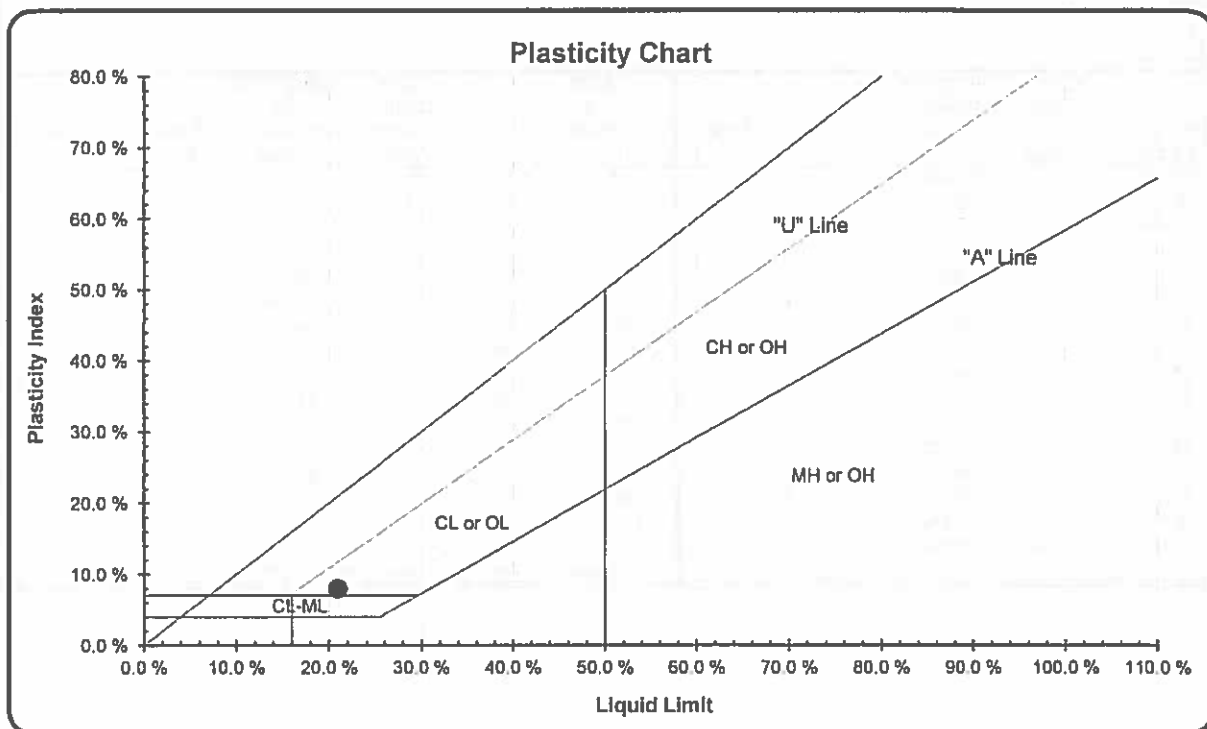
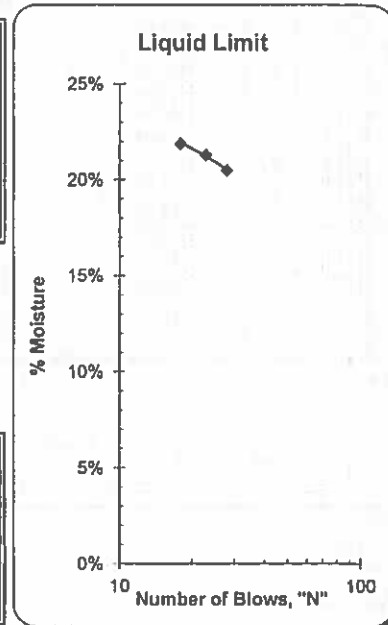
Liquid Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	24.73	33.57	33.09			
Weight of Dry Soils + Pan:	22.21	30.65	30.30			
Weight of Pan:	10.69	16.94	16.68			
Weight of Dry Soils:	11.52	13.71	13.62			
Weight of Moisture:	2.52	2.92	2.79			
% Moisture:	21.9 %	21.3 %	20.5 %			
N:	18	23	28			

Liquid Limit @ 25 Blows: 20.9 %
Plastic Limit: 12.9 %
Plasticity Index, I_p: 8.0 %
Natural Moisture Content: 13.6 %

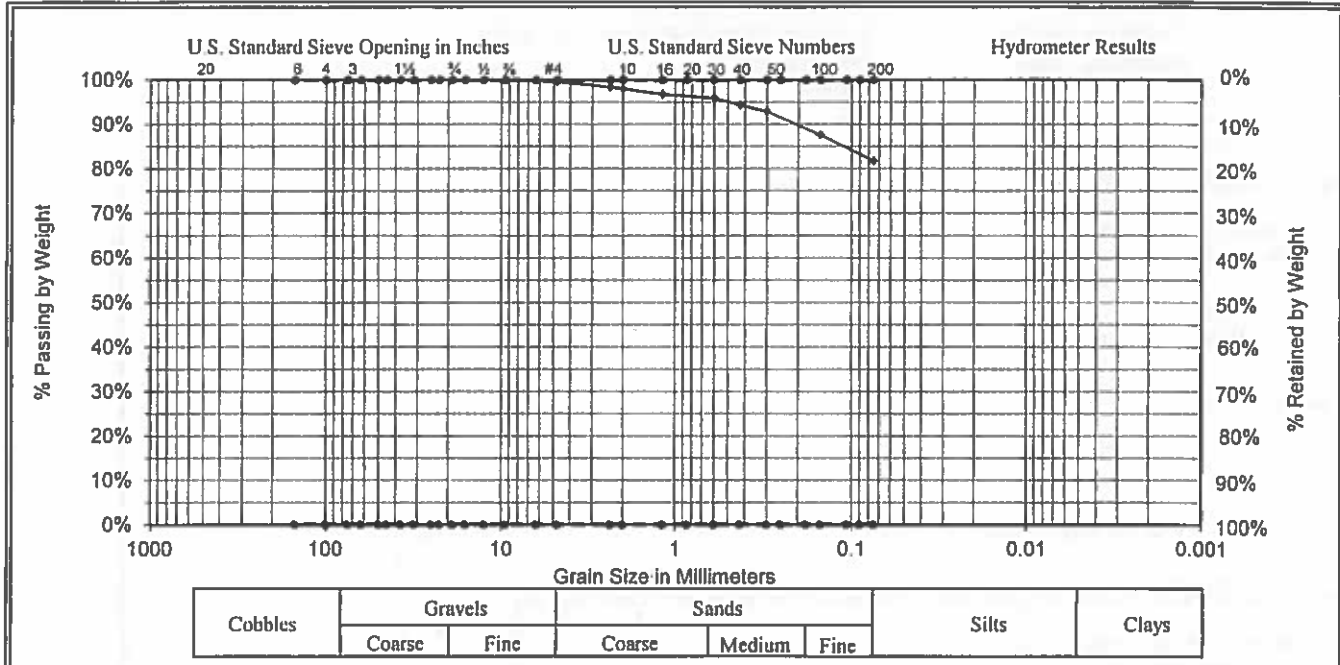
Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.48					
Weight of Dry Soils + Pan:	24.13					
Weight of Pan:	13.69					
Weight of Dry Soils:	10.44					
Weight of Moisture:	1.35					
% Moisture:	12.9 %					



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Cobbles	Gravels		Sands			Silts	Clays
	Coarse	Fine	Coarse	Medium	Fine		

Date : 12/10/16
Project#: 161184
Sample ID: B-3:S-7
Source: TGG Drilling
Project: Medina Bridges
Location: Medina Co., OH
Boring #: B-3
Depth: 23.5'-25.0'

USCS Classification
CL, Lean Clay with Sand

% Gravel % Sand
0.4% 17.9%
% Silt & Clay
81.7%

Coarse Section		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min	Fines Section		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
US Sieve Size	Metric					US Sieve Size	Metric				
6.00"	150.00		100.0%			#4	4.750	99.6%	99.6%		
4.00"	100.00		100.0%			#8	2.360	98.4%	98.4%		
3.00"	75.00		100.0%			#10	2.000	98.1%	98.1%		
2.50"	63.00		100.0%			#16	1.180	96.8%	96.8%		
2.00"	50.00		100.0%			#20	0.850	96.3%	96.3%		
1.75"	45.00		100.0%			#30	0.600	95.9%	95.9%		
1.50"	37.50		100.0%			#40	0.425	94.3%	94.3%		
1.25"	31.50		100.0%			#50	0.300	92.9%	92.9%		
1.00"	25.00		100.0%			#60	0.250	91.2%	91.2%		
7/8"	22.40		100.0%			#80	0.180	88.7%	88.7%		
3/4"	19.00		100.0%			#100	0.150	87.6%	87.6%		
5/8"	16.00		100.0%			#140	0.106		84.2%		
1/2"	12.50		100.0%			#170	0.090		82.9%		
3/8"	9.50	100.0%	100.0%			#200	0.075	81.7%	81.7%		
1/4"	6.30		99.8%			#270	0.053				
#4	4.75	99.6%	99.6%								

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Atterberg Limits

Date Received: 12/10/16 Project: Medina Bridges
Project #: 161184 Location: Shaw Rd at Black River Bridge
Sample ID: 16264 Boring #: B-4:S-6
Source: TGG Drilling Depth: 23.5'-25.0'
ASTM D-2487, Unified Soils Classification System
CL

Liquid Limit Determination

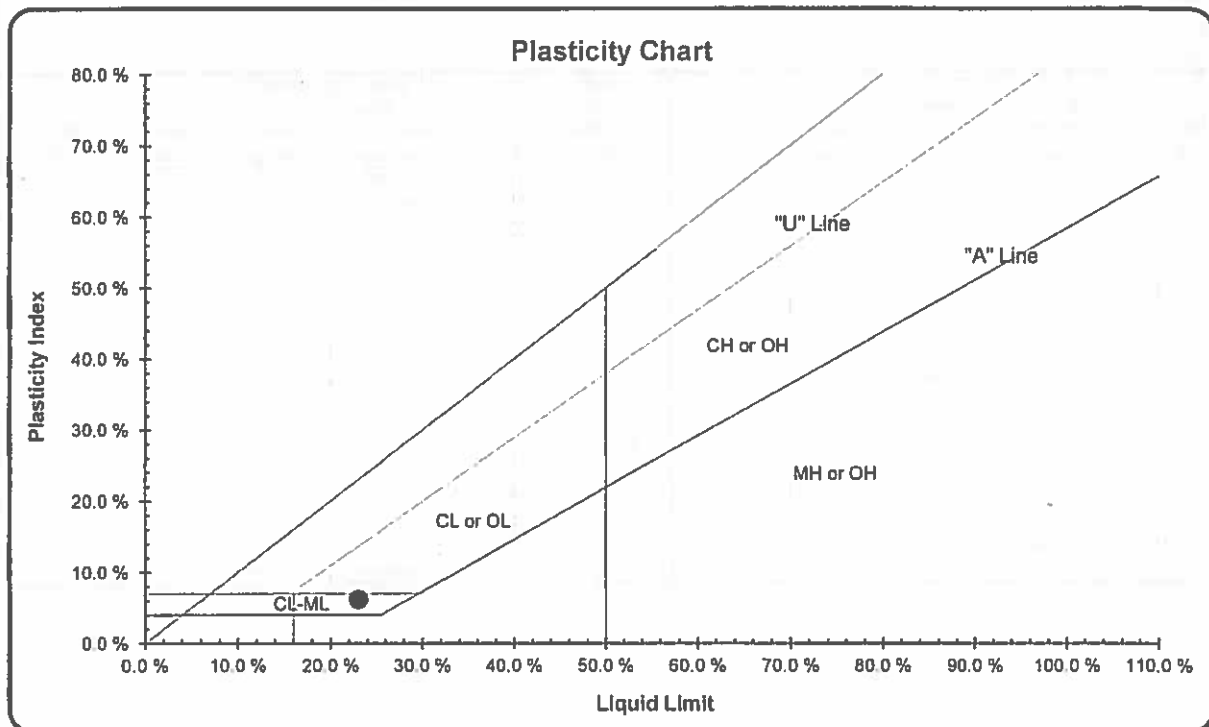
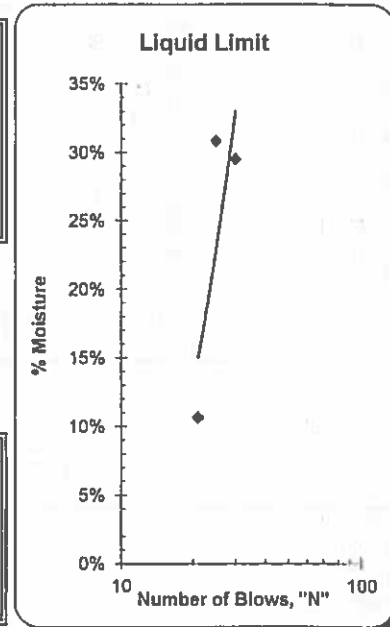
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	22.48	26.02	32.67			
Weight of Dry Soils + Pan:	19.59	22.40	29.12			
Weight of Pan:	10.65	10.67	17.10			
Weight of Dry Soils:	26.02	11.73	12.02			
Weight of Moisture:	22.40	3.62	3.55			
% Moisture:	10.7 %	30.9 %	29.5 %			
N:	21	25	30			

29.12

Liquid Limit @ 25 Blows 23.0 %
Plastic Limit: 16.8 %
Plasticity Index, I_p: 6.2 %
Natural Moisture Content: 15.5 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	24.27					
Weight of Dry Soils + Pan:	22.74					
Weight of Pan:	13.62					
Weight of Dry Soils:	9.12					
Weight of Moisture:	1.53					
% Moisture:	16.8 %					



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