Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

May 16, 2016

CALL NO. 300
CONTRACT ID NO. 161234
ADDENDUM # 1

Subject: Carroll County, FD04 SPP 021 0042 009-014
Letting May 27, 2016

(1) Revised - Plan Sheets - R2, R2A, R2B, R2C & R2G
(2) Added - Note - Pages 1-71 of 71
(3) Revised - Bid Items - Pages 308-313 of 313

Proposal revisions are available at http://transportation.ky.gov/Construction-Procurement/.

Plan revisions are available at http://www.lynnimaging.com/kytransportation/.

If you have any questions, please contact us at 502-564-3500.

Sincerely,

Rachel Mills

Rachel Mills, P.E.
Director
Division of Construction Procurement

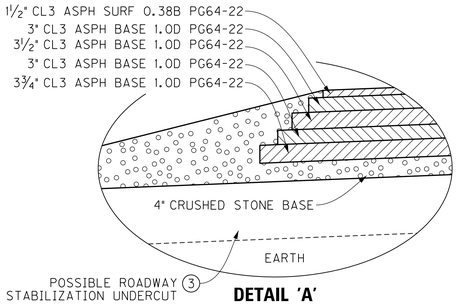
RM:ks
Enclosures

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2

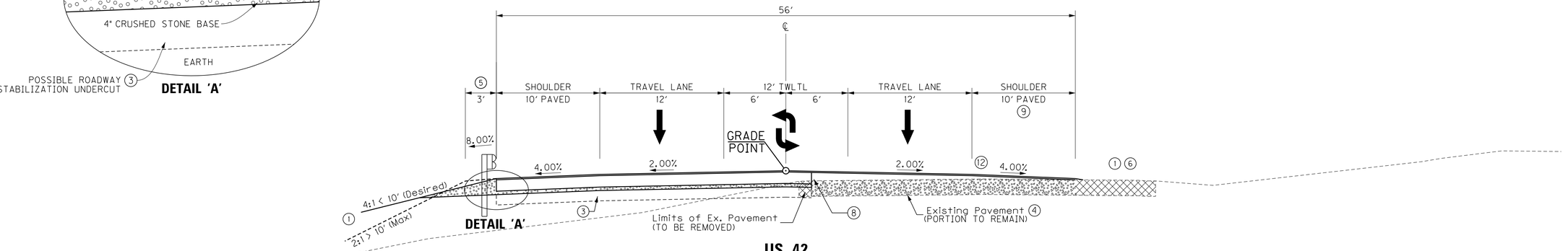
REVISED 5-11-16

TYPICAL SECTIONS

US 42 SECTION 4 MAINLINE



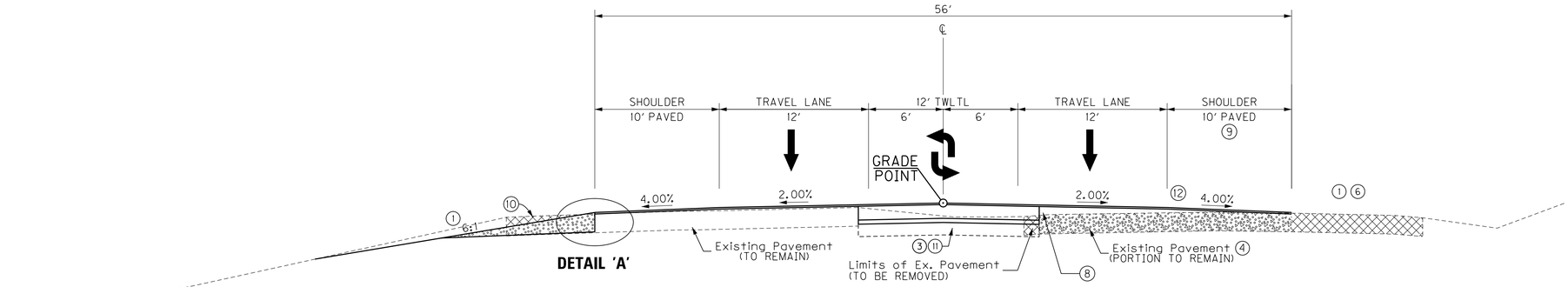
DETAIL 'A'



DETAIL 'A'

US 42

NORMAL SECTION
STA. 71+55 TO STA. 76+00
STA. 123+64 TO STA. 149+50
STA. 162+00 TO STA. 172+40
STA. 210+10 TO STA. 222+00



DETAIL 'A'

US 42

NORMAL SECTION
STA. 66+28 TO STA. 71+55

PAVEMENT DESIGN

US 42

OVERALL

ITEM NO.	DESCRIPTION	DEPTH
00388	CL3 ASPH SURF 0.38B PG64-22	1½" DEPTH
00190	LEVEL AND WEDGING 1.0D PG64-22	TON (EST. FROM X-SECT.)

BASE WIDENING

ITEM NO.	DESCRIPTION	DEPTH
00214	CL3 ASPH BASE 1.00D PG64-22	13¼" DEPTH (3¾"+3"+3½"+3")
00003	CRUSHED STONE BASE	4" DEPTH

DAYLIGHTED SHOULDERS

ASPHALT SEAL REQUIRED FROM THE EDGE OF PAVEMENT TO A POINT 2 FEET DOWN THE DITCH OF FILL SLOPE.
TWO APPLICATIONS OF THE FOLLOWING:

ITEM NO.	DESCRIPTION	DEPTH
00103	ASPHALT SEAL COAT	2.40 LB/SQ YD
00100	ASPHALT SEAL AGGREGATE	20 LB/SQ YD

GENERAL NOTES

(1) SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.

2. SEE CROSS SECTIONS AND PLAN SHEETS FOR LAYOUT DIMENSIONS

(3) ROADWAY STABILIZATION UNDERCUT: USED ONLY IN AREAS AS DETERMINED BY THE ENGINEER. FOR PURPOSES OF DESIGNING UTILITY RELOCATIONS, 1' UNDERCUT SHOULD BE ASSUMED.

(4) EX. 30' WIDTH CONCRETE PAVEMENT WITH ASPHALT WIDENING AND OVERLAY.

(5) WIDEN SHOULDER 3' WHEN GUARDRAIL INSTALLED.

(6) LIMITS OF EXISTING PAVEMENT TO BE REMOVED DURING MOT PHASE 2, SEE CROSS SECTIONS.

(7) SEE CROSS SECTIONS AND PLANS FOR SPECIAL DITCH LOCATIONS AND GEOMETRY.

(8) LEVEL AND WEDGING PARTIALLY CONSTRUCTED IN PHASE 1B OF THE MAINTENANCE OF TRAFFIC PLAN. SEE SHEET R34 FOR PAVEMENT REMOVAL REQUIREMENTS AT THE EXISTING EDGE OF PAVEMENT. SAW CUT INCIDENTAL TO THE PAVING OPERATION.

(9) AT RIGHT TURN LOCATIONS THE SHOULDER TAPERS FROM A 10' PAVED SHOULDER TO A 4' PAVED. SEE CROSS SECTIONS.

(10) EXISTING PAVEMENT TO BE REMOVED DURING MOT PHASE 1, SEE CROSS SECTIONS.

(11) AT BEGINNING OF PROJECT, THE WIDTH OF THE CENTER BASE WIDENING VARIES, SEE CROSS SECTIONS.

(12) SAWED RUMBLE STRIPS TO BE INSTALLED IN RURAL ROADWAY SECTIONS.

SCALE: 1"= 5'

US42 SECTION 4
TYPICAL SECTIONS
SHEET 1 OF 4

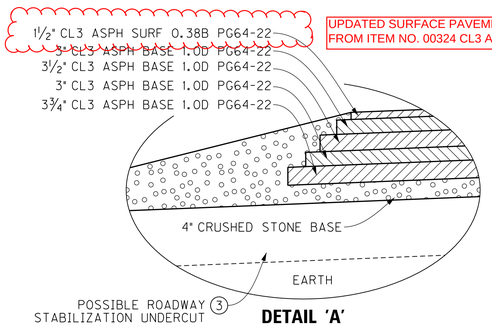
COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2

REVISED 5-11-16

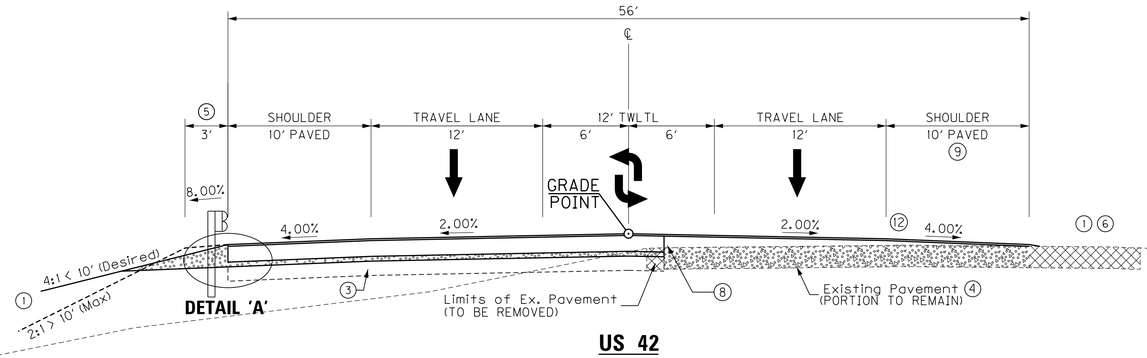
TYPICAL SECTIONS

US 42 SECTION 4 MAINLINE

UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22



DETAIL 'A'



DETAIL 'A'

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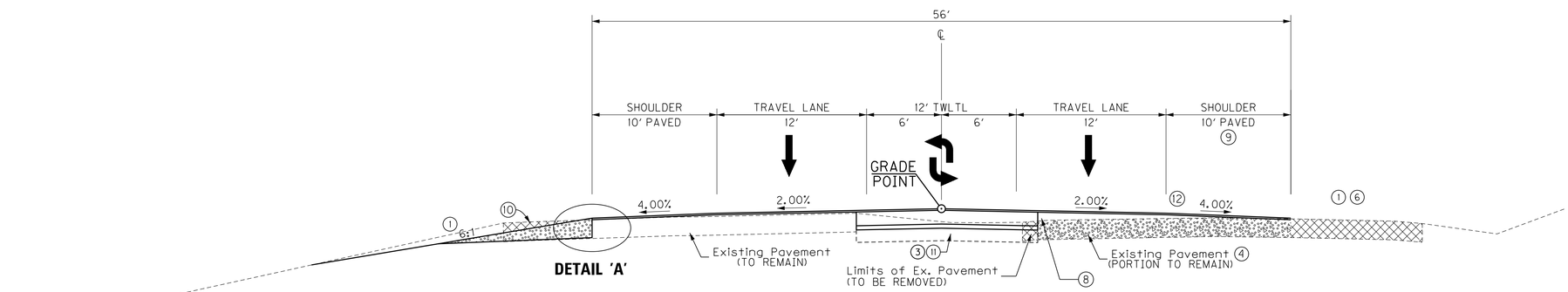

DETAIL 'A'

US 42

NORMAL SECTION
STA. 66+28 TO STA. 71+55

GENERAL NOTES

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(7) SEE CROSS SECTIONS AND PLANS FOR SPECIAL DITCH LOCATIONS AND GEOMETRY.

(8) LEVEL AND WEDGING PARTIALLY CONSTRUCTED IN PHASE 1B OF THE MAINTENANCE OF TRAFFIC PLAN. SEE SHEET R34 FOR PAVEMENT REMOVAL REQUIREMENTS AT THE EXISTING EDGE OF PAVEMENT. SAW CUT INCIDENTAL TO THE PAVING OPERATION.

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PAVEMENT DESIGN

US 42

OVERALL

UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

ITEM NO.	DESCRIPTION	DEPTH
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SCALE: 1"= 5'

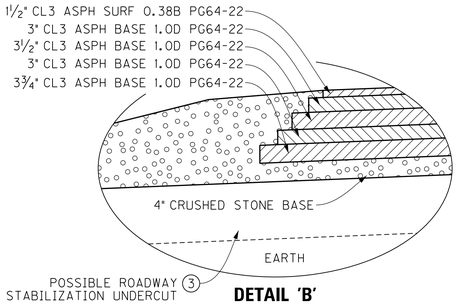
US42 SECTION 4
TYPICAL SECTIONS
SHEET 1 OF 4

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2A

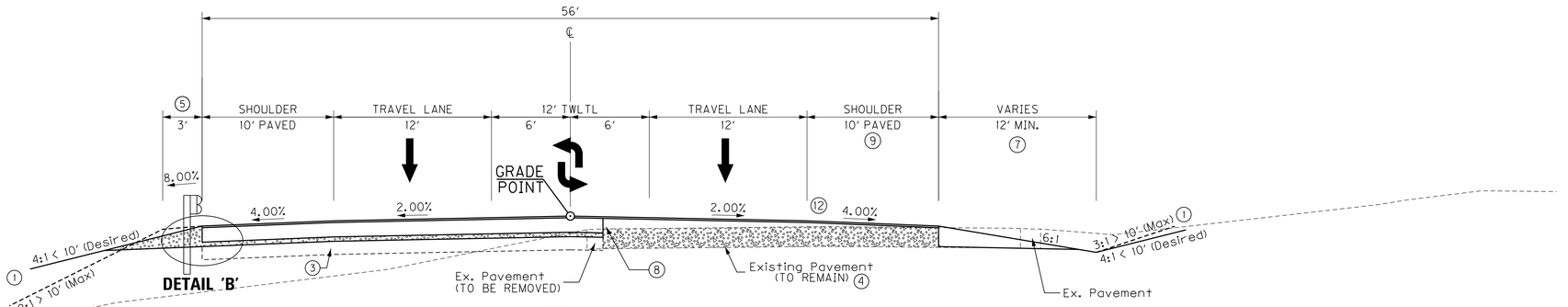
REVISED 5-11-16

TYPICAL SECTIONS

US 42 SECTION 4 MAINLINE

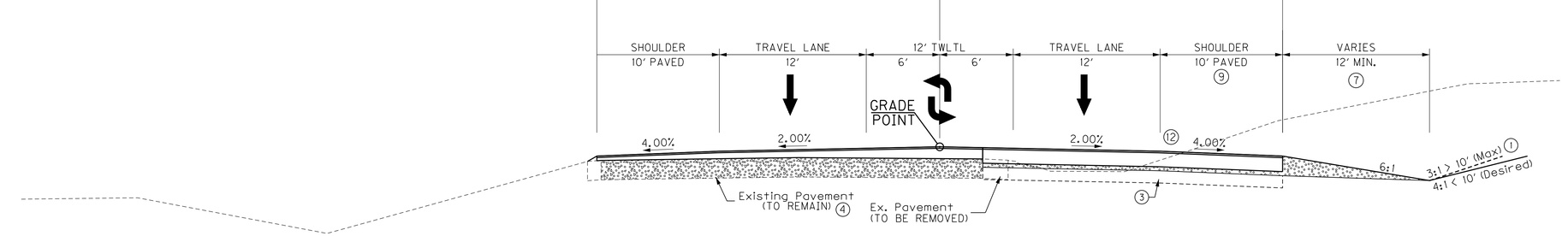


DETAIL 'B'

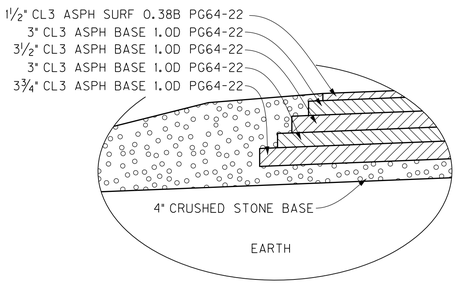


DETAIL 'B'

US 42
NORMAL SECTION
STA. 148+50 TO STA. 163+00
STA. 116+28 TO STA. 123+64
STA. 149+50 TO STA. 162+00



US 42
NORMAL SECTION
STA. 102+00 TO STA. 116+28



DETAIL 'A'

DETAIL 'A'

US 42
NORMAL SECTION
STA. 76+00 TO STA. 98+00

GENERAL NOTES

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(8) LEVEL AND WEDGING PARTIALLY CONSTRUCTED IN PHASE 1B OF THE MAINTENANCE OF TRAFFIC PLAN. SEE SHEET R34 FOR PAVEMENT REMOVAL REQUIREMENTS AT THE EXISTING EDGE OF PAVEMENT. SAW CUT INCIDENTAL TO THE PAVING OPERATION.

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SCALE: 1"= 5'

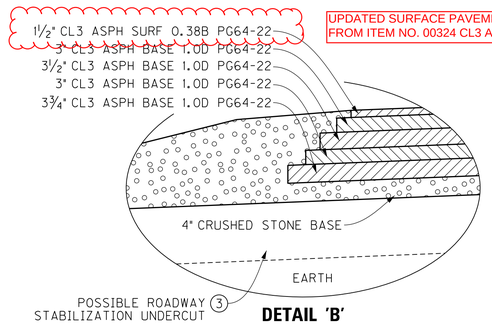
US42 SECTION 4
TYPICAL SECTIONS
SHEET 2 OF 4

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2A

REVISED 5-11-16

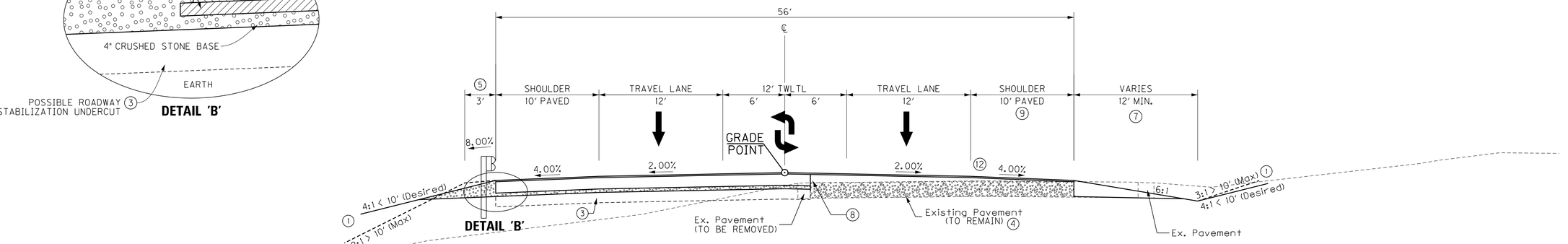
TYPICAL SECTIONS

US 42 SECTION 4 MAINLINE



UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

DETAIL 'B'



US 42
NORMAL SECTION
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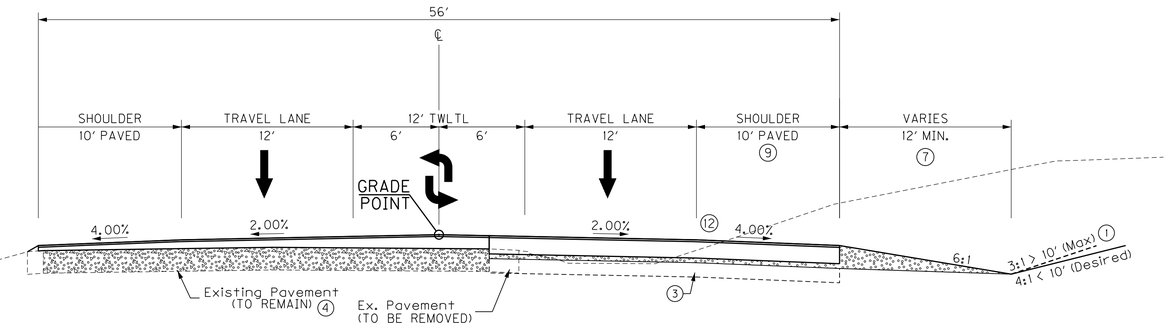

US 42
NORMAL SECTION
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UPDATED SURFACE PAVEMENT DESIGN
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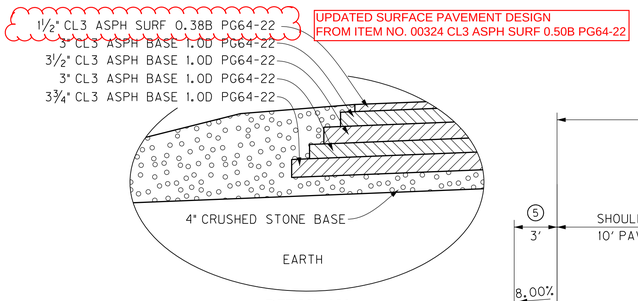

DETAIL 'A'

US 42
NORMAL SECTION
STA. 76+00 TO STA. 98+00

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SCALE: 1"= 5'

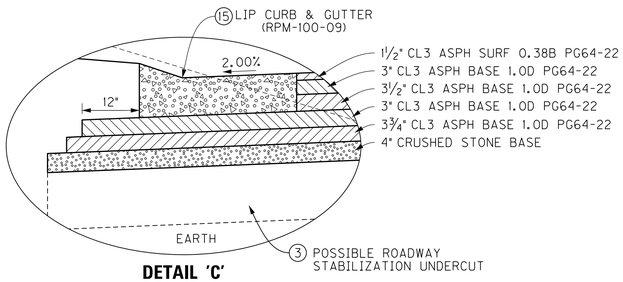
US42 SECTION 4
TYPICAL SECTIONS
SHEET 2 OF 4

TYPICAL SECTIONS

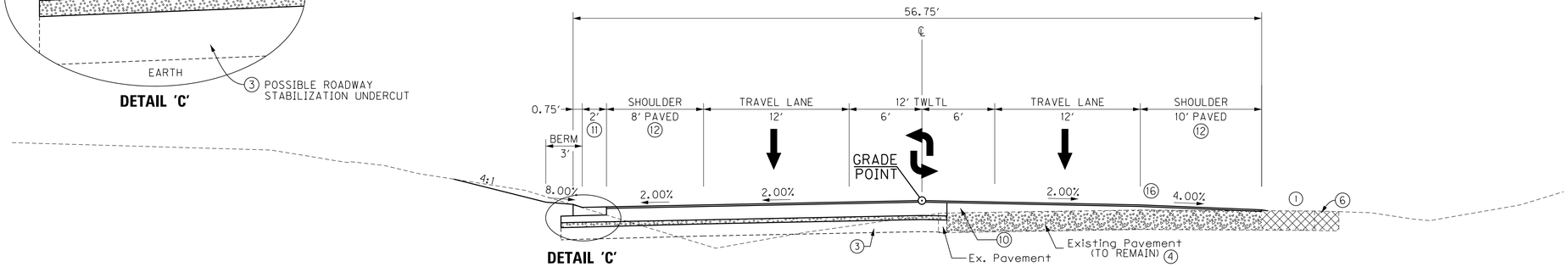
US 42 SECTION 4 MAINLINE

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2B

REVISED 5-11-16



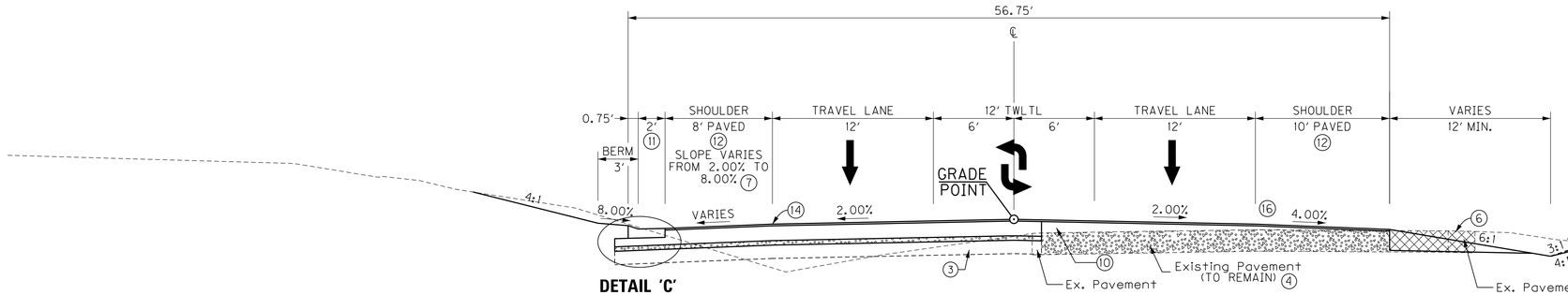
DETAIL 'C'



DETAIL 'C'

US 42

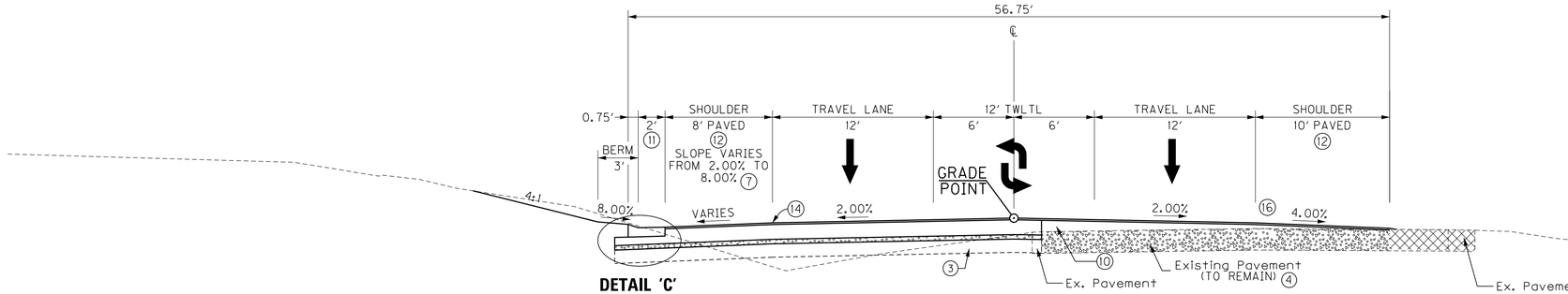
NORMAL SECTION
STA. 202+20 TO STA. 210+10



DETAIL 'C'

US 42

NORMAL SECTION
STA. 178+00 TO STA. 181+00
STA. 184+00 TO STA. 187+00
STA. 190+00 TO STA. 193+50



DETAIL 'C'

US 42

NORMAL SECTION
STA. 172+40 TO STA. 178+00
STA. 181+00 TO STA. 184+00
STA. 187+00 TO STA. 190+00
STA. 193+50 TO STA. 202+20

GENERAL NOTES

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(7) THE SHOULDER CROSS SLOPE IN THIS STATION RANGE VARIES TO CREATE LONGITUDINAL SLOPE ALONG THE GUTTER. SEE PROFILE AND CROSS SECTIONS.

8. NOT USED

9. BASE WIDENING, LEFT OF THE CENTERLINE DOES EXIST BETWEEN STA. 194+00 TO STA. 200+00 AND STA. 212+00 TO STA. 221+97.

(10) LEVEL AND WEDGING PARTIALLY CONSTRUCTED IN PHASE 1B OF THE MAINTENANCE OF TRAFFIC PLAN. SEE SHEET R34 FOR PAVEMENT REMOVAL REQUIREMENTS AT THE EXISTING EDGE OF PAVEMENT. SAW CUT INCIDENTAL TO THE PAVING OPERATION.

(11) THE CROSS SLOPE OF THE GUTTER SHALL ALWAYS BE 2.00%.

(12) AT RIGHT TURN LOCATIONS THE SHOULDER TAPERS FROM A 10' PAVED SHOULDER TO A 4' PAVED. SEE CROSS SECTIONS.

13. SEE SHEET R2 FOR THE MAINLINE PAVEMENT DESIGN. SEE SHEET R2B FOR THE ENTRANCE PAVEMENT DESIGN.

(14) HINGE POINT. SEE NOTE #7.

(15) GUTTER ELEVATION LOCATION.

(16) SAWED RUMBLE STRIPS TO BE INSTALLED IN RURAL ROADWAY SECTIONS.

SCALE: 1"= 5'

US 42 SECTION 4
TYPICAL SECTIONS
SHEET 3 OF 4

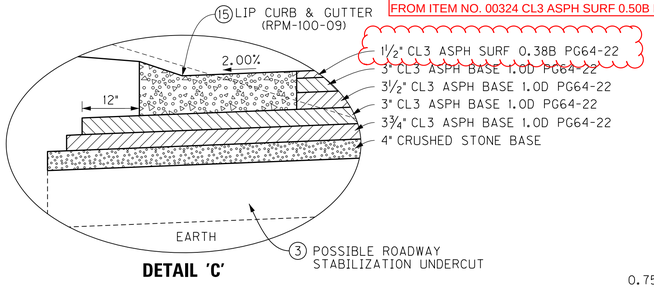
COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2B

REVISED 5-11-16

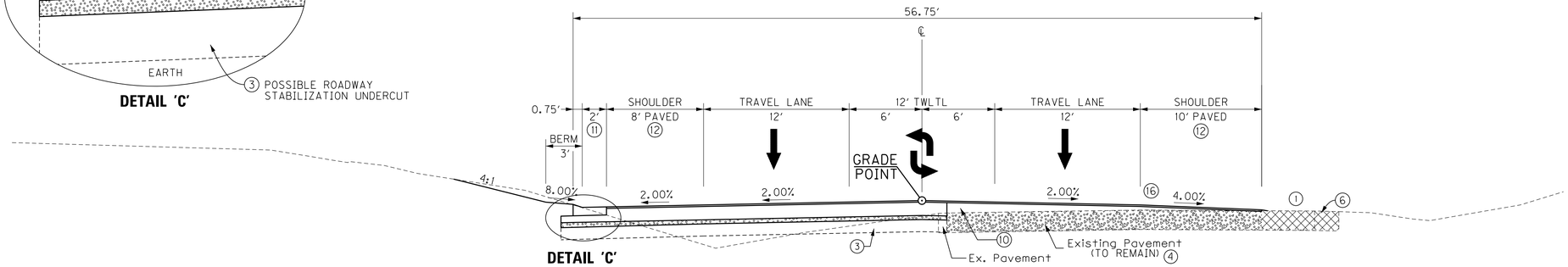
TYPICAL SECTIONS

US 42 SECTION 4 MAINLINE

UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

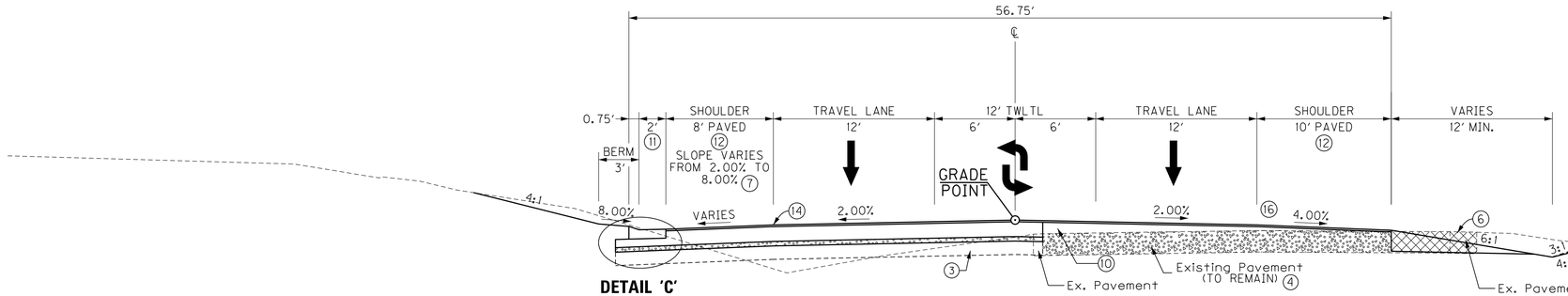


DETAIL 'C'



DETAIL 'C'

US 42
NORMAL SECTION
STA. 202+20 TO STA. 210+10



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US 42
NORMAL SECTION
STA. 178+00 TO STA. 181+00
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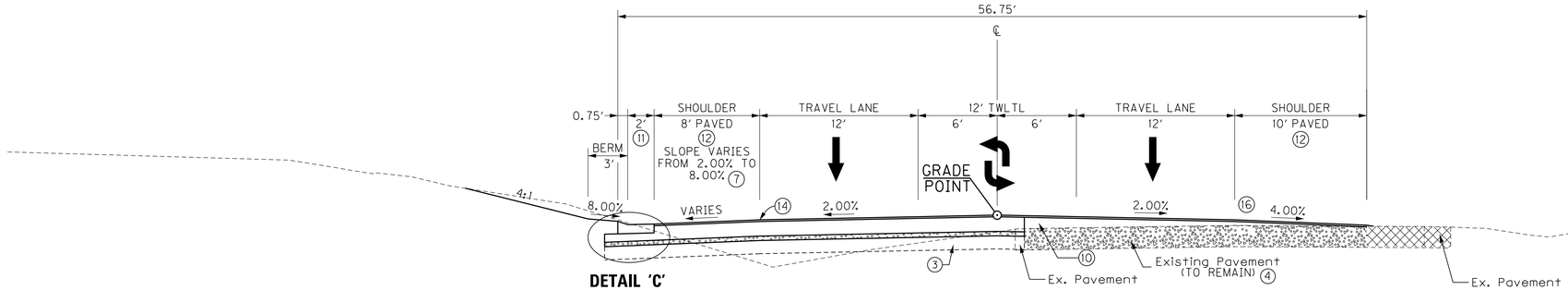

DETAIL 'C'

US 42
NORMAL SECTION
STA. 172+40 TO STA. 178+00
STA. 181+00 TO STA. 184+00
STA. 187+00 TO STA. 190+00
STA. 193+50 TO STA. 202+20

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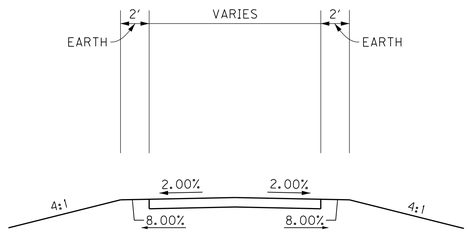
SCALE: 1"= 5'

US 42 SECTION 4
TYPICAL SECTIONS
SHEET 3 OF 4

TYPICAL SECTIONS

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2C

REVISED 5-11-16



ENTRANCE PAVEMENT DESIGN

PAVEMENT DESIGN

ENTRANCE PAVEMENT

RESIDENTAL – ASPHALT

ITEM NO.	DESCRIPTION	DEPTH
00388	CL3 ASPH SURF 0.38B PG64-22	1½" DEPTH
00214	CL3 ASPH BASE 1.00D PG64-22	2" DEPTH
00003	CRUSHED STONE BASE	4" DEPTH

COMMERCIAL – ASPHALT

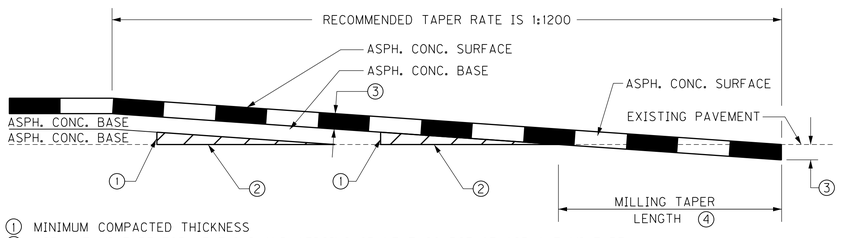
ITEM NO.	DESCRIPTION	DEPTH
00388	CL3 ASPH SURF 0.38B PG64-22	1½" DEPTH
00214	CL3 ASPH BASE 1.00D PG64-22	2" DEPTH
00003	CRUSHED STONE BASE	6" DEPTH

COMMERCIAL – CONCRETE

ITEM NO.	DESCRIPTION	DEPTH
02070	JPC PAVEMENT - 12 IN	12" DEPTH
00003	CRUSHED STONE BASE	6" DEPTH

STONE ENTRANCES

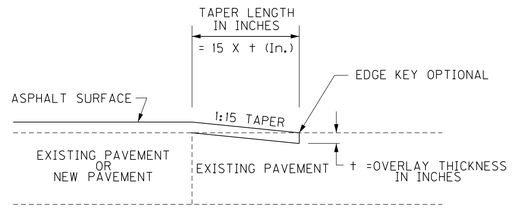
ITEM NO.	DESCRIPTION	DEPTH
00020	TRAFFIC BOUND BASE	5" DEPTH



① MINIMUM COMPACTED THICKNESS
② ASPHALT MIXTURE FOR LEVELING AND WEDGING OR NEXT COURSE OF ASPHALT MIXTURE.
③ ASPHALT SURFACE THICKNESS (FULL DEPTH)
④ MILL EXISTING PAVEMENT TO RECEIVE ASPHALT SURFACE FULL DEPTH (EDGE KEY).
TAPER LENGTH (ft) = $\frac{\text{t (in)} \times \text{TAPER RATE}}{12}$

FOR A TAPER RATE OF 1:1200
TAPER LENGTH = 125 FEET WHEN t = 1.25 inches
TAPER LENGTH = 150 FEET WHEN T = 1.50 inches

TAPERING OF OVERLAYS ON HIGH SPEED FACILITIES (≥45 MPH)



TAPER @ ENTRANCES (EDGE KEY DETAIL)

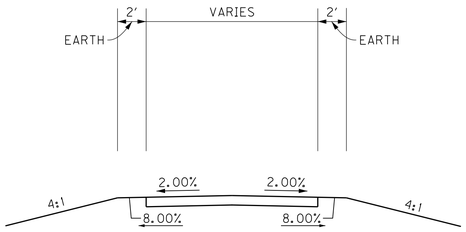
SCALE: 1"= 5'

US42 SECTION 4
TYPICAL SECTIONS
SHEET 4 OF 4

TYPICAL SECTIONS

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2C

REVISED 5-11-16



ENTRANCE PAVEMENT DESIGN

PAVEMENT DESIGN

ENTRANCE PAVEMENT

RESIDENTAL – ASPHALT

UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

ITEM NO.	DESCRIPTION	DEPTH
~~00388~~	~~CL3 ASPH SURF 0.50B PG64-22~~	~~1½" DEPTH~~
~~00214~~	~~CL3 ASPH BASE 1.00D PG64-22~~	~~2" DEPTH~~
00388	CL3 ASPH SURF 0.38B PG64-22	1½" DEPTH
00214	CL3 ASPH BASE 1.00D PG64-22	2" DEPTH
00003	CRUSHED STONE BASE	4" DEPTH

COMMERCIAL – ASPHALT

UPDATED SURFACE PAVEMENT DESIGN
FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

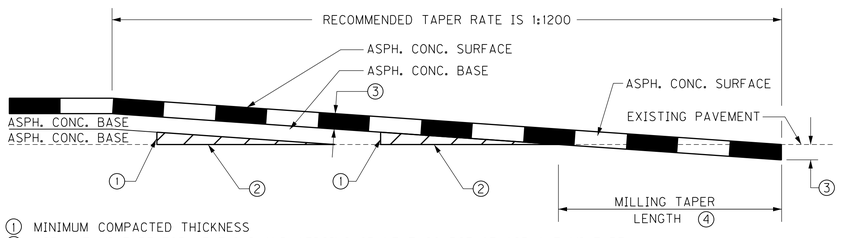
ITEM NO.	DESCRIPTION	DEPTH
~~00388~~	~~CL3 ASPH SURF 0.50B PG64-22~~	~~1½" DEPTH~~
~~00214~~	~~CL3 ASPH BASE 1.00D PG64-22~~	~~2" DEPTH~~
00388	CL3 ASPH SURF 0.38B PG64-22	1½" DEPTH
00214	CL3 ASPH BASE 1.00D PG64-22	2" DEPTH
00003	CRUSHED STONE BASE	6" DEPTH

COMMERCIAL – CONCRETE

ITEM NO.	DESCRIPTION	DEPTH
02070	JPC PAVEMENT - 12 IN	12" DEPTH
00003	CRUSHED STONE BASE	6" DEPTH

STONE ENTRANCES

ITEM NO.	DESCRIPTION	DEPTH
00020	TRAFFIC BOUND BASE	5" DEPTH



① MINIMUM COMPACTED THICKNESS
② ASPHALT MIXTURE FOR LEVELING AND WEDGING OR NEXT COURSE OF ASPHALT MIXTURE.
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TAPER LENGTH (ft) = $\frac{\text{t (in)} \times \text{TAPER RATE}}{12}$

FOR A TAPER RATE OF 1:1200
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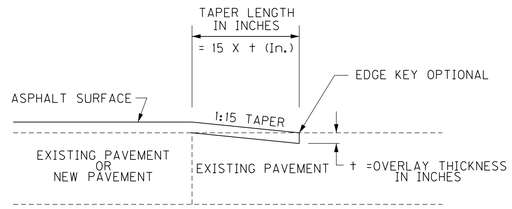
TAPERING OF OVERLAYS ON HIGH SPEED FACILITIES (≥45 MPH)



TAPER @ ENTRANCES (EDGE KEY DETAIL)

SCALE: 1"= 5'

US42 SECTION 4
TYPICAL SECTIONS
SHEET 4 OF 4

PAVING AREAS

ITEM	MAINLINE									ENTRANCES		TOTAL PROJECT
	S	Q	U	A	R	E		Y	A	R	D	S
CSB (4 INCH)	50773									709		51481
CSB (6 INCH)										2405		2405
TRAFFIC BOUND BASE (5 INCH)										801		801
CL3 ASPH BASE 1.00D PG 64-22 (3 INCH TOP LIFT)	49912											49912
CL3 ASPH BASE 1.00D PG 64-22 (3.5 INCH MIDDLE LIFT)	50127											50127
CL3 ASPH BASE 1.00D PG 64-22 (3 INCH MIDDLE LIFT)	50332											50332
CL3 ASPH BASE 1.00D PG 64-22 (3.75 INCH BOTTOM LIFT)	50559											50559
CL3 ASPH BASE 1.00D PG 64-22 (2 INCH)										3114		3114
CL3 ASPH SURF 0.38B PG 64-22 (1.5 INCH)	106272									4605		110877
JPC PAVEMENT - 12 IN										1119		1119

PAVING SUMMARY

ITEM CODE	ITEM	UNIT					TOTAL PROJECT
00003	CSB (1) (4)	TON	24578				24578
00020	TRAFFIC BOUND BASE	TON	230				230
00190	LEVELING AND WEDGING PG64-22 (5)	TON	16842				16842
00214	CL3 ASPH BASE 1.00D PG 64-22	TON	36540				36540
00388	CL3 ASPH SURF 0.38B PG 64-22	TON	9100				9100
00100	ASPHALT SEAL AGGREGATE (2)	TON	125				125
00103	ASPHALT SEAL COAT (3)	TON	15				15
02070	JPC PAVEMENT - 12 IN	SQ YD	1119				1119

NOTES

ALL ASHALT MIXTURES SHALL BE ESTIMATED AT 110 LBS. PER SQ. YD. PER INCH OF DEPTH, UNLESS NOTED OTHERWISE.

(1) ESTIMATED AT 115 LBS. PER SQ. YD. PER INCH OF DEPTH.

(2) ESTIMATED AT 20 LBS. PER SQ. YD. 2 APPLICATIONS REQUIRED.

(3) ESTIMATED AT 2.40 LBS. PER SQ. YD. 2 APPLICATIONS REQUIRED.

(4) 5% OF THIS QUANTITY ESTIMATED FOR MAINTANENCE OF TRAFFIC.

(5) QUANTITY MEASURED FROM CROSS SECTIONS. 8506 CY AT 1.98 TONS/CY.

REVISED 5-11-16

PAVING SUMMARY

COUNTY OF	ITEM NO.	SHEET NO.
CARROLL	6-8002.10	R2C

PAVING AREAS

ITEM	MAINLINE SQUARE YARDAGE	ENTRANCES SQUARE YARDAGE	TOTAL PROJECT SQUARE YARDAGE
CSB (4 INCH)	50773	709	51481
CSB (6 INCH)		2405	2405
TRAFFIC BOUND BASE (5 INCH)		801	801
CL3 ASPH BASE 1.00D PG 64-22 (3 INCH TOP LIFT)	49912		49912
CL3 ASPH BASE 1.00D PG 64-22 (3.5 INCH MIDDLE LIFT)	50127		50127
CL3 ASPH BASE 1.00D PG 64-22 (3 INCH MIDDLE LIFT)	50332		50332
CL3 ASPH BASE 1.00D PG 64-22 (3.75 INCH BOTTOM LIFT)	50559		50559
CL3 ASPH BASE 1.00D PG 64-22 (2 INCH)		3114	3114
CL3 ASPH SURF 0.38B PG 64-22 (1.5 INCH)	106272	4605	110877
JPC PAVEMENT - 12 IN		1119	1119

UPDATED SURFACE PAVEMENT DESIGN FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

PAVING SUMMARY

ITEM CODE	ITEM	UNIT	TOTAL PROJECT
00003	CSB (1) (4)	TON	24578
00020	TRAFFIC BOUND BASE	TON	230
00190	LEVELING AND WEDGING PG64-22 (5)	TON	16842
00214	CL3 ASPH BASE 1.00D PG 64-22	TON	36540
00388	CL3 ASPH SURF 0.38B PG 64-22	TON	9100
00100	ASPHALT SEAL AGGREGATE (2)	TON	125
00103	ASPHALT SEAL COAT (3)	TON	15
02070	JPC PAVEMENT - 12 IN	SQ YD	1119

UPDATED SURFACE PAVEMENT DESIGN FROM ITEM NO. 00324 CL3 ASPH SURF 0.50B PG64-22

NOTES

ALL ASHALT MIXTURES SHALL BE ESTIMATED AT 110 LBS. PER SQ. YD. PER INCH OF DEPTH, UNLESS NOTED OTHERWISE.

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(5) QUANTITY MEASURED FROM CROSS SECTIONS. 8506 CY AT 1.98 TONS/CY.

REVISED 5-11-16

PAVING SUMMARY

COUNTY OF: CARROLL | ITEM NO.: 6-8002.10 | SHEET NO.: R2G

Report of GEOTECHNICAL EXPLORATION

AMERICAN ENGINEERS, INC.

NORTH AMERICAN STAINLESS

HAUL ROAD BRIDGE
OVER US 42

GHENT, KY

MAY 2015

DESIGNING YOUR FUTURE, TODAY.

AEI

AEI
AMERICAN
ENGINEERS, INC.

May 22, 2015

Mr. Juan Fernandez
North American Stainless
6870 Highway 42 East
Ghent, Kentucky

Re: Geotechnical Exploration
North American Stainless
Haul Road Bridge over US 42
Ghent, Kentucky
AEI Project No. 215-042

Dear Mr. Fernandez:

American Engineers, Inc. is pleased to submit this geotechnical report that details the results of our geotechnical exploration performed at the above referenced site.

The attached report describes the site and subsurface conditions and also details our recommendations for the proposed project. The Appendices to the report contains a drawing with a boring layout, typed boring logs, the results of all laboratory testing and LRFD pile capacities.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

Respectfully,
AMERICAN ENGINEERS, INC.

Brad High, PG
Project Geologist

Dusty Barrett, PE
Geotechnical Project Manager

REPORT OF GEOTECHNICAL EXPLORATION
NORTH AMERICAN STAINLESS
HAUL ROAD BRIDGE OVER US 42
GHENT, KENTUCKY

Table of Contents

Appendices

Appendix A – Boring Layout

Appendix B – Typed Boring Logs

Appendix C – Laboratory Testing Results

Appendix D – LRFD Pile Capacities

REPORT OF GEOTECHNICAL EXPLORATION
NORTH AMERICAN STAINLESS
HAUL ROAD BRIDGE OVER US 42
GHENT, KENTUCKY

1 PROJECT AND SITE DESCRIPTION

The project is located at the existing North American Stainless facility in Ghent, Kentucky. A new bridge crossing U.S. 42 is scheduled for construction at the site to provide access for the haul road to the river dock. Currently the bridge is scheduled to be single span, 24 feet wide and has a two percent grade. The length of the bridge is on the order of 111 feet. The anticipated foundation for the bridge will consist of a pile cap bearing on 18-inch closed-end pipe piles.

The existing topography of the site is best described as relatively level terrain. At the time of the exploration the site was covered in a growth of mixed grasses with sparse tree cover. Site drainage generally trends north toward the Ohio River.

2 GENERAL SITE GEOLOGY

Available geologic mapping (*Geologic Map of parts of the Vevay South and Vevay North Quadrangles, North-Central Kentucky, USGS 1973 and the Kentucky Geological Survey Geologic Map Information Service* online) indicates the site to be underlain by Quaternary-aged alluvium and glacial outwash deposits resulting from the Wisconsin Glaciation. Mapping describes the alluvium as interbedded sand, sandy silt and silty clay, yellowish-gray to red in color and thin bedded to massive. Pebbles and cobbles are scattered throughout the alluvium as well as local vegetative matter. The Glacial Outwash is described as gravel, sand, silt and clay. Commonly the gravel ranges up to three or four inches in diameter. The sand of the outwash is typically light brown to red or yellowish brown in color and very fine to coarse grained. Mapping indicates bedrock in the vicinity of the project may lie 120 feet or more beneath the existing ground surface.

No geologic hazards were readily apparent during the course of the investigation or upon review of the available geologic mapping. It should be understood that it is impossible to fully identify the presence or future potential of all geologic hazards during the course of a typical geotechnical investigation.

3 SCOPE OF WORK PERFORMED

The geotechnical exploration for this project consisted of drilling four soil test borings at the site of the proposed bridge. Two borings were located at each abutment, with one

on each side of the abutment. Each soil test boring was drilled to a predetermined boring termination depth ranging from about 40 to 80 feet beneath the existing ground surface. Drilling activities were conducted by AEI personnel utilizing a track mounted drill rig equipped with hollow stem augers. Drilling and sampling took place during March, 2014. A copy of the boring layout is included in Appendix A.

The borings were performed using 3 ¼ inch continuous flight hollow stem augers. A graduate Geologist logged the samples recovered from the split-spoon samplers. Standard penetration tests (SPT's) were performed on 5 foot centers throughout the disturbed soil borings to the predetermined boring termination depths. One undisturbed sample was obtained from Boring B-2 at a depth of about five feet. Particular attention was given to the color, textures, plasticity, relative moisture contents and consistencies of the recovered materials. Logs of the soil test borings are shown on the typed boring logs in Appendix B.

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change but rather the general area of change from one soil type to another; in-situ, the transition is gradual. A copy of the typed boring logs is attached.

The natural moisture content of the soil samples was determined in the laboratory. The natural moisture content is denoted as (W%) and shown as a percentage of the dry weight of the soil on the boring logs. In addition, Atterberg Limits, grain-size analyses and unconfined compressive strength tests were performed on samples representative of the predominant soil horizons. The results of the laboratory tests are summarized in Appendix C.

The soils were classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The Unified symbol for each stratum is shown on the legend for the typed boring logs. The testing was performed in accordance with the generally accepted standards for such tests.

4 RESULTS OF THE EXPLORATION

4.1 GENERAL

Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

4.2 SUBSURFACE SOIL CONDITIONS

The generalized subsurface conditions encountered at the boring locations, including descriptions of the various strata and their depths and thicknesses are presented on the Typed Boring Logs in Appendix B.

Topsoil was encountered in Borings B-3 and B-4 with thicknesses of two and four inches, respectively. Beneath the surface materials low to moderate plasticity clays and clayey silts were typically encountered which contained variable amounts of sand and gravel. Below the clays and silts variably graded sands were encountered to the predetermined boring termination depths. The clay and silt soils encountered were typically described as either silty lean clay or clayey silt, contained trace to some fine-grained sand, brown in color and wet of the anticipated optimum moisture content for compaction. The sands encountered varied from fine to coarse grained, commonly silty and contained trace to some fine gravel.

SPT-N values in the cohesive soils ranged from three to 12 blows per foot (bpf). Corresponding Qp values range from less than 0.25 to greater than 4.5+ tons per square foot (tsf). Together, the SPT-N and Qp values are indicative of medium stiff to stiff soil strength consistencies with soft zones.

SPT-N values in the sands ranged from one to 77 bpf, with most values between six and 20 bpf, indicative of indicative of loose to medium dense relative density with very loose and dense zones.

Visual classification, Atterberg Limits, grain-size analyses and unconfined compressive strength testing was performed on representative samples and the results indicate that the near-surface clay soils typically classify as CL (Clay of Low plasticity), lean clay, and as CL-ML, silty lean clay, in accordance with the Unified Soil Classification System (USCS). Liquid limit test results from Boring B-4 resulted in a value of 26 percent with a plastic limit of 18 percent. Natural moisture content testing was also performed on all recovered samples. Natural moisture contents of the cohesive soil samples obtained during the investigation range from about 16 to 22 percent. Results of natural moisture content and Atterberg limits testing indicate that the on-site soils are typically at a moisture content near to about five percent wet of the plastic limit.

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change but rather the general area of change from one soil type to another; in-situ, the transition is gradual.

4.3 BEDROCK CONDITIONS

Refusal, as would be indicated by the Driller on the field boring logs, indicates a depth where either essentially no downward progress can be made by the auger or where the N-value indicates essentially no penetration of the split-spoon sampler. It is normally indicative of a very hard or very dense material such as large boulders or the upper bedrock surface. Auger refusal was not encountered in any of the borings at the site during the investigation prior to reaching the predetermined boring termination depths.

4.4 GROUNDWATER CONDITIONS

Groundwater was encountered in Borings B-1, B-3 and B-4 at the site during drilling operations at depths beneath the existing ground surface ranging from about 39 to 48 feet. Generally, the groundwater at this site is slightly higher than the water levels associated with the nearby Ohio River. However, when water levels within the Ohio River fluctuate due to flooding they may exceed the on-site groundwater levels by several feet. During dry periods, when water levels of the Ohio River decrease, they may approach the ground water levels at the site. Groundwater should not be a significant factor in foundation design, as fluctuations in levels may occur due to variations in rainfall, evaporation, construction activities, surface runoff and other site specific factors.

5 ANALYSES AND RECOMMENDATIONS

The recommendations that follow are based on our conceptual understanding of the project. As the site design is advanced, please notify us of any significant design changes so that our recommendations can be reviewed and modified as necessary.

5.1 GENERAL SITE WORK

5.1.1 On-Site Soils

The near-surface soils on this site are low to moderate plasticity clay and silt soils that classify predominantly as CL and CL-ML in accordance with the USCS. These soils exhibit low to moderate potential to swell or shrink when exposed to long-term increases or decreases in moisture content. These soils are suitable for use as fill material provided they are wetted or dried to a moisture content suitable for compaction.

5.1.2 General Fill Requirements

Any material, whether borrowed on-site or imported to the site, placed as engineered fill on the project site beneath the proposed on-grade structures such as pavement, parking lots, sidewalks, etc., should be an approved material, free of environmental contamination, vegetation, topsoil, organic material, wet soil, construction debris and rock fragments greater than six inches in diameter. Deeper fills associated with the

roadway embankments may include larger diameter rock material, as approved by the Geotechnical Engineer.

We recommend that any borrow material, if needed, consist of granular or lean clay materials or mixtures thereof with Unified Classifications of CL, SC, or GC. We further recommend high plasticity clays, known as fat clays (CH soils) not be *imported* to the site due to their potential for volume changes with fluctuations in moisture content. Rock fill from the project construction should be suitably graded and not contain individual pieces greater than 2 feet in the greatest dimension.

The preferred off-site borrow material should have a Plasticity Index (PI) less than 20 and a standard Proctor maximum dry density of at least 95 pcf. Engineering classification and standard Proctor tests should be performed on all potential borrow soils and the test results evaluated by an AEI Geotechnical Engineer to evaluate the suitability of the soil for use as engineered fill.

Based on our understanding of the project, the approach embankments will be constructed from Reclime material from onsite manufacturing operations. For laboratory data associated with Reclime material, please see AEI Report Number 215-066, NAS Staging Lot. Based on preliminary lab data, this material should be placed a sandy silt or silty sand which may require a narrow moisture range to achieve adequate compaction.

5.1.3 Topsoil Stripping

Prior to earthwork operations, topsoil and surface plant material root mat should be stripped from both cut and fill areas and stockpiled for landscaping purposes.

5.1.4 Subgrade Evaluation/Conditioning

Once the topsoil is removed, areas to receive fill should be “proofrolled” under the observation of an AEI Geotechnical Engineer or Technician to evaluate the subgrade for suitability for fill placement. The proofrolling should be performed using heavy construction equipment such as a fully loaded single or tandem axle dump truck (approximately 20-25 tons), passing repeatedly over the subgrade at a slow rate of speed.

Subgrade soils that are considered unstable after proofrolling should be stabilized by additional compaction or by one or more of the following methods; in-place stabilization using chemical methods (lime/soil cement), removal and replacement with engineered fill, partial depth removal and replacement with a crushed (angular) aggregate layer/ durable shot rock, or partial depth removal and replacement with a geogrid and a crushed aggregate layer. The specific method of treatment will be based on the conditions present at the time the proof rolling is performed and local availability of

materials and economic factors. The selection of the appropriate method to mitigate degrading subgrade soils is dependent on the time of year site work is anticipated, cost, anticipated effectiveness, and scheduling impacts. The AEI Geotechnical Engineer should be contacted to assist in selecting an appropriate method considering all factors.

Once the subgrade is judged to be relatively uniform and suitable for support of engineered fill, fill areas should be brought to design elevations with on-site soil and/or suitable off-site borrow material placed and compacted as specified in Section 5.2.2.

5.2 ROADWAY CONSTRUCTION

5.2.1 Embankments

Roadway fill embankments will achieve maximum heights of around 30 feet. Embankment slopes of two horizontal to one vertical (2:1) or flatter are acceptable for fill embankments provided the embankments are constructed per the provided recommendations. Sloped subgrade areas exceeding 15 percent should be benched into the hillside to key into the existing slope and allow uniform compaction to occur. Steeper slopes such as 2:1 slopes are susceptible to erosion if surface water is allowed to concentrate and flow down the slope. Drainage measures and erosion control should be provided for the embankment slopes. Recommendations for fill placement are provided in Section 5.2.2. Borrow areas should be approved by an AEI Geotechnical Engineer.

Based on discussions with the structural designer, in an attempt to avoid a drainage ditch adjacent to the proposed roadway, slopes in a limited portion (around Station 50+50) of the proposed embankment may require steeper slopes. Slopes as steep as 1 1/2 horizontal to one vertical (1.5:1) should be stable at the referenced heights provided fill material consists of durable shot rock (or rip rap). Maintenance on these slopes will be difficult. The shot rock should extend from the toe of the slope to the approximate centerline horizontally and from the existing groundline to the proposed subgrade elevation vertically. To allow for pavement construction, the shot rock can be capped near the proposed subgrade elevation with smaller stone.

5.2.2 Fill Placement

Suitable fill material placed under roadway areas should be placed in maximum eight inch (loose thickness) horizontal lifts, with each lift being compacted to a minimum of 95 percent of the standard Proctor maximum dry density, at a moisture content within two percent of optimum moisture for compaction. Wetting or drying of the soils may be necessary to achieve a moisture content suitable for compaction. Representative and adequate field density testing should be performed by AEI to verify that compaction requirements have been met.

5.3 SITE SOIL PRACTICES

Working with the on-site soils will require accepted construction practices and techniques. Some of these include:

- Prevent stripping too far in advance of actual earthwork needs. Problems arise when broad areas of clay/silt mixtures are exposed and allowed to become wet and soft from rainfall. Once saturated, rutting can occur by movement of construction equipment.

- Strip areas to receive fill in small, sequential areas as needed. These areas should be limited to the contractor's abilities to reasonably place and compact fill material.

- Schedule earthwork construction to take full advantage of a summer season. The required moisture range can be difficult to achieve in the winter and early spring when rainfall activity is more prevalent and soil drying is not always possible.

- Maintain good surface drainage during earthwork construction. Grade construction areas on a daily basis if necessary to promote sheet drainage of precipitation and seal all engineered fill placed with a smooth drum steel roller at the end of each day.

- Perform frequent density tests during fill placement to confirm achievement of proper compaction.

- If the project is to begin in the fall and continue through the winter, care must be taken not to place frozen soil, as proper compaction will be impossible. Moisture contents must also be carefully monitored during the winter, as wet soil will be difficult to dry.

5.4 STRUCTURE FOUNDATIONS

5.4.1 Recommended Foundation Type and Capacity

Structures associated with the project will be supported on driven 18-inch closed-end, steel, pipe piles. Driveability of the referenced piles were evaluated using the wave equation analysis (GRLWEAP 2005). The piles were assumed to be 45 ksi steel with a minimum wall thickness of 0.375 inches. The driveability analysis indicates that a hammer with a minimum energy of 30 kip-ft is required to drive the piles to the required capacities without encountering damage due to excessive blow counts or overstress.

Pile capacities are shown on the attached pile capacity charts. Piles that do not achieve adequate capacities at target, minimum pile tip elevations, should be left a minimum of one day so pore pressures caused by pile installations can dissipate allowing the soil to set up. After the waiting period, the piles can be re-struck to determine if the piles have achieved adequate capacity. Driveability analyses were performed assuming continuous driving operations. If extended periods of delay occur during driving individual piles, difficulty in resuming pile installation may occur due to pore pressure dissipation.

These recommendations are provided in consideration of the field-testing, laboratory testing, local codes, and our experience with materials of similar description.

5.4.2 Wing Wall Recommendations

Below grade walls, should include sand or gravel backfill. The sand or gravel backfill should be placed within a zone extending upwardly from the heel of the wall on a 1H:1V slope. The design should also include weepholes and perforated pipe foundation drains to prevent hydrostatic pressures behind the wall. For retaining walls free to rotate without top fixity, an equivalent fluid pressure of 41 pcf should be used for design. For walls with top fixity restrained from rotation, an equivalent fluid pressure of 65 pcf should be used for design. A coefficient of friction of 0.35 can also be used between the concrete foundation and bearing materials when calculating resisting forces. The above stated equivalent fluid pressures are based on the Reclime material being used as fill. If the material type used for fill varies, then the equivalent fluid pressures will need to be reevaluated.

5.5 GENERAL CONSIDERATIONS

5.5.1 Construction Monitoring/Testing

Field density and moisture content determinations should be made on each lift of fill with a minimum of one test per every 100 feet of roadway. All construction operations involving earthwork and paving should be performed in the presence of an experienced representative of AEI. The representative would operate under the direct supervision of an AEI Geotechnical Engineer. Some adjustments in the test frequencies may be required based upon the general fill types, changes in the fill material and soil conditions at the time of placement.

Site problems can be avoided or reduced if proper field observation and testing services are provided. We recommend all foundation excavations, proofrolling, site and subgrade preparation, subgrade stabilization (if used), and pavement construction be monitored by AEI. Density tests should be performed to verify compaction and moisture content for all earthwork operations. Field observations should be performed prior to and during concrete placement operations.

5.5.2 Construction Considerations

Site grading should be maintained during construction so that positive drainage is promoted at all times. Final site grading should be accomplished in such a manner as to divert surface runoff away from paved areas. Maintenance should be performed regularly on paved areas to seal pavement cracks and reduce surface water infiltration into the pavement subgrade.

The surface soils at the site are susceptible to loss of bearing capacity (pumping) by the action of water and construction equipment. Once the subgrade has been stripped, cut to grade and performed adequately during proof-rolling, it should be sealed at the end of each filling day with a smooth drum roller and sloped to sheet drain rainwater. Any material disturbed by rainwater and construction operations should be undercut prior to placing the next lift of fill.

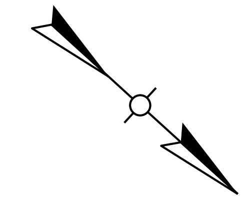
5.5.3 Limitations

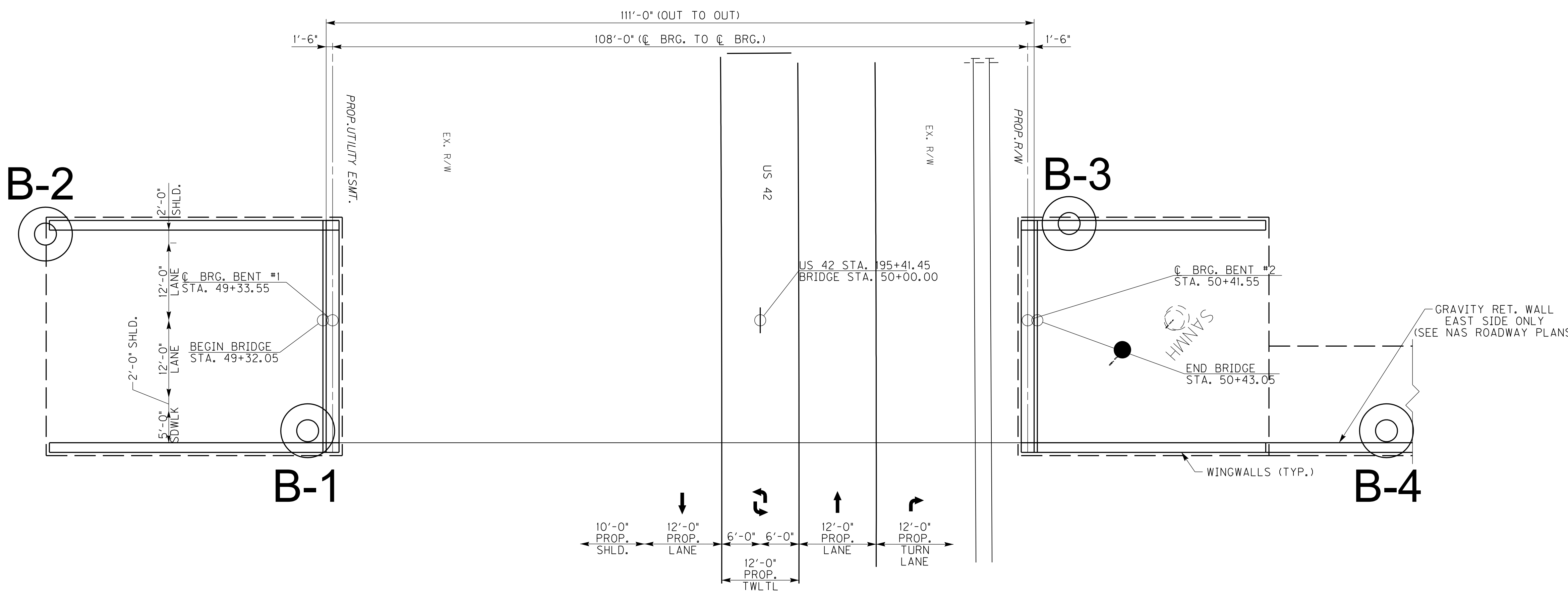
The conclusions and recommendations presented herein are based on information gathered from the borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between the borings.

We will retain samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the cover of this report. After this period, the samples will be discarded unless otherwise requested.

APPENDIX A

Boring Layout





PLAN

~Superstructure not shown~

LEGEND

◎ SOIL TEST BORING WITH STANDARD PENETRATION TESTS

REVISIONS	NO. / DATE / DESCRIPTION
	BORING LAYOUT
CLIENT:	North American Stainless
PROJECT:	NAS Bridge over US 42 Ghent, KY
PLANS PREPARED AND SUBMITTED BY: DESIGN CONSULTANT	AEI AMERICAN ENGINEERS, INC. PROFESSIONAL ENGINEERING ● 65 Aberdeen Drive, Glasgow, KY 42141, (270) 651-7220 Branch Offices ○ 2500 Nelson Miller Parkway, Louisville, KY 40222, (502) 245-3813 ○ 1634 White Circle, Suite 101, Marietta, GA 30066, (770) 421-8422 www.aei.cc
SCALE:	1"=20'
DATE:	5-12-15
DRAWN BY:	J. CHILDRESS
CHECKED BY:	D. BARRETT
FILE:	T:/15 Projects/215-042/Geotech/NAS Bridge Boring Layout.dgn
SHEET:	B1

APPENDIX B

Boring Logs

FIELD TESTING PROCEDURES

The general field procedures employed by the Field Services Center are summarized in the following outline. The procedures utilized by the AEI Field Service Center are recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Soil Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the surface conditions. Borings are advanced into the ground using continuous flight augers. At prescribed intervals throughout the boring depths, soil samples are obtained with a split-spoon or thin-walled sampler and sealed in airtight glass jars and labeled. The sampler is first seated 6 inches to penetrate loose cuttings and then driven an additional foot, where possible, with blows from a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler each six-inch increment is recorded. The penetration resistance, or "N-value" is designated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. The split spoon sampling procedures used during the exploration are in general accordance with ASTM D 1586. Split spoon samples are considered to provide *disturbed* samples, yet are appropriate for most engineering applications. Thin-walled (Shelby tube) samples are considered to provide *undisturbed* samples and obtained when warranted in general accordance with ASTM D 1587.

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Core Drilling Procedures for use on refusal materials. Prior to coring, casing is set in the boring through the overburden soils. Refusal materials are then cored according to ASTM D-2113 using a diamond bit attached to the end of a hollow double tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Samples of the material penetrated are protected and retained in the inner tube, which is retrieved at the end of each drill run. Upon retrieval of the inner tube the core is recovered, measured and placed in boxes for storage.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soil in general accordance with the procedures outlined in ASTM D 2487 and D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

Representative portions of soil samples are placed in sealed containers and transported to the laboratory. In the laboratory, the samples are examined to verify the driller's field classifications. Test Boring Records are attached which show the soil descriptions and penetration resistances.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designate the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using as electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Sampling Terminology

Undisturbed Sampling: Thin-walled or Shelby tube samples used for visual examination, classification tests and quantitative laboratory testing. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airtight and transported to the laboratory. Locations and depths of undisturbed samples are shown on the "Boring Logs."

Bag Sampling: Bulk samples of soil are obtained at selected locations. These samples consist of soil brought to the surface by the drilling augers, or obtained from test pits or the ground surface using hand tools. Samples are placed in bags, with sealed jar samples of the material, and taken to our laboratory for testing where more mass material is required (i.e. Proctors and CBR's). The locations of these samples are indicated on the appropriate logs, or on the Boring Location Plan.

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

COHESIVE SOILS
(Clay, Silt, and Mixtures)

CONSISTENCY	SPT N-VALUE	Qu/Qp (tsf)
Very Soft	2 blows/ft or less	0 – 0.25
Soft	2 to 4 blows/ft	0.25 – 0.49
Medium Stiff	4 to 8 blows/ft	0.50 – 0.99
Stiff	8 to 15 blows/ft	1.00 – 2.00
Very Stiff	15 to 30 blows/ft	2.00 – 4.00
Hard	30 blows/ft or more	> 4.00

PLASTICITY

Degree of Plasticity	Plasticity Index (PI)
Low	0 – 7
Medium	8 – 22
High	over 22

NON-COHESIVE SOILS
(Silt, Sand, Gravel, and Mixtures)

DENSITY	SPT N-VALUE
Very Loose	4 blows/ft or less
Loose	4 to 10 blows/ft
Medium Dense	10 to 30 blows/ft
Dense	30 to 50 blows/ft
Very Dense	50 blows/ft or more

PARTICLE SIZE IDENTIFICATION

Boulders	12 inch diameter or more
Cobbles	3 to 12 inch diameter
Gravel	Coarse – 1 to 3 inch
	Medium – ½ to 1 inch
	Fine – ¼ to ½ inch
Sand	Coarse – 0.6mm to ¼ inch
	Medium – 0.2mm to 0.6mm
	Fine – 0.05mm to 0.2mm
Silt	0.05mm to 0.005mm
Clay	0.005mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 – 10
Trace to Some	11 – 20
Some	21 – 35
And	36 – 50

NOTES

Classification – The Unified Soil Classification System is used to identify soil unless otherwise noted.

Standard "N" Penetration Test (SPT) (ASTM D1586) – Driving a 2-inch O.D., 1 3/8-inch I.D. sampler a distance of 1 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6-inches to seat the sampler into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the field drill long (e.g., 10/8/7). On the report log, the Standard Penetration Test result (i.e., the N value) is normally presented and consists of the sum of the 2nd and 3rd penetration counts (i.e., N = 8 + 7 = 15 blows/ft.)

Soil Property Symbols

Qu:	Unconfined Compressive Strength	N:	Standard Penetration Value (see above)
Qp:	Unconfined Comp. Strength (pocket pent.)	omc:	Optimum Moisture content
LL:	Liquid Limit, % (Atterberg Limit)	PL:	Plastic Limit, % (Atterberg Limit)
PI:	Plasticity Index	mdd:	Maximum Dry Density

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CLIENT North American Stainless
PROJECT NAME NAS Bridge over US 42
PROJECT NUMBER 215-042
PROJECT LOCATION Ghent, KY
DATE STARTED 3/18/15 **COMPLETED** 3/18/15
GROUND ELEVATION
DRILLER Adam Thompson
GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING 48.0 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		(ML) clayey SILT, trace fine sand, dark brown, moist to wet, medium stiff									
			SPT 1	93	2-2-5 (7)	<0.25	22				
5											
		(SW) gravelly SAND, fine to medium grained, brown, very loose									
			SPT 2	40	1-1-1 (2)	n/a	8				
10											
		(SP-SM) SAND with silt, fine to medium grained, brown, trace to some fine to medium gravel, loose to very dense									
			SPT 3	0	1-3-4 (7)	n/a					
15											
			SPT 4	87	3-6-8 (14)	n/a	6	NP	NP	NP	
20											
			SPT 5	80	6-4-4 (8)	n/a	8				
25											
			SPT 6	100	5-6-6 (12)	n/a	5				
30											
			SPT 7	100	6-17-35 (52)	n/a	8				
35											

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
35		(SP-SM) SAND with silt, fine to medium grained, brown, trace to some fine to medium gravel, loose to very dense *(continued)*									
40		(GM) silty GRAVEL and SAND, fine to medium grained, brown, wet, very dense to medium dense	SPT 8	87	25-37-40 (77)	n/a	4	NP	NP	NP	
45			SPT 9	67	22-12-9 (21)	n/a	10				
50		▼	SPT 10	60	4-10-11 (21)	n/a	12				
55			SPT 11	100	11-13-14 (27)	n/a	17	NP	NP	NP	
60			SPT 12	53	14-9-12 (21)	n/a	13				
65			SPT 13	60	12-12-14 (26)	n/a	13				
70			SPT 14	87	10-13-14 (27)	n/a	17				
75			SPT 15	60	8-9-15 (24)	n/a	16				

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
75		(GM) silty GRAVEL and SAND, fine to medium grained, brown, wet, very dense to medium dense *(continued)*									
80			SPT 16	67	18-20-25 (45)	n/a	14	NP	NP	NP	
		Bottom of borehole at 80.0 feet.									

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CLIENT North American Stainless
PROJECT NAME NAS Bridge over US 42
PROJECT NUMBER 215-042
PROJECT LOCATION Ghent, KY
DATE STARTED 3/19/15 **COMPLETED** 3/19/15
GROUND ELEVATION
DRILLER Adam Thompson
GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		(CL) silty lean CLAY, some fine sand, brown, moist to wet									
5			ST 1	85			20				
		(SP-SM) SAND with gravel and silt, fine to medium grained, some fine to medium gravel, brown, medium dense									
10			SPT 2	47	2-6-7 (13)	n/a	4				
15			SPT 3	67	12-12-15 (27)	n/a	3				
20			SPT 4	73	8-9-11 (20)	n/a	4	NP	NP	NP	
25			SPT 5	73	5-6-7 (13)	n/a	2				
30			SPT 6	80	8-8-9 (17)	n/a					
35			SPT	100	5-7-8	n/a	4				

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
35		(SP-SM) SAND with gravel and silt, fine to medium grained, some fine to medium gravel, brown, medium dense *(continued)*	7		(15)						
40			SPT 8	100	8-10-12 (22)	n/a	13				
		Bottom of borehole at 40.5 feet.									

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CLIENT North American Stainless
PROJECT NAME NAS Bridge over US 42
PROJECT NUMBER 215-042
PROJECT LOCATION Ghent, KY
DATE STARTED 3/19/15 **COMPLETED** 3/19/15
GROUND ELEVATION
DRILLER Adam Thompson
GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING 39.0 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2 inches)									
		(SM) silty SAND with clay, very fine to fine grained, brown, wet, medium dense	SPT 1	100	6-6-7 (13)	1.5	20	NP	NP	NP	
5		(CL) silty CLAY, trace to some fine sand, brown, moist to wet, stiff to medium stiff	SPT 2	93	3-3-4 (7)	n/a	18				
10		(SW-SM) SAND with silt, brown, moist to wet, stiff to medium stiff	SPT 3	67	3-4-6 (10)	n/a	20				
15											
20		(SP-SM) SAND with silt and gravel, fine grained, brown, loose to medium dense	SPT 4	93	3-4-4 (8)	n/a	20				
			SPT 5	87	3-5-6 (11)	n/a	7	NP	NP	NP	
25											
30			SPT 6	100	2-4-12 (16)	n/a	5				
35		(SW) SAND, medium to coarse grained, trace to some fine gravel, brown to gray, dense to medium dense	SPT 7	33	22-24-26 (50)	n/a	4				

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
35		(SW) SAND, medium to coarse grained, trace to some fine gravel, brown to gray, dense to medium dense *(continued)*									
40			SPT 8	80	8-12-18 (30)	n/a	10	NP	NP	NP	
45			SPT 9	60	7-8-8 (16)	n/a	15				
50			SPT 10	53	6-7-8 (15)	n/a	11				
55			SPT 11	67	6-10-14 (24)	n/a	14				
60			SPT 12	87	8-9-10 (19)	n/a	13				
65			SPT 13	100	4-8-13 (21)	n/a	11				
70		(SM) silty SAND, fine to medium grained, brown, dense to medium dense	SPT 14	53	10-12-12 (24)	n/a	22				
75			SPT 15	53	9-12-14 (26)	n/a	17				

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
75		(SM) silty SAND, fine to medium grained, brown, dense to medium dense *(continued)*									
80			SPT 16	100	15-25-18 (43)	n/a	24				
		Bottom of borehole at 80.0 feet.									

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CLIENT North American Stainless
PROJECT NAME NAS Bridge over US 42
PROJECT NUMBER 215-042
PROJECT LOCATION Ghent, KY
DATE STARTED 3/19/15 **COMPLETED** 3/19/15
GROUND ELEVATION
DRILLER Adam Thompson
GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING 45.0 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL with mulch (4 inches)									
		(CL) lean CLAY, trace fine sand, brown, moist to wet, soft	SPT 1	13	1-1-2 (3)	4.5	16				
5											
		(CL) silty lean CLAY with sand, brown, moist to wet, stiff to medium stiff	SPT 2	73	8-5-7 (12)	2.75	19	26	18	8	
10											
			SPT 3	100	4-4-4 (8)	1.0	21				
15											
		(SW) silty SAND, fine grained, brown, wet, loose	SPT 4	93	3-3-3 (6)	n/a	18				
20											
			SPT 5	100	3-2-4 (6)	n/a	17				
25											
		(ML) sandy SILT, brown, wet to saturated, medium stiff	SPT 6	100	2-3-3 (6)	n/a	17	NP	NP	NP	
30											
			SPT	100	2-2-2	n/a	21				
35											

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CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
35		(SW) SAND, fine to medium grained, trace fine gravel, brown, wet, very loose to loose *(continued)*	7		(4)						
40			SPT 8	7	3-2-2 (4)	n/a	14				
45		▼	SPT 9	0	3-2-3 (5)	n/a					
50		(SW) SAND, medium to coarse grained, some fine gravel, brown, wet, very loose to medium dense	SPT 10	53	0-0-1 (1)	n/a	19				
55			SPT 11	100	7-8-6 (14)	n/a	15				
		Bottom of borehole at 55.5 feet.									

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KEY TO SYMBOLS

CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- CL: USCS Low Plasticity Clay
- GM: USCS Silty Gravel
- ML: USCS Silt
- SM: USCS Silty Sand
- SP-SM: USCS Poorly-graded Sand with Silt
- SW: USCS Well-graded Sand
- SW-SM: USCS Well-graded Sand with Silt
- TOPSOIL: Topsoil

SAMPLER SYMBOLS

- Standard Penetration Test
- Shelby Tube

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

APPENDIX C

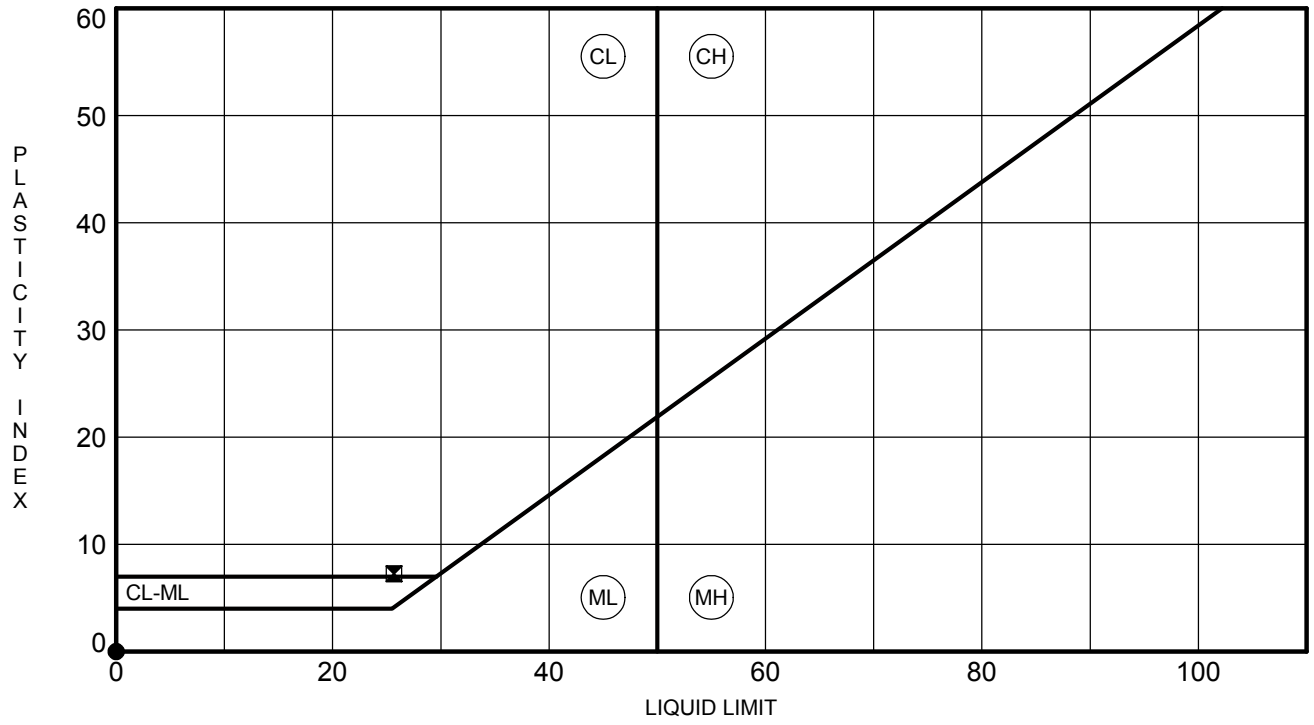
Laboratory Testing Results

AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING
65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

ATTERBERG LIMITS RESULTS

CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-3**	**3.5**	**NP**	**NP**	**NP**		**silty SAND with clay**
⧓	**B-4**	**10.0**	**26**	**18**	**8**		**silty lean CLAY with sand**

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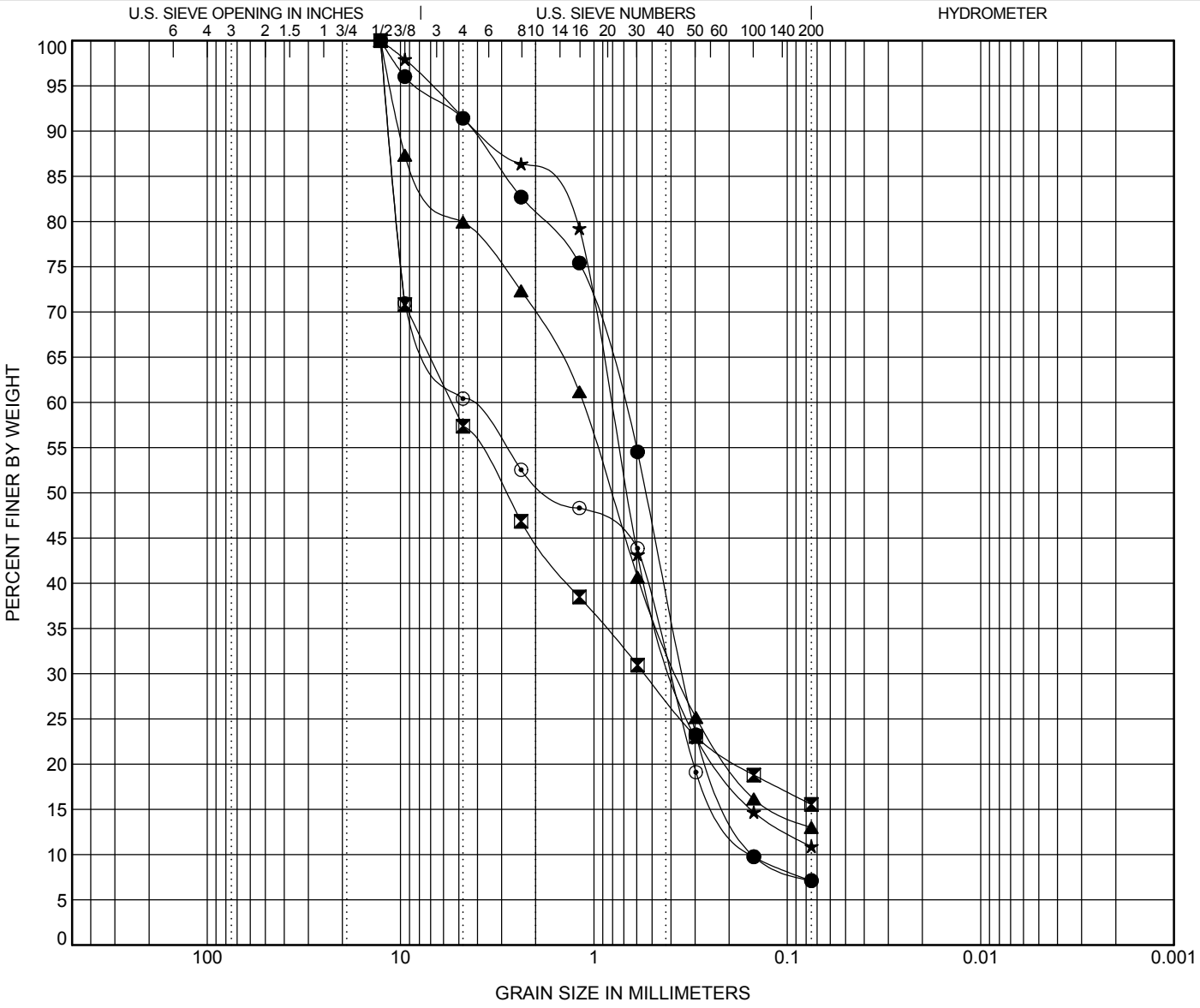
GRAIN SIZE DISTRIBUTION

CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-1	18.5	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.11	4.74
⊠	B-1	38.5	SILTY GRAVEL with SAND(GM)	NP	NP	NP		
▲	B-1	53.5	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
★	B-1	78.5	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP	2.74	12.88
⊙	B-2	19.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.23	30.15

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	18.5	12.7	0.714	0.345	0.151	8.6	84.3	7.1	
⊠	B-1	38.5	12.7	5.454	0.547		42.7	41.8	15.5	
▲	B-1	53.5	12.7	1.144	0.369		20.1	66.9	13.0	
★	B-1	78.5	12.7	0.822	0.379		8.5	80.6	10.9	
⊙	B-2	19.0	12.7	4.586	0.403	0.152	39.6	53.3	7.1	

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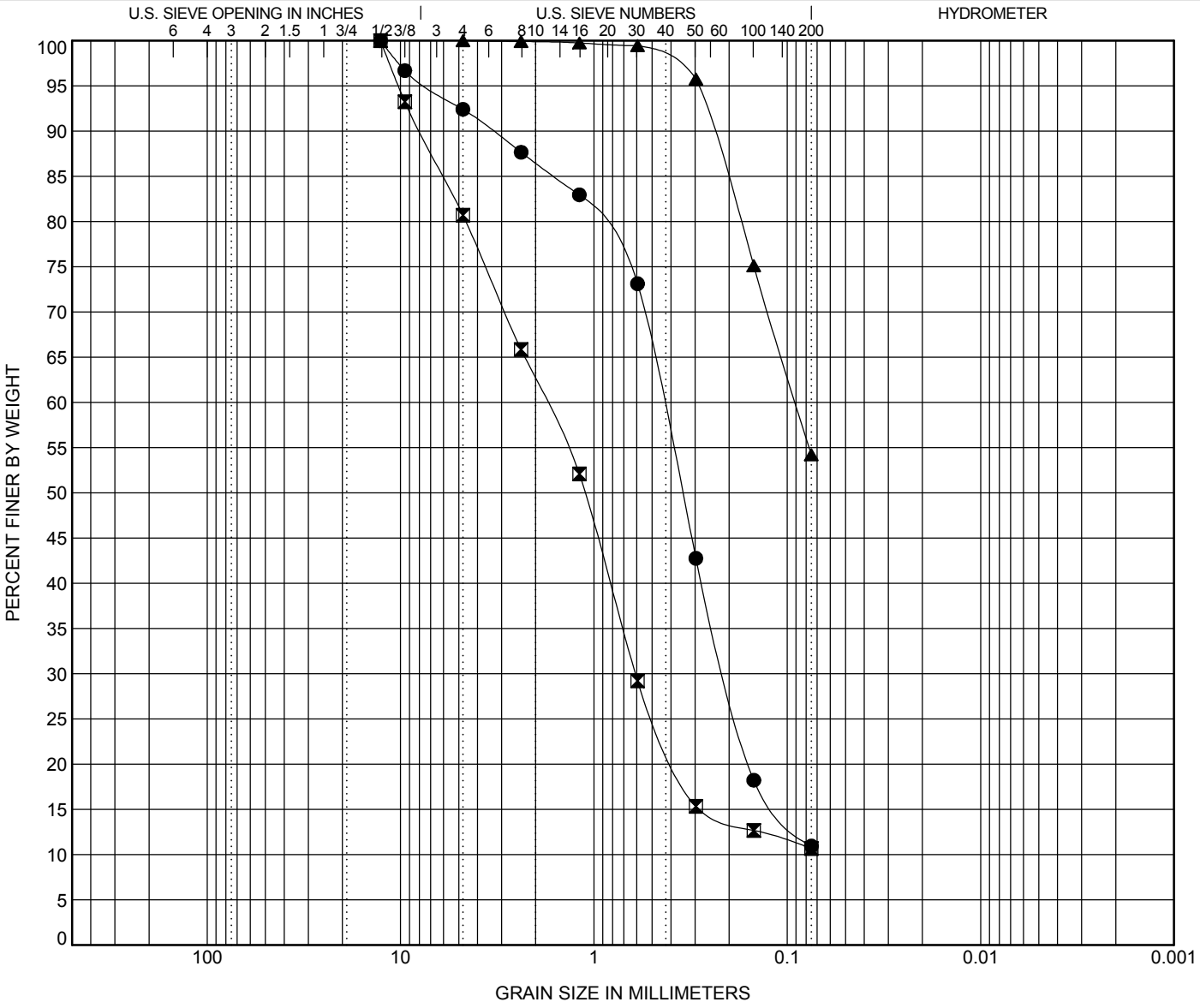
GRAIN SIZE DISTRIBUTION

CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-3	23.5	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP	1.42	6.42
⊠	B-3	38.5	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	3.53	29.90
▲	B-4	29.0	SANDY SILT(ML)	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-3	23.5	12.7	0.441	0.208		7.6	81.4	10.9	
⊠	B-3	38.5	12.7	1.774	0.609		19.3	70.0	10.7	
▲	B-4	29.0	4.76	0.091			0.0	45.8	54.2	

GRAIN SIZE - GINT STD US LAB.GDT - 5/12/15 16:22 - T:\15 PROJECTS\215-042 NAS BRIDGE OVER US 42\GEOTECH\REPORTS\215-042 GEOTECH.GPJ

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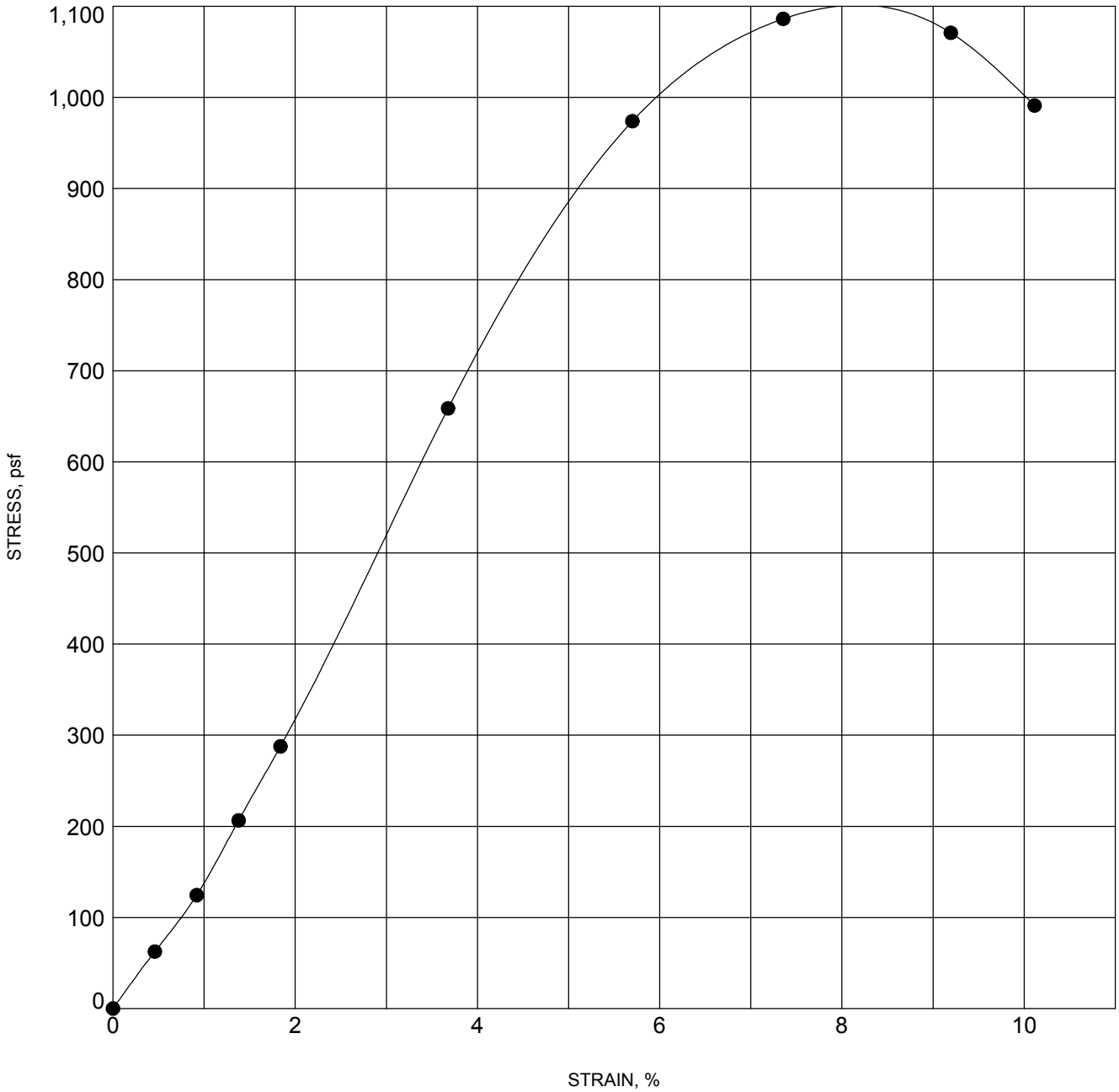
Glasgow, KY 42141
(270) 651-7220

UNCONFINED COMPRESSION TEST

CLIENT North American Stainless **PROJECT NAME** NAS Bridge over US 42

PROJECT NUMBER 215-042 **PROJECT LOCATION** Ghent, KY



BOREHOLE	DEPTH	Classification	γ_d	Qu
● B-2	4.0	**brown silty lean CLAY with sand**	**113**	**1086**

APPENDIX D

LRFD Pile Capacities

LRFD Pile Capacities (Pipe Piles in Friction)

County: Carroll
Location: NAS Bridge over US 42
Project Number: 215-042

Foundation Type: End Bent
Pile Size: Pipe, 18", Closed end

Depth Below Pile Cap (feet)	Soil Type	Nominal Skin Friction (kips)	Nominal End Bearing (kips)	Total Capacity (kips)	Total Factored Resistance (Static Analysis) (kips)	Total Factored Resistance (Dynamic Analysis) (kips)
0	cohesive	0	14	14	5	9
7	cohesive	27	41	68	31	44
16	cohesionless	65	67	132	59	86
25	cohesionless	132	68	200	90	130
34	cohesionless	230	69	299	135	194
43	cohesionless	358	70	428	193	278
48	cohesionless	441	71	512	230	333
57	cohesionless	609	72	681	306	443
66	cohesionless	791	73	864	389	562
75	cohesionless	990	74	1064	479	692
80	cohesionless	1106	75	1181	531	768

Factors:

Axial Capacity	Static Analysis	Dynamic Analysis
Skin Friction and End Bearing in Clays	0.35	0.65
Skin Friction and End Bearing in Sands	0.45	0.65

Uplift Resistance	
Clays	0.25
Sands	0.35

Driving Resistance Reductions	
Cohesive	0.5
Cohesionless	0.25

Note: All capacities are for a single pile.
Note: Capacities have been adjusted. Reduced to account for the effects of scour, if any, and side friction accumulated through embankment fill has been neglected.

Your Geotechnical Engineering Report

To help manage your risks, this information is being provided because subsurface issues are a major cause of construction delays, cost overruns, disputes, and claims.

Geotechnical Services are Performed for Specific Projects, Purposes, and People

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering exploration conducted for an engineer may not fulfill the needs of a contractor or even another engineer. Each geotechnical engineering exploration and report is unique and is prepared solely for the client. No one except the client should rely on the geotechnical engineering report without first consulting with the geotechnical engineer who prepared it. The report should not be applied for any project or purpose except the one originally intended.

Read the Entire Report

To avoid serious problems, the full geotechnical engineering report should be read in its entirety. Do not only read selected sections or the executive summary.

A Unique Set of Project-Specific Factors is the Basis for a Geotechnical Engineering Report

Geotechnical engineers consider a numerous unique, project-specific factors when determining the scope of a study. Typical factors include: the client's goals, objectives, project costs, risk management preferences, proposed structures, structures on site, topography, and other proposed or existing site improvements, such as access roads, parking lots, and utilities. Unless indicated otherwise by the geotechnical engineer who conducted the original exploration, a geotechnical engineering report should not be relied upon if it was:

- not prepared for you or your project,
- not prepared for the specific site explored, or
- completed before important changes to the project were implemented.

Typical changes that can lessen the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a multi-story hotel to a parking lot
- finished floor elevation, location, orientation, or weight of the proposed structure, anticipated loads or
- project ownership

Geotechnical engineers cannot be held liable or responsible for issues that occur because their report did not take into account development items of which they were not informed. The geotechnical engineer should always be notified of any project changes. Upon notification, it should be requested of the geotechnical engineer to give an assessment of the impact of the project changes.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that exist at the time of the exploration. A geotechnical engineering report should not be relied upon if its reliability could be in question due to factors such as man-made events as construction on or adjacent to the site, natural events such as floods, earthquakes, or groundwater fluctuation, or time. To determine if a geotechnical report is still reliable, contact the geotechnical engineer. Major problems could be avoided by performing a minimal amount of additional analysis and/or testing.

Most Geotechnical Findings are Professional Opinions

Geotechnical site explorations identify subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field logs and laboratory data and apply their professional judgment to make conclusions about the subsurface conditions throughout the site. Actual subsurface conditions may differ from those indicated in the report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risk associated with unanticipated conditions.

The Recommendations within a Report Are Not Final

Do not put too much faith on the construction recommendations included in the report. The recommendations are not final due to geotechnical engineers developing them principally from judgment and opinion. Only by observing actual subsurface conditions revealed during construction can geotechnical engineers finalize their recommendations. Responsibility and liability cannot be assumed for the recommendations

within the report by the geotechnical engineer who developed the report if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject To Misinterpretation

Misinterpretation of geotechnical engineering reports has resulted in costly problems. The risk of misinterpretation can be lowered after the submittal of the final report by having the geotechnical engineer consult with appropriate members of the design team. The geotechnical engineer could also be retained to review crucial parts of the plans and specifications put together by the design team. The geotechnical engineering report can also be misinterpreted by contractors which can result in many problems. By participating in pre-bid and preconstruction meetings and providing construction observations by the geotechnical engineer, many risks can be reduced.

Final Boring Logs Should not be Re-drawn

Geotechnical engineers prepare final boring logs and testing results based on field logs and laboratory data. The logs included in a final geotechnical engineering report should never be redrawn to be included in architectural or design drawings due to errors that could be made. Electronic reproduction is acceptable, along with photographic reproduction, but it should be understood that separating logs from the report can elevate risk.

Contractors Need a Complete Report and Guidance

By limiting what is provided for bid preparation, contractors are not liable for unforeseen subsurface conditions although some owners and design professionals believe the opposite to be true. The complete geotechnical engineering report, accompanied with a cover letter or transmittal, should be provided to contractors to help prevent costly problems. The letter states that the report was not prepared for purposes of bid development and the report's accuracy is limited. Although a fee may be required, encourage the contractors to consult with the geotechnical engineer who prepared the report and/or to conduct additional studies to obtain the specific types of information they need or prefer. A prebid conference involving the owner, geotechnical engineer, and contractors can prove to be very valuable. If needed, allow contractors sufficient time to perform additional studies. Upon doing this you might be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Closely Read Responsibility Provisions

Geotechnical engineering is not as exact as other engineering disciplines. This lack of understanding by clients, design professionals, and contractors has created unrealistic expectations that have led to disappointments, claims, and disputes. To minimize such risks, a variety of explanatory provisions may be included in the report by the geotechnical engineer. To help others recognize their own responsibilities and risks, many of these provisions indicate where the geotechnical engineer's responsibilities begin and end. These provisions should be read carefully, questions asked if needed, and the geotechnical engineer should provide satisfactory responses.

Environmental Issues/Concerns are not Covered

Unforeseen environmental issues can lead to project delays or even failures. Geotechnical engineering reports do not usually include environmental findings, conclusions, or recommendations. As with a geotechnical engineering report, do not rely on an environmental report that was prepared for someone else.

AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING

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Report of GEOTECHNICAL EXPLORATION

AMERICAN ENGINEERS, INC.

NORTH AMERICAN STAINLESS

TRAILER STAGING LOT

GHENT, KY

MAY 2015

DESIGNING YOUR FUTURE, TODAY.

AEI

AEI
AMERICAN
ENGINEERS, INC.

May 22, 2015

Mr. Juan Fernandez
North American Stainless
6870 Highway 42 East
Ghent, Kentucky

Re: Geotechnical Exploration
North American Stainless
Trailer Staging Lot
Ghent, Kentucky
AEI Project No. 215-066

Dear Mr. Fernandez:

American Engineers, Inc. is pleased to submit this geotechnical report that details the results of our geotechnical exploration performed at the above referenced site.

The attached report describes the site and subsurface conditions and also details our recommendations for the proposed project. The Appendices to the report contains a drawing with a boring layout, typed boring logs, and the results of all laboratory testing.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

Respectfully,
AMERICAN ENGINEERS, INC.

Brad High, PG
Project Geologist

Dusty Barrett, PE
Geotechnical Project Manager

REPORT OF GEOTECHNICAL EXPLORATION
NORTH AMERICAN STAINLESS
TRAILER STAGING LOT
GHENT, KENTUCKY

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Appendices

Appendix A – Boring Layout

Appendix B – Typed Boring Logs

Appendix C – Laboratory Testing Results

REPORT OF GEOTECHNICAL EXPLORATION
NORTH AMERICAN STAINLESS
TRAILER STAGING LOT
GHENT, KENTUCKY

1 PROJECT AND SITE DESCRIPTION

The project is located at the existing North American Stainless facility in Ghent, Kentucky. A new trailer staging lot is scheduled for construction at the site to support the existing manufacturing and shipping facilities near Gate 2. The trailer staging lot will be approximately 240 feet by 1,100 feet and will provide a staging area for 200 to 300 tractor trailers. It is anticipated that several feet of fill will be required to achieve the design subgrade elevation.

The existing topography of the site is best described as relatively level terrain. At the time of the exploration the site was covered in a growth of mixed grasses with sparse tree cover. Site drainage generally trends north toward the Ohio River.

2 GENERAL SITE GEOLOGY

Available geologic mapping (*Geologic Map of parts of the Vevay South and Vevay North Quadrangles, North-Central Kentucky, USGS 1973 and the Kentucky Geological Survey Geologic Map Information Service* online) indicates the site to be underlain by Quaternary-aged alluvium and glacial outwash deposits resulting from the Wisconsin Glaciation. Mapping describes the alluvium as interbedded sand, sandy silt and silty clay, yellowish-gray to red in color and thin bedded to massive. Pebbles and cobbles are scattered throughout the alluvium as well as local vegetative matter. The Glacial Outwash is described as gravel, sand, silt and clay. Commonly the gravel ranges up to three or four inches in diameter. The sand of the outwash is typically light brown to red or yellowish brown in color and very fine to coarse grained. Mapping indicates bedrock in the vicinity of the project may lie 120 feet or more beneath the existing ground surface.

No geologic hazards were readily apparent during the course of the investigation or upon review of the available geologic mapping. It should be understood that it is impossible to fully identify the presence or future potential of all geologic hazards during the course of a typical geotechnical investigation.

3 SCOPE OF WORK PERFORMED

The geotechnical exploration for this project consisted of drilling six soil test borings in the limits of the proposed trailer staging lot. The soil test borings were drilled to

predetermined boring termination depths ranging from five to 11 feet beneath the existing ground surface. Drilling activities were conducted by AEI personnel utilizing a track mounted drill rig to access the terrain and site conditions. A boring layout is included in Appendix A.

Soil test borings were drilled at the proposed trailer staging lot to provide strength consistencies of the site soils and samples for classification. The borings were performed using 3 ¼ inch continuous flight hollow stem augers. A graduate Geologist was on site to log samples recovered from the split-spoon samplers. Standard penetration tests (SPT's) were performed on 2-½ foot centers throughout the disturbed soil borings to the predetermined boring termination depths. Particular attention was given to the color, texture, plasticity, relative moisture content and consistency of the recovered materials. Samples of the predominant soil types were obtained to provide samples for engineering classification. Moisture-density, grain-size analysis and California Bearing Ratio (CBR) tests were performed on Reclime material samples proposed to be utilized as fill at the site to achieve the design subgrade elevation. A copy of the typed boring logs are included in Appendix B.

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change but rather the general area of change from one soil type to another; in-situ, the transition is gradual.

The natural moisture content of the soil samples was determined in the laboratory. The natural moisture content is denoted as (W%) and shown as a percentage of the dry weight of the soil on the boring logs. In addition, Atterberg limits tests were performed on samples representative of the predominant soil horizons. The results of the laboratory tests are summarized in Appendix C.

The soils were classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The Unified symbol for each stratum is shown on the legend for the typed boring logs. The testing was performed in accordance with the generally accepted standards for such tests.

4 RESULTS OF THE EXPLORATION

4.1 GENERAL

Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

4.2 SUBSURFACE SOIL CONDITIONS

The generalized subsurface conditions encountered at the boring locations, including descriptions of the various strata and their depths and thicknesses are presented on the Typed Boring Logs in Appendix B.

Measured topsoil thicknesses in the sample borings ranged from about four to seven inches. Beneath the topsoil low to moderate plasticity clays were typically encountered which contained variable amounts of sand and gravel. The soils encountered were typically described as silty lean clay with sand, brown in color, moist to wet of anticipated optimum moisture content for compaction and medium stiff to stiff in soil strength consistency. Silty sand was also encountered beginning about seven feet beneath the existing ground surface in Boring B-1. The silty sand was described as fine grained in texture, brown, wet and loose in relative density.

SPT-N values in the clay soils ranged from six to 17 blows per foot (bpf), with most values between eight and 15 bpf. Corresponding Q_p values range from 1.0 to greater than 4.5+ tons per square foot (tsf), with most values between about 1.5 and 3.5 tsf. Together, the SPT-N and Q_p values are indicative of stiff soil strength consistencies with both medium stiff and very stiff zones.

Visual classification and Atterberg Limits testing was performed on representative samples and the results indicate that the near-surface clay soils typically classify as CL (Clay of Low plasticity), lean clay, in accordance with the Unified Soil Classification System (USCS). Liquid limit test results of 27 and 37 percent were obtained with corresponding plasticity indices of nine and 16 percent, respectively. Natural moisture content testing was also performed on all recovered samples. Natural moisture contents range from about four to 29 percent with most values between 18 and 23 percent. Results of natural moisture content and Atterberg limits testing indicate that the on-site soils are typically at a moisture content near to about five percent wet of the plastic limit.

Standard Proctor testing was performed on representative bulk samples of Reclime material obtained from NAS personnel. Maximum dry densities ranged from 128.2 to 131.2 pounds per cubic foot (pcf) with corresponding optimum moistures ranging from 12.6 to 13.5 percent. California Bearing Ratio (CBR) testing was also performed on portions of the same samples and resulted in values of 38.7 and 40.2 at 0.1 inches of penetration. Currently, AEI is performing a 14-day CBR to determine whether a moderate term soaked condition negatively affects the CBR value. Copies of lab testing results are included in Appendix C.

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change

but rather the general area of change from one soil type to another; in-situ, the transition is gradual.

4.3 BEDROCK CONDITIONS

Refusal, as would be indicated by the Driller on the field boring logs, indicates a depth where either essentially no downward progress can be made by the auger or where the N-value indicates essentially no penetration of the split-spoon sampler. It is normally indicative of a very hard or very dense material such as large boulders or the upper bedrock surface. Auger refusal was not encountered in any of the borings at the site prior to encountering the predetermined boring termination depths.

4.4 GROUNDWATER CONDITIONS

Groundwater was not encountered in any of the borings at the site during drilling operations. Generally, the groundwater at this site is slightly higher than the water levels associated with the nearby Ohio River. However, when water levels within the Ohio River fluctuate due to flooding they may exceed the on-site groundwater levels by several feet. During dry periods, when water levels of the Ohio River decrease, they may approach the ground water levels at the site. Groundwater should not be a significant factor in foundation design, as fluctuations in levels may occur due to variations in rainfall, evaporation, construction activities, surface runoff and other site specific factors.

5 ANALYSES AND RECOMMENDATIONS

The recommendations that follow are based on our conceptual understanding of the project. As the site design is advanced, please notify us of any significant design changes so that our recommendations can be reviewed and modified as necessary.

5.1 GENERAL SITE WORK

5.1.1 On-Site Soils

Measured topsoil thicknesses ranged from about four to seven inches. An anticipated topsoil stripping depth likely lies within that range, however thickness of the topsoil horizon will likely vary between the borings. The near-surface soils on this site are low to moderate plasticity clay soils or clay fill that classify as CL in accordance with the USCS. Based on SPT-N and near surface moisture content values obtained during the investigation, it is anticipated that the subgrade in these areas will tend to moderately pump and rut when subjected to typical construction traffic, particularly near the areas of Borings B-3, B-4 and B-5. Once the site is stripped, areas to receive fill should be proofrolled and remediated as necessary as outlined in Section 5.1.4 below. The lateral and vertical extent of areas to receive remediation will be influenced somewhat by seasonal precipitation at the time of construction. Further it is recommended to

perform fill placement during the driest times of the year such as summer to fall seasons.

5.1.2 General Fill Requirements

Any material, whether borrowed on-site or imported to the site, placed as engineered fill on the project site beneath the proposed on-grade structures such as pavement, parking lots, sidewalks, etc., should be an approved material, free of environmental contamination, vegetation, topsoil, organic material, wet soil, construction debris, and rock fragments greater than six inches in diameter. Deeper fills associated with the roadway embankments may include larger diameter rock material, as approved by the Geotechnical Engineer.

We recommend that any borrow material, if needed, consist of granular or lean clay materials or mixtures thereof with Unified Classifications of CL, SC, or GC. We further recommend high plasticity clays, known as fat clays (CH soils) not be *imported* to the site due to their potential for volume changes with fluctuations in moisture content. Rock fill from the project construction should be suitably graded and not contain individual pieces greater than two feet in the greatest dimension.

The preferred off-site borrow material should have a Plasticity Index (PI) less than 20 and a standard Proctor maximum dry density of at least 95 pcf. Engineering classification and standard Proctor tests should be performed on all potential borrow soils and the test results evaluated by an AEI Geotechnical Engineer to evaluate the suitability of the soil for use as engineered fill.

5.1.3 Topsoil Stripping

Prior to earthwork operations, topsoil and surface plant material root mat should be stripped from both cut and fill areas and stockpiled for landscaping purposes.

5.1.4 Subgrade Evaluation/Conditioning

Once the topsoil is removed, areas to receive fill should be “proofrolled” under the observation of an AEI Geotechnical Engineer or Technician to evaluate the subgrade for suitability for fill placement. The proofrolling should be performed using heavy construction equipment such as a fully loaded single or tandem axle dump truck (approximately 20-25 tons), passing repeatedly over the subgrade at a slow rate of speed.

Subgrade soils that are considered unstable after proofrolling should be stabilized by additional compaction or by one or more of the following methods; in-place stabilization using chemical methods (lime/soil cement), removal and replacement with engineered fill, partial depth removal and replacement with a crushed (angular) aggregate layer/

durable shot rock, or partial depth removal and replacement with a geogrid and a crushed aggregate layer. It is also anticipated that the Reclime material, if utilized as fill will have a stabilizing effect on ***moderately*** pumping and rutting clay soils. The specific method of treatment will be based on the conditions present at the time the proof rolling is performed and local availability of materials and economic factors. The selection of the appropriate method to mitigate degrading subgrade soils is dependent on the time of year site work is anticipated, cost, anticipated effectiveness, and scheduling impacts. The AEI Geotechnical Engineer should be contacted to assist in selecting an appropriate method considering all factors.

Once the subgrade is judged to be relatively uniform and suitable for support of engineered fill, fill areas should be brought to design elevations with on-site soil and/or suitable off-site borrow material placed and compacted as specified in Section 5.1.5.

5.1.5 Fill Placement

Suitable fill material placed under areas to receive pavement should be placed in maximum eight inch (loose thickness) horizontal lifts, with each lift being compacted to a minimum of 95 percent of the standard Proctor maximum dry density, at a moisture content within two percent of optimum moisture for compaction. Any granular material utilized as fill at the site such as Reclime may require tighter moisture tolerances in order to achieve compaction and minimize pumping. Wetting or drying of the soils may be necessary to achieve a moisture content suitable for compaction. Representative and adequate field density testing should be performed by AEI to verify that compaction requirements have been met.

5.2 PAVEMENT RECOMMENDATIONS

Based on the traffic counts provided for the semis, the number of ESALs (equivalent 18-kip single axle loads) were estimated above 18 million for a 20 year design life. It is also noted that there will be frequent turning of the semis to stage trailers with trailers potentially sitting loaded in locations for extended periods of time. Based on the high ESALs and usage of the staging lot, it is recommend to use a Portland cement concrete pavement in lieu of asphalt. Additionally, due to the size of the staging lot, it is recommended to utilize Roller Compacted Concrete (RCC) to decrease construction time and costs.

A CBR value of ten was utilized for the Reclime fill material with a corresponding Effective Modulus of Subgrade Reaction (k) of 250 pci. A minimal recommended heavy-duty rigid pavement design would consist of 12 inches or RCC pavement with a 28-day compressive strength of 4,000 psi and a corresponding modulus of rupture (MR) of 650 psi.

5.3 SITE SOIL PRACTICES

Working with the on-site soils will require accepted construction practices and techniques. Some of these include:

- Prevent stripping too far in advance of actual earthwork needs. Problems arise when broad areas of clay/silt mixtures are exposed and allowed to become wet and soft from rainfall. Once saturated, rutting can occur by movement of construction equipment.

- Strip areas to receive fill in small, sequential areas as needed. These areas should be limited to the contractor's abilities to reasonably place and compact fill material.

- Schedule earthwork construction to take full advantage of a summer season. The required moisture range can be difficult to achieve in the winter and early spring when rainfall activity is more prevalent and soil drying is not always possible.

- Maintain good surface drainage during earthwork construction. Grade construction areas on a daily basis if necessary to promote sheet drainage of precipitation and seal all engineered fill placed with a smooth drum steel roller at the end of each day.

- Perform frequent density tests during fill placement to confirm achievement of proper compaction.

- If the project is to begin in the fall and continue through the winter, care must be taken not to place frozen soil, as proper compaction will be impossible. Moisture contents must also be carefully monitored during the winter, as wet soil will be difficult to dry.

5.4 GENERAL CONSIDERATIONS

5.4.1 Construction Monitoring/Testing

Field density and moisture content determinations should be made on each lift of fill with a minimum of one test per every 100 feet of roadway and one test per every 3,000 to 5,000 square feet in parking areas. All construction operations involving earthwork and paving should be performed in the presence of an experienced representative of AEI. The representative would operate under the direct supervision of an AEI Geotechnical Engineer. Some adjustments in the test frequencies may be required

based upon the general fill types, changes in the fill material and soil conditions at the time of placement.

Site problems can be avoided or reduced if proper field observation and testing services are provided. We recommend all proofrolling, site and subgrade preparation, fill placement and pavement construction be monitored by AEI. Density tests should be performed to verify compaction and moisture content for all earthwork operations. Field observations should be performed prior to and during concrete placement operations.

5.4.2 Construction Considerations

Site grading should be maintained during construction so that positive drainage is promoted at all times. Final site grading should be accomplished in such a manner as to divert surface runoff away from paved areas. Maintenance should be performed regularly on paved areas to seal pavement cracks and reduce surface water infiltration into the pavement subgrade.

The surface soils at the site are susceptible to loss of bearing capacity (pumping) by the action of water and construction equipment. Once the subgrade has been stripped, cut to grade and performed adequately during proof-rolling, it should be sealed at the end of each filling day with a smooth drum roller and sloped to sheet drain rainwater. Any material disturbed by rainwater and construction operations should be undercut prior to placing the next lift of fill.

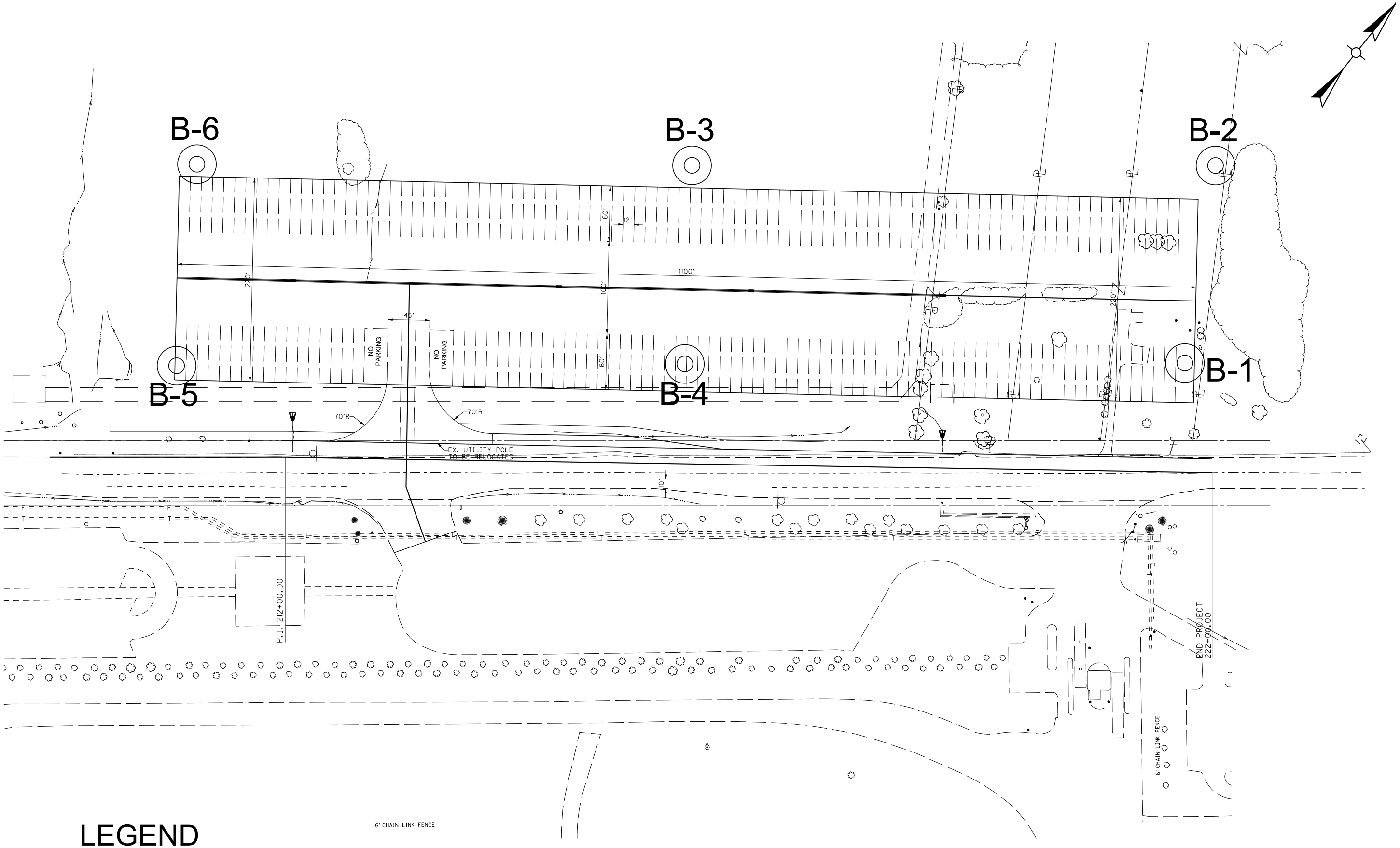
5.4.3 Limitations

The conclusions and recommendations presented herein are based on information gathered from the borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between the borings.

We will retain samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the cover of this report. After this period, the samples will be discarded unless otherwise requested.

APPENDIX A

Boring Layout



LEGEND

◎ SOIL TEST BORING WITH STANDARD PENETRATION TESTS

CARROLL COUNTY
FD04 SPP 021 0042 009-014

NO.	DATE	REVISIONS DESCRIPTION

BORING LAYOUT

CLIENT: North American Stainless

PROJECT: NAS Trailer Staging Lot Ghent, KY

PLANS PREPARED AND SUBMITTED BY:
GEOTECHNICAL CONSULTANT
AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING
AND TESTING
Glasgow, KY 42141
(270) 678-5111
Branch Offices
2500 Nelson Miller Parkway, Louisville, KY 40223 (502) 245-3813
1034 Wright Circle, Suite 101, Florence, KY 41042 (770) 425-9422
www.aei.cc

SCALE: 1"=100'

DATE: 5-12-15

DRAWN BY: J. CHILDRESS

CHECKED BY: D. BARRETT

FILE: T:/15 Projects/215-066/ Geotech/NAS STAGING BOR Layout.dgn

SHEET: B1

ADDED ADDENDUM #1: 5-16-16

APPENDIX B

Boring Logs

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

COHESIVE SOILS
(Clay, Silt, and Mixtures)

CONSISTENCY	SPT N-VALUE	Qu/Qp (tsf)
Very Soft	2 blows/ft or less	0 – 0.25
Soft	2 to 4 blows/ft	0.25 – 0.49
Medium Stiff	4 to 8 blows/ft	0.50 – 0.99
Stiff	8 to 15 blows/ft	1.00 – 2.00
Very Stiff	15 to 30 blows/ft	2.00 – 4.00
Hard	30 blows/ft or more	> 4.00

PLASTICITY

Degree of Plasticity	Plasticity Index (PI)
Low	0 – 7
Medium	8 – 22
High	over 22

NON-COHESIVE SOILS
(Silt, Sand, Gravel, and Mixtures)

DENSITY	SPT N-VALUE
Very Loose	4 blows/ft or less
Loose	4 to 10 blows/ft
Medium Dense	10 to 30 blows/ft
Dense	30 to 50 blows/ft
Very Dense	50 blows/ft or more

PARTICLE SIZE IDENTIFICATION

Boulders	12 inch diameter or more
Cobbles	3 to 12 inch diameter
Gravel	Coarse – 1 to 3 inch
	Medium – ½ to 1 inch
	Fine – ¼ to ½ inch
Sand	Coarse – 0.6mm to ¼ inch
	Medium – 0.2mm to 0.6mm
	Fine – 0.05mm to 0.2mm
Silt	0.05mm to 0.005mm
Clay	0.005mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 – 10
Trace to Some	11 – 20
Some	21 – 35
And	36 – 50

NOTES

Classification – The Unified Soil Classification System is used to identify soil unless otherwise noted.

Standard "N" Penetration Test (SPT) (ASTM D1586) – Driving a 2-inch O.D., 1 3/8-inch I.D. sampler a distance of 1 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6-inches to seat the sampler into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the field drill long (e.g., 10/8/7). On the report log, the Standard Penetration Test result (i.e., the N value) is normally presented and consists of the sum of the 2nd and 3rd penetration counts (i.e., N = 8 + 7 = 15 blows/ft.)

Soil Property Symbols

Qu:	Unconfined Compressive Strength	N:	Standard Penetration Value (see above)
Qp:	Unconfined Comp. Strength (pocket pent.)	omc:	Optimum Moisture content
LL:	Liquid Limit, % (Atterberg Limit)	PL:	Plastic Limit, % (Atterberg Limit)
PI:	Plasticity Index	mdd:	Maximum Dry Density

FIELD TESTING PROCEDURES

The general field procedures employed by the Field Services Center are summarized in the following outline. The procedures utilized by the AEI Field Service Center are recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Soil Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the surface conditions. Borings are advanced into the ground using continuous flight augers. At prescribed intervals throughout the boring depths, soil samples are obtained with a split-spoon or thin-walled sampler and sealed in airtight glass jars and labeled. The sampler is first seated 6 inches to penetrate loose cuttings and then driven an additional foot, where possible, with blows from a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler each six-inch increment is recorded. The penetration resistance, or "N-value" is designated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. The split spoon sampling procedures used during the exploration are in general accordance with ASTM D 1586. Split spoon samples are considered to provide *disturbed* samples, yet are appropriate for most engineering applications. Thin-walled (Shelby tube) samples are considered to provide *undisturbed* samples and obtained when warranted in general accordance with ASTM D 1587.

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Core Drilling Procedures for use on refusal materials. Prior to coring, casing is set in the boring through the overburden soils. Refusal materials are then cored according to ASTM D-2113 using a diamond bit attached to the end of a hollow double tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Samples of the material penetrated are protected and retained in the inner tube, which is retrieved at the end of each drill run. Upon retrieval of the inner tube the core is recovered, measured and placed in boxes for storage.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soil in general accordance with the procedures outlined in ASTM D 2487 and D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

Representative portions of soil samples are placed in sealed containers and transported to the laboratory. In the laboratory, the samples are examined to verify the driller's field classifications. Test Boring Records are attached which show the soil descriptions and penetration resistances.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designate the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using as electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Sampling Terminology

Undisturbed Sampling: Thin-walled or Shelby tube samples used for visual examination, classification tests and quantitative laboratory testing. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airtight and transported to the laboratory. Locations and depths of undisturbed samples are shown on the "Boring Logs."

Bag Sampling: Bulk samples of soil are obtained at selected locations. These samples consist of soil brought to the surface by the drilling augers, or obtained from test pits or the ground surface using hand tools. Samples are placed in bags, with sealed jar samples of the material, and taken to our laboratory for testing where more mass material is required (i.e. Proctors and CBR's). The locations of these samples are indicated on the appropriate logs, or on the Boring Location Plan.

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PAGE 1 OF 1

CLIENT North American Stainless
PROJECT NAME NAS Trailer Staging Lot
PROJECT NUMBER 215-066
PROJECT LOCATION Ghent, KY
DATE STARTED 3/2/15 **COMPLETED** 3/2/15
GROUND ELEVATION
DRILLER Adam Thompson
GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)									
		(CL) lean CLAY with sand, brown, stiff, moist to wet	SPT 1	87	3-4-5 (9)	2.0	21	27	18	9	
5			SPT 2	100	3-5-5 (10)	1.0	23				
		(SM) silty SAND, fine grained, brown, wet, loose	SPT 3	100	3-2-3 (5)		18				
10			SPT 4	87	2-2-2 (4)		19				
		Bottom of borehole at 11.0 feet.									

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 3/17/15 14:02 - T:\15 PROJECTS\215-066 NAS STAGING LOT\GEOTECH\215-066 NAS STAGING LOT.GPJ

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CLIENT North American Stainless
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GROUND WATER LEVELS:
DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (5 inches)	SPT 1	100	3-5-5 (10)	1.0	16				
		(CL) silty lean CLAY with sand, brown, stiff, wet									
5			SPT 2	67	3-4-5 (9)	2.25	21				
		Bottom of borehole at 5.0 feet.									

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PAGE 1 OF 1

CLIENT North American Stainless
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DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (7 inches)									
		(CL) silty lean CLAY with sand, brown, medium stiff to stiff, wet	SPT 1	80	3-3-5 (8)	2.0	20				
			SPT 2	87	2-3-4 (7)	1.5	22				
5			SPT 3	87	2-4-7 (11)	1.5	23				
10		(GW) GRAVEL with sand	SPT 4	80	6-9-12 (21)		4				

Bottom of borehole at 11.0 feet.

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DRILLING METHOD Hollow-stem augers
AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (7 inches)									
		(CL) silty lean CLAY with sand, brown with gray mottle, medium stiff to very stiff, moist to wet	SPT 1	100	3-3-5 (8)	2.5	23				
5			SPT 2	87	4-7-10 (17)	4.0	26	37	21	16	
			SPT 3	100	4-7-8 (15)	3.0	18				
10			SPT 4	100	3-4-6 (10)	3.5	20				
		Bottom of borehole at 11.0 feet.									

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AT TIME OF DRILLING ---
LOGGED BY Mitchell Read **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (4 inches)	SPT 1	73	2-2-4 (6)	1.5	29				
		(CL) silty lean CLAY, trace fine sand, brown, medium stiff to stiff, moist to wet									
5			SPT 2	100	2-3-5 (8)	2.0	23				
		Bottom of borehole at 5.0 feet.									

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CLIENT North American Stainless
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NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)									
		(CL) silty lean CLAY, trace to some fine sand, brown, wet, stiff to very stiff	SPT 1	73	4-6-8 (14)	4.0	22				
5			SPT 2	80	1-7-10 (17)	4.5+	20				
			SPT 3	100	5-7-10 (17)	4.5+	22				
10			SPT 4	100	4-4-7 (11)	3.5	22				
		Bottom of borehole at 11.0 feet.									

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KEY TO SYMBOLS

CLIENT North American Stainless **PROJECT NAME** NAS Trailer Staging Lot

PROJECT NUMBER 215-066 **PROJECT LOCATION** Ghent, KY

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- CL: USCS Low Plasticity Clay
- GW: USCS Well-graded Gravel
- SM: USCS Silty Sand
- TOPSOIL: Topsoil

SAMPLER SYMBOLS

- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

APPENDIX C

Laboratory Testing Results

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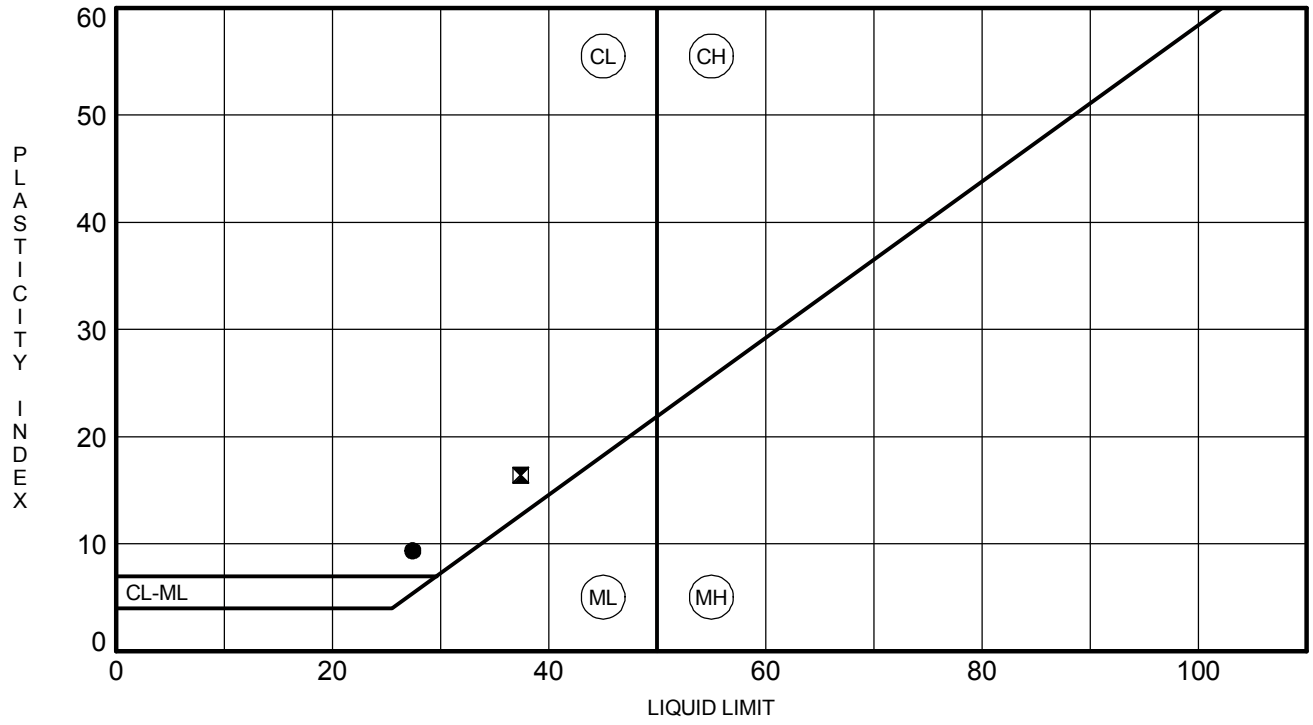
ATTERBERG LIMITS RESULTS

CLIENT North American Stainless **PROJECT NAME** NAS Trailer Staging Lot

PROJECT NUMBER 215-066 **PROJECT LOCATION** Ghent, KY



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**2.0**	**27**	**18**	**9**		**lean brown CLAY**
⊠	**B-4**	**4.0**	**37**	**21**	**16**		**lean brown CLAY**

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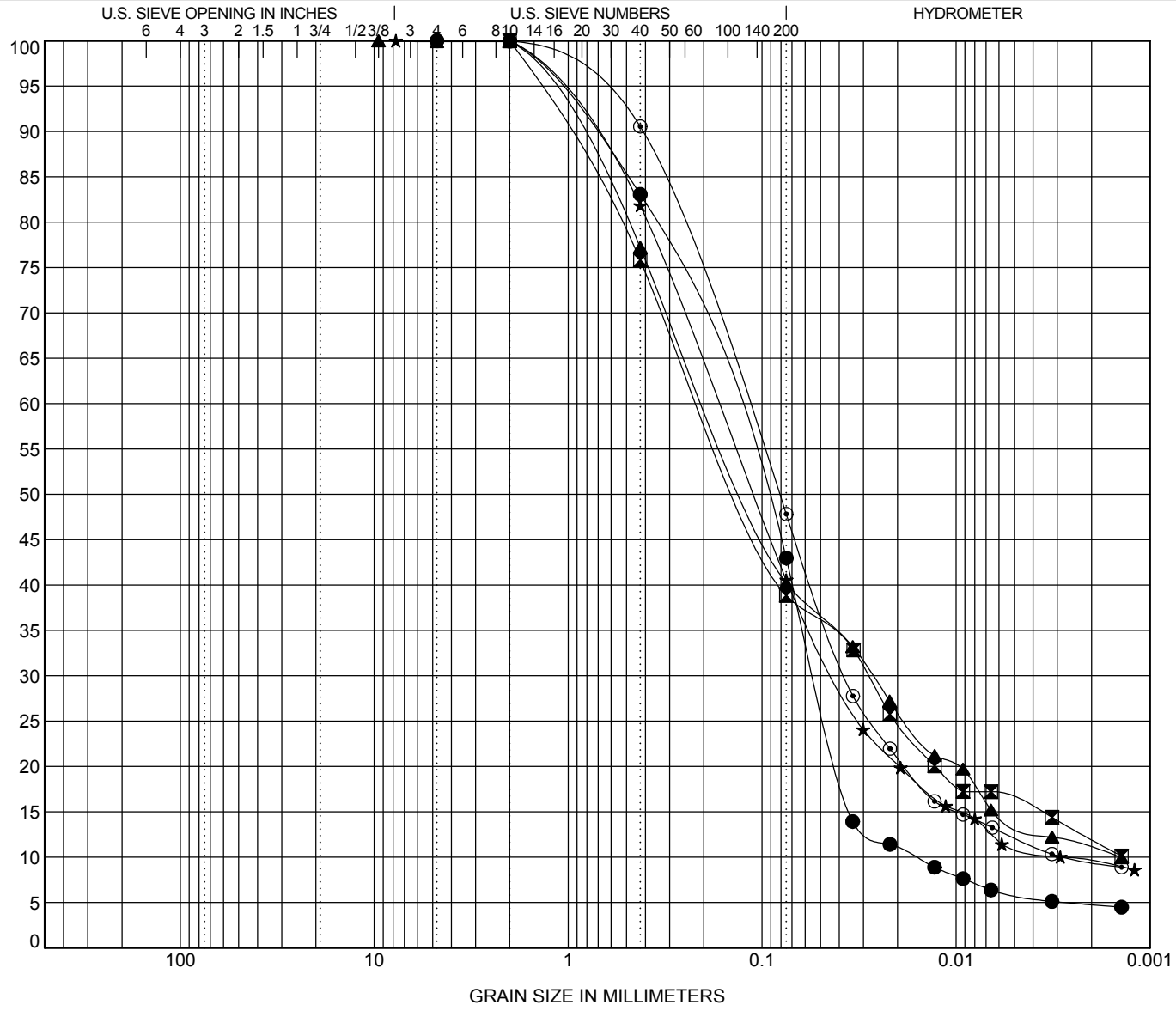
GRAIN SIZE DISTRIBUTION

CLIENT North American Stainless **PROJECT NAME** NAS Trailer Staging Lot

PROJECT NUMBER 215-066 **PROJECT LOCATION** Ghent, KY



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**Reclime 1**	**0.0**	**Reclime**				**1.09**	**9.61**
⊠	**Reclime 2**	**0.0**	**Reclime**					
▲	**Reclime 3**	**0.0**	**Reclime**				**2.69**	**132.70**
★	**RecLime 101**	**0.0**	**SILTY SAND(SM)**	**NP**	**NP**	**NP**	**3.57**	**58.97**
⊙	**RecLime 102**	**0.0**	**SILTY SAND(SM)**	**NP**	**NP**	**NP**	**4.26**	**46.67**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**Reclime 1**	**0.0**	**4.75**	**0.157**	**0.053**	**0.016**	**0.0**	**57.0**	**37.1**	**5.9**
⊠	**Reclime 2**	**0.0**	**2**	**0.202**	**0.028**		**0.0**	**61.1**	**22.7**	**16.1**
▲	**Reclime 3**	**0.0**	**9.5**	**0.189**	**0.027**	**0.001**	**0.1**	**59.7**	**26.2**	**14.1**
★	**RecLime 101**	**0.0**	**7.75**	**0.17**	**0.042**	**0.003**	**0.0**	**59.4**	**29.4**	**11.1**
⊙	**RecLime 102**	**0.0**	**4.75**	**0.123**	**0.037**	**0.003**	**0.0**	**52.2**	**35.7**	**12.2**

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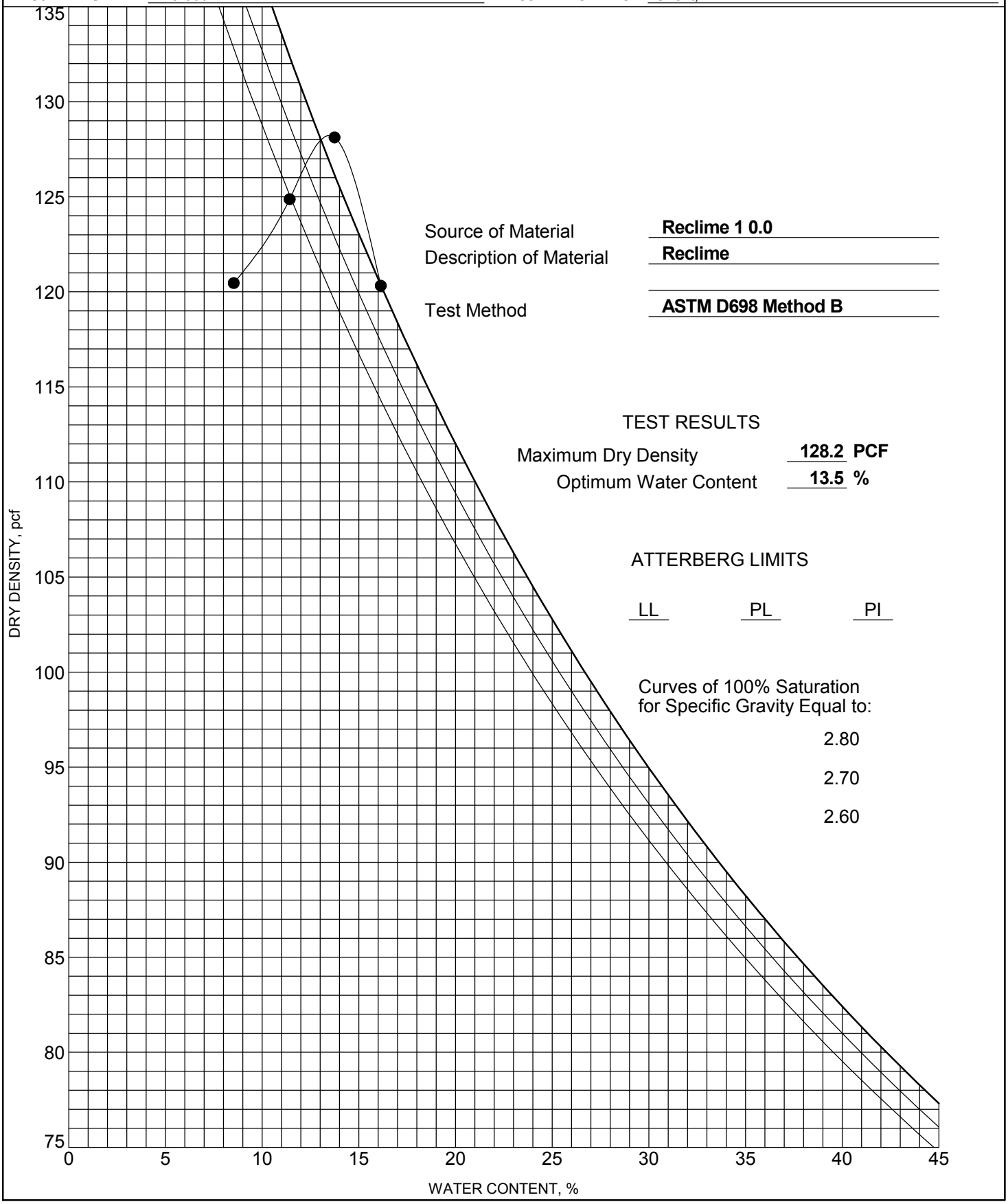
MOISTURE-DENSITY RELATIONSHIP

CLIENT North American Stainless
PROJECT NAME NAS Trailer Staging Lot
PROJECT NUMBER 215-066
PROJECT LOCATION Ghent, KY



Source of Material **Reclime 1 0.0**
Description of Material **Reclime**

Test Method **ASTM D698 Method B**

TEST RESULTS

Maximum Dry Density **128.2** **PCF**
Optimum Water Content **13.5** **%**

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

COMPACTION - GINT STD US LAB.GDT - 5/22/15 11:36 - T:\15 PROJECTS\215-066 NAS STAGING LOT\GEOTECH\REPORTS\215-066 NAS STAGING LOT.GPJ

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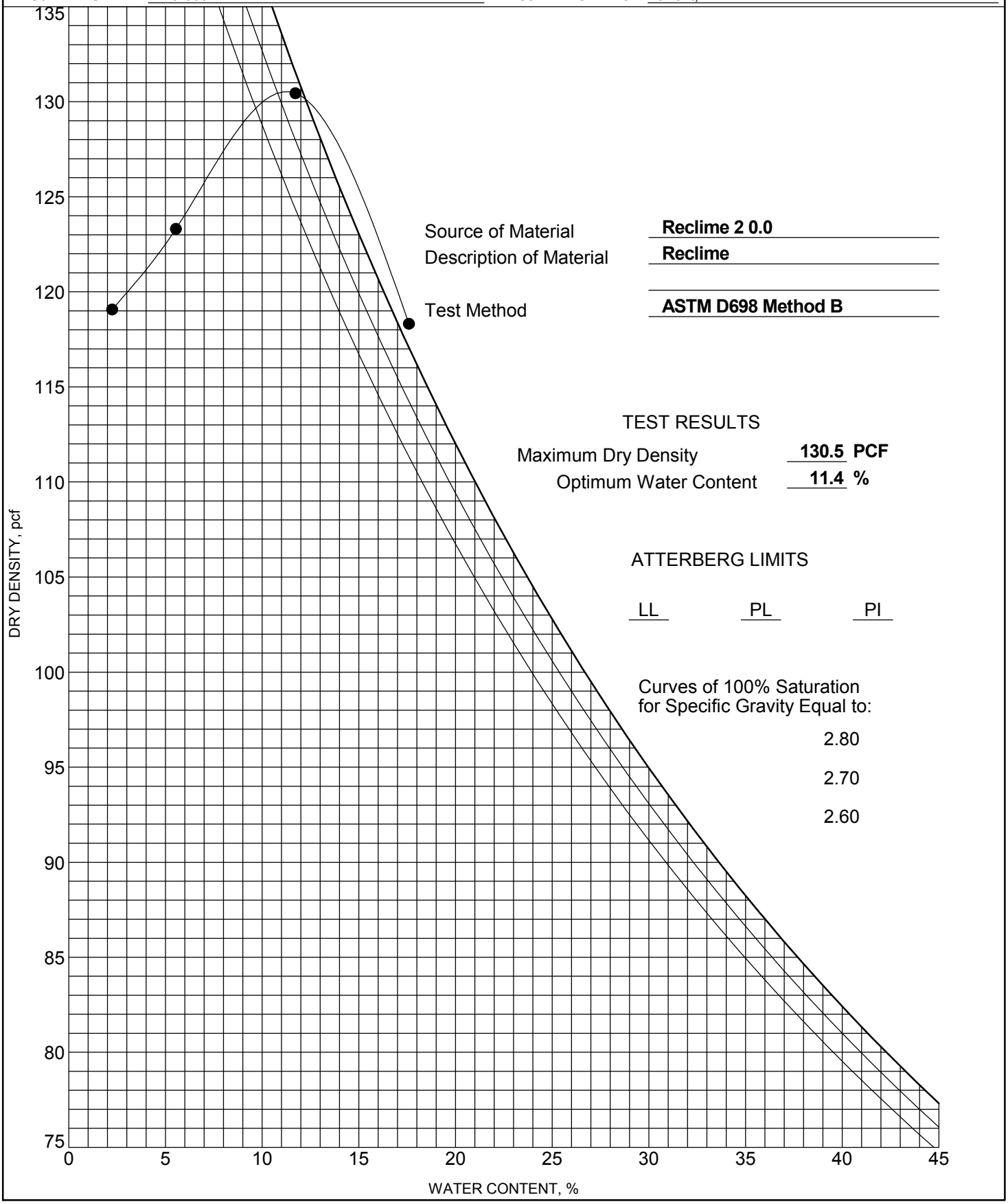
MOISTURE-DENSITY RELATIONSHIP

CLIENT North American Stainless **PROJECT NAME** NAS Trailer Staging Lot

PROJECT NUMBER 215-066 **PROJECT LOCATION** Ghent, KY



Source of Material **Reclime 2 0.0**

Description of Material **Reclime**

Test Method **ASTM D698 Method B**

TEST RESULTS

Maximum Dry Density **130.5** **PCF**

Optimum Water Content **11.4** **%**

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 5/22/15 16:34 - T:\15 PROJECTS\215-066 NAS STAGING LOT\GEOTECH\REPORTS\215-066 NAS STAGING LOT.GPJ

Your Geotechnical Engineering Report

To help manage your risks, this information is being provided because subsurface issues are a major cause of construction delays, cost overruns, disputes, and claims.

Geotechnical Services are Performed for Specific Projects, Purposes, and People

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering exploration conducted for an engineer may not fulfill the needs of a contractor or even another engineer. Each geotechnical engineering exploration and report is unique and is prepared solely for the client. No one except the client should rely on the geotechnical engineering report without first consulting with the geotechnical engineer who prepared it. The report should not be applied for any project or purpose except the one originally intended.

Read the Entire Report

To avoid serious problems, the full geotechnical engineering report should be read in its entirety. Do not only read selected sections or the executive summary.

A Unique Set of Project-Specific Factors is the Basis for a Geotechnical Engineering Report

Geotechnical engineers consider a numerous unique, project-specific factors when determining the scope of a study. Typical factors include: the client's goals, objectives, project costs, risk management preferences, proposed structures, structures on site, topography, and other proposed or existing site improvements, such as access roads, parking lots, and utilities. Unless indicated otherwise by the geotechnical engineer who conducted the original exploration, a geotechnical engineering report should not be relied upon if it was:

- not prepared for you or your project,
- not prepared for the specific site explored, or
- completed before important changes to the project were implemented.

Typical changes that can lessen the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a multi-story hotel to a parking lot
- finished floor elevation, location, orientation, or weight of the proposed structure, anticipated loads or
- project ownership

Geotechnical engineers cannot be held liable or responsible for issues that occur because their report did not take into account development items of which they were not informed. The geotechnical engineer should always be notified of any project changes. Upon notification, it should be requested of the geotechnical engineer to give an assessment of the impact of the project changes.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that exist at the time of the exploration. A geotechnical engineering report should not be relied upon if its reliability could be in question due to factors such as man-made events as construction on or adjacent to the site, natural events such as floods, earthquakes, or groundwater fluctuation, or time. To determine if a geotechnical report is still reliable, contact the geotechnical engineer. Major problems could be avoided by performing a minimal amount of additional analysis and/or testing.

Most Geotechnical Findings are Professional Opinions

Geotechnical site explorations identify subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field logs and laboratory data and apply their professional judgment to make conclusions about the subsurface conditions throughout the site. Actual subsurface conditions may differ from those indicated in the report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risk associated with unanticipated conditions.

The Recommendations within a Report Are Not Final

Do not put too much faith on the construction recommendations included in the report. The recommendations are not final due to geotechnical engineers developing them principally from judgment and opinion. Only by observing actual subsurface conditions revealed during construction can geotechnical engineers finalize their recommendations. Responsibility and liability cannot be assumed for the recommendations

within the report by the geotechnical engineer who developed the report if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject To Misinterpretation

Misinterpretation of geotechnical engineering reports has resulted in costly problems. The risk of misinterpretation can be lowered after the submittal of the final report by having the geotechnical engineer consult with appropriate members of the design team. The geotechnical engineer could also be retained to review crucial parts of the plans and specifications put together by the design team. The geotechnical engineering report can also be misinterpreted by contractors which can result in many problems. By participating in pre-bid and preconstruction meetings and providing construction observations by the geotechnical engineer, many risks can be reduced.

Final Boring Logs Should not be Re-drawn

Geotechnical engineers prepare final boring logs and testing results based on field logs and laboratory data. The logs included in a final geotechnical engineering report should never be redrawn to be included in architectural or design drawings due to errors that could be made. Electronic reproduction is acceptable, along with photographic reproduction, but it should be understood that separating logs from the report can elevate risk.

Contractors Need a Complete Report and Guidance

By limiting what is provided for bid preparation, contractors are not liable for unforeseen subsurface conditions although some owners and design professionals believe the opposite to be true. The complete geotechnical engineering report, accompanied with a cover letter or transmittal, should be provided to contractors to help prevent costly problems. The letter states that the report was not prepared for purposes of bid development and the report's accuracy is limited. Although a fee may be required, encourage the contractors to consult with the geotechnical engineer who prepared the report and/or to conduct additional studies to obtain the specific types of information they need or prefer. A prebid conference involving the owner, geotechnical engineer, and contractors can prove to be very valuable. If needed, allow contractors sufficient time to perform additional studies. Upon doing this you might be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Closely Read Responsibility Provisions

Geotechnical engineering is not as exact as other engineering disciplines. This lack of understanding by clients, design professionals, and contractors has created unrealistic expectations that have led to disappointments, claims, and disputes. To minimize such risks, a variety of explanatory provisions may be included in the report by the geotechnical engineer. To help others recognize their own responsibilities and risks, many of these provisions indicate where the geotechnical engineer's responsibilities begin and end. These provisions should be read carefully, questions asked if needed, and the geotechnical engineer should provide satisfactory responses.

Environmental Issues/Concerns are not Covered

Unforeseen environmental issues can lead to project delays or even failures. Geotechnical engineering reports do not usually include environmental findings, conclusions, or recommendations. As with a geotechnical engineering report, do not rely on an environmental report that was prepared for someone else.

AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING

65 Aberdeen Drive
Glasgow, KY 42141
270-651-7220

161234

PROPOSAL BID ITEMS

Report Date 5/16/16

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	24,578.00	TON		$	
0020	00020		TRAFFIC BOUND BASE	230.00	TON		$	
0030	00100		ASPHALT SEAL AGGREGATE	125.00	TON		$	
0040	00103		ASPHALT SEAL COAT	15.00	TON		$	
0050	00190		LEVELING & WEDGING PG64-22	16,842.00	TON		$	
0060	00214		CL3 ASPH BASE 1.00D PG64-22	36,540.00	TON		$	
0070	00388		CL3 ASPH SURF 0.38B PG64-22 (REVISED: 5-16-16)	9,100.00	TON		$	
0080	02070		JPC PAVEMENT-12 IN	1,119.00	SQYD		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0110	00078		CRUSHED AGGREGATE SIZE NO 2	2,850.00	TON		$	
0120	01810		STANDARD CURB AND GUTTER	51.00	LF		$	
0130	01820		LIP CURB AND GUTTER	3,459.00	LF		$	
0140	01987		DELINEATOR FOR GUARDRAIL BI DIRECTIONAL WHITE	42.00	EACH		$	
0150	02014		BARRICADE-TYPE III	12.00	EACH		$	
0160	02091		REMOVE PAVEMENT	6,361.00	SQYD		$	
0170	02159		TEMP DITCH	1,000.00	LF		$	
0180	02160		CLEAN TEMP DITCH	500.00	LF		$	
0190	02230		EMBANKMENT IN PLACE	86,561.00	CUYD		$	
0200	02242		WATER	150.00	MGAL		$	
0210	02351		GUARDRAIL-STEEL W BEAM-S FACE	2,062.50	LF		$	
0220	02360		GUARDRAIL TERMINAL SECTION NO 1	1.00	EACH		$	
0230	02363		GUARDRAIL CONNECTOR TO BRIDGE END TY A	4.00	EACH		$	
0240	02373		GUARDRAIL END TREATMENT TYPE 3	1.00	EACH		$	
0250	02381		REMOVE GUARDRAIL	1,993.00	LF		$	
0260	02391		GUARDRAIL END TREATMENT TYPE 4A	4.00	EACH		$	
0270	02429		RIGHT-OF-WAY MONUMENT TYPE 1	39.00	EACH		$	
0280	02432		WITNESS POST	39.00	EACH		$	
0290	02484		CHANNEL LINING CLASS III	662.20	TON		$	
0300	02545		CLEARING AND GRUBBING (APPROXIMATELY 37.4 ACRES)	1.00	LS		$	
0310	02562		TEMPORARY SIGNS	500.00	SQFT		$	
0320	02565		OBJECT MARKER TYPE 2	2.00	EACH		$	
0330	02585		EDGE KEY	13.00	LF		$	
0340	02599		FABRIC-GEOTEXTILE TYPE IV	21,240.00	SQYD		$	
0350	02600		FABRIC GEOTEXTILE TY IV FOR PIPE	27,300.00	SQYD	$2.00	$	$54,600.00
0360	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0370	02671		PORTABLE CHANGEABLE MESSAGE SIGN	2.00	EACH		$	
0380	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		$	
0390	02677		ASPHALT PAVE MILLING & TEXTURING	177.00	TON		$	
0400	02690		SAFELOADING	14.00	CUYD		$	
0410	02696		SHOULDER RUMBLE STRIPS-SAWED	28,300.00	LF		$	

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PROPOSAL BID ITEMS

Report Date 5/16/16

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0420	02701		TEMP SILT FENCE	7,275.00	LF		$	
0430	02703		SILT TRAP TYPE A	5.00	EACH		$	
0440	02704		SILT TRAP TYPE B	60.00	EACH		$	
0450	02705		SILT TRAP TYPE C	75.00	EACH		$	
0460	02706		CLEAN SILT TRAP TYPE A	5.00	EACH		$	
0470	02707		CLEAN SILT TRAP TYPE B	60.00	EACH		$	
0480	02708		CLEAN SILT TRAP TYPE C	75.00	EACH		$	
0490	02726		STAKING	1.00	LS		$	
0500	02731		REMOVE STRUCTURE	1.00	LS		$	
0510	02775		ARROW PANEL	2.00	EACH		$	
0520	03171		CONCRETE BARRIER WALL TYPE 9T	480.00	LF		$	
0530	03262		CLEAN PIPE STRUCTURE	6.00	EACH		$	
0540	05950		EROSION CONTROL BLANKET	7,408.00	SQYD		$	
0550	05952		TEMP MULCH	42,709.00	SQYD		$	
0560	05953		TEMP SEEDING AND PROTECTION	32,064.00	SQYD		$	
0570	05963		INITIAL FERTILIZER	2.00	TON		$	
0580	05964		20-10-10 FERTILIZER	3.30	TON		$	
0590	05985		SEEDING AND PROTECTION	64,127.00	SQYD		$	
0600	05989		SPECIAL SEEDING CROWN VETCH	4,067.00	SQYD		$	
0610	05992		AGRICULTURAL LIMESTONE	40.00	TON		$	
0620	06510		PAVE STRIPING-TEMP PAINT-4 IN	128,444.00	LF		$	
0630	06514		PAVE STRIPING-PERM PAINT-4 IN (QTY IS A SUM OF WHITE & YELLOW)	73,777.00	LF		$	
0640	06550		PAVE STRIPING-TEMP REM TAPE-W	3,032.00	LF		$	
0650	06551		PAVE STRIPING-TEMP REM TAPE-Y	3,079.00	LF		$	
0660	06574		PAVE MARKING-THERMO CURV ARROW	84.00	EACH		$	
0670	06578		PAVE MARKING-THERMO MERGE ARROW	2.00	EACH		$	
0680	08903		CRASH CUSHION TY VI CLASS BT TL3	2.00	EACH		$	
0690	10020NS		FUEL ADJUSTMENT	104,729.00	DOLL	$1.00	$	$104,729.00
0700	10030NS		ASPHALT ADJUSTMENT	149,090.00	DOLL	$1.00	$	$149,090.00
0710	20209EP69		GRANULAR PILE CORE	180.00	CUYD		$	
0720	20757ED		PAVEMENT REPAIR	670.00	SQYD		$	
0730	22664EN		WATER BLASTING EXISTING STRIPE	56,497.00	LF		$	
0740	23274EN11F		TURF REINFORCEMENT MAT 1	2,631.00	SQYD		$	
0750	24489EC		INLAID PAVEMENT MARKER	855.00	EACH		$	

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0760	00440		ENTRANCE PIPE-15 IN	252.00	LF		$	
0770	00441		ENTRANCE PIPE-18 IN	150.00	LF		$	
0780	00462		CULVERT PIPE-18 IN	645.00	LF		$	
0790	00464		CULVERT PIPE-24 IN	86.00	LF		$	
0800	00521		STORM SEWER PIPE-15 IN	148.00	LF		$	
0810	00522		STORM SEWER PIPE-18 IN	566.00	LF		$	
0820	00524		STORM SEWER PIPE-24 IN	695.00	LF		$	
0830	00526		STORM SEWER PIPE-30 IN	944.00	LF		$	
0840	00528		STORM SEWER PIPE-36 IN	459.00	LF		$	
0850	00529		STORM SEWER PIPE-42 IN	830.00	LF		$	

PROPOSAL BID ITEMS

Report Date 5/16/16

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0860	00530		STORM SEWER PIPE-48 IN	577.00	LF		$	
0870	01000		PERFORATED PIPE-4 IN	77.00	LF		$	
0880	01010		NON-PERFORATED PIPE-4 IN	30.00	LF		$	
0890	01032		PERF PIPE HEADWALL TY 4-4 IN	2.00	EACH		$	
0900	01204		PIPE CULVERT HEADWALL-18 IN	7.00	EACH		$	
0910	01216		PIPE CULVERT HEADWALL-48 IN	1.00	EACH		$	
0920	01450		S & F BOX INLET-OUTLET-18 IN	18.00	EACH		$	
0930	01451		S & F BOX INLET-OUTLET-24 IN	2.00	EACH		$	
0940	01480		CURB BOX INLET TYPE B	26.00	EACH		$	
0950	01490		DROP BOX INLET TYPE 1	1.00	EACH		$	
0960	01545		DROP BOX INLET TYPE 11 MOD	1.00	EACH		$	
0970	01650		JUNCTION BOX	9.00	EACH		$	
0980	01720		RECONSTRUCT INLET	1.00	EACH		$	
0990	01767		MANHOLE TYPE C	2.00	EACH		$	
1000	08100		CONCRETE-CLASS A	1.07	CUYD		$	
1010	23952EC		DRAINAGE JUNCTION BOX TY B	1.00	EACH		$	

Section: 0004 - BRIDGE - NAS HAUL ROAD - DWG. 27336

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1020	00003		CRUSHED STONE BASE	53.00	TON		$	
1030	00100		ASPHALT SEAL AGGREGATE	21.00	TON		$	
1040	00103		ASPHALT SEAL COAT	3.00	TON		$	
1050	00214		CL3 ASPH BASE 1.00D PG64-22	95.00	TON		$	
1060	00312		CL3 ASPH SURF 0.50D PG64-22	45.00	TON		$	
1070	00462		CULVERT PIPE-18 IN	222.00	LF		$	
1080	01480		CURB BOX INLET TYPE B	2.00	EACH		$	
1090	01544		DROP BOX INLET TYPE 11	1.00	EACH		$	
1100	01830		STANDARD INTEGRAL CURB	599.00	LF		$	
1110	02203		STRUCTURE EXCAV-UNCLASSIFIED	14.00	CUYD		$	
1120	02355		GUARDRAIL-STEEL W BEAM-S FACE A	775.00	LF		$	
1130	02360		GUARDRAIL TERMINAL SECTION NO 1	3.00	EACH		$	
1140	02363		GUARDRAIL CONNECTOR TO BRIDGE END TY A	3.00	EACH		$	
1150	02585		EDGE KEY	20.00	LF		$	
1160	02611		HANDRAIL-TYPE A-1	38.00	LF		$	
1170	02720		SIDEWALK-4 IN CONCRETE	349.00	SQYD		$	
1180	02998		MASONRY COATING	2,167.40	SQYD		$	
1190	03299		ARMORED EDGE FOR CONCRETE	66.00	LF		$	
1200	05997		TOPSOIL FURNISHED AND PLACED	691.00	CUYD		$	
1210	08001		STRUCTURE EXCAVATION-COMMON	1,219.00	CUYD		$	
1220	08018		RETAINING WALL	1,643.00	SQFT		$	
1230	08018		RETAINING WALL (GRAVITY RETAINING WALL - SEE PLANS)	152.00	SQFT		$	
1240	08019		CYCLOPEAN STONE RIP RAP	2,320.00	TON		$	
1250	08033		TEST PILES	164.00	LF		$	
1260	08100		CONCRETE-CLASS A	971.10	CUYD		$	
1270	08104		CONCRETE-CLASS AA	269.00	CUYD		$	
1280	08141		MECHANICAL REINF COUPLER #6 EPOXY COATED	474.00	EACH		$	

PROPOSAL BID ITEMS

Report Date 5/16/16

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1290	08150		STEEL REINFORCEMENT	123,743.00	LB		$	
1300	23233EC		DYNAMIC PILE TESTING	4.00	EACH		$	
1310	23546EC		PIPE PILE-18 IN	3,820.30	LF		$	
1320	23964EC		PROTECTIVE FENCE	189.00	LF		$	
1330	24042EC		INSIDE FIT SNUB NOSE CONICAL POINT-18 IN	55.00	EACH		$	
1340	24112EC		STEEL REINFORCEMENT STAINLESS STEEL	57,087.00	LB		$	
1350	24451EC		CONCRETE (CL AA, CL A & PRESTRESSED GIRDER, SEE PLAN NOTE)	1,390.00	CUYD		$	
1360	24463ED		PPC I-BEAM HN 54 49	547.50	LF		$	
1370	24596EN		GRANULAR BACKFILL	6,332.00	CUYD		$	
1380	24701ED		CORED HOLE IN DRAINAGE PIPE	1.00	EACH		$	
1390	40023		KYTC S&F HEADWALL-18 IN	2.00	EACH		$	

Section: 0005 - BRIDGE - MCCOOL'S CREEK - DWG. 27171

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1400	02231		STRUCTURE GRANULAR BACKFILL	194.00	CUYD		$	
1410	02998		MASONRY COATING	517.00	SQYD		$	
1420	03299		ARMORED EDGE FOR CONCRETE	112.00	LF		$	
1430	08001		STRUCTURE EXCAVATION-COMMON	1,088.00	CUYD		$	
1440	08019		CYCLOPEAN STONE RIP RAP	3,786.00	TON		$	
1450	08033		TEST PILES	244.00	LF		$	
1460	08100		CONCRETE-CLASS A	292.00	CUYD		$	
1470	08104		CONCRETE-CLASS AA	431.40	CUYD		$	
1480	08130		MECHANICAL REINF COUPLER #5	28.00	EACH		$	
1490	08133		MECHANICAL REINF COUPLER #8	16.00	EACH		$	
1500	08134		MECHANICAL REINF COUPLER #9	12.00	EACH		$	
1510	08135		MECHANICAL REINF COUPLER #10	12.00	EACH		$	
1520	08140		MECHANICAL REINF COUPLER #5 EPOXY COATED	989.00	EACH		$	
1530	08150		STEEL REINFORCEMENT	43,380.00	LB		$	
1540	08151		STEEL REINFORCEMENT-EPOXY COATED	108,266.00	LB		$	
1550	08633		PRECAST PC I BEAM TYPE 3	1,549.30	LF		$	
1560	21532ED		RAIL SYSTEM TYPE III	450.00	LF		$	
1570	23546EC		PIPE PILE-18 IN	2,670.00	LF		$	
1580	24042EC		INSIDE FIT SNUB NOSE CONICAL POINT-18 IN	54.00	EACH		$	

Section: 0006 - UTILITY - GASLINE RELOCATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1590	16000		G DIRECTIONAL BORE	300.00	LF		$	
1600	16014		G MAIN POINT RELOCATE (6-IN GAS LOWERING W/ TEMP BYPASS)	2.00	EACH		$	
1610	16025		G PIPE STEEL 04 INCH	124.00	LF		$	
1620	16026		G PIPE STEEL 06 INCH	60.00	LF		$	
1630	16028		G PIPE STEEL 10 INCH	10,511.00	LF		$	

161234

PROPOSAL BID ITEMS

Report Date 5/16/16

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1640	16031		G SERVICE LONG SIDE 1 OR 1-1/4 INCH	1.00	EACH		$	
1650	16033		G SERVICE LONG SIDE 2 INCH	1.00	EACH		$	
1660	16034		G SERVICE LONG SIDE 3/4 INCH	2.00	EACH		$	
1670	16036		G SERVICE SHORT SIDE 1 OR 1-1/4 INCH	1.00	EACH		$	
1680	16038		G SERVICE SHORT SIDE 2 INCH	2.00	EACH		$	
1690	16039		G SERVICE SHORT SIDE 3/4 INCH	1.00	EACH		$	
1700	16040		G SERVICE SPECIAL	3.00	EACH		$	
1710	16043		G TIE-IN POLYETHYLENE/PLASTIC 04 INCH	1.00	EACH		$	
1720	16044		G TIE-IN POLYETHYLENE/PLASTIC 06 INCH	3.00	EACH		$	
1730	16056		G VALVE SPECIAL (ABOVE GRADE ISOLATION VALVE)	2.00	EACH		$	
1740	16059		G VALVE STEEL 04 INCH	2.00	EACH		$	
1750	16060		G VALVE STEEL 06 INCH	1.00	EACH		$	
1760	16065		G LINE MARKER	36.00	EACH		$	
1770	21341ND		BOLLARDS	8.00	EACH		$	

Section: 0007 - SEWER

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1780	15000		S BYPASS PUMPING	5.00	EACH		$	
1790	15011		S DIRECTIONAL BORE (6-IN	650.00	LF		$	
1800	15012		S ENCASEMENT CONCRETE	70.00	LF		$	
1810	15015		S ENCASEMENT STEEL BORED RANGE 2 (8-IN)	95.00	LF		$	
1820	15026		S FORCE MAIN AIR RLS/VAC VLV 02 IN (COMBINATION AIR VALVE)	4.00	EACH		$	
1830	15057		S FORCE MAIN PVC 02 INCH (SDR 21)	150.00	LF		$	
1840	15060		S FORCE MAIN PVC 06 INCH (HDPE, DR11)	11,113.00	LF		$	
1850	15074		S FORCE MAIN TIE-IN 06 INCH	7.00	EACH		$	
1860	15093		S MANHOLE ABANDON/REMOVE	2.00	EACH		$	
1870	15119		S PUMP STATION	1.00	EACH		$	
1880	15120		S SPECIAL ITEM (MANHOLE AT 3-IN FORCE MAIN TIE-IN AT 6-IN FORCE MAIN)	1.00	EACH		$	
1890	15122		S STRUCTURE REMOVAL (PUMP STATION WET WELL AND VALVE VAULT)	2.00	EACH		$	
1900	15123		S LINE MARKER	7.00	EACH		$	

Section: 0008 - WATERLINE - US 42

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1910	14000		W AIR RELEASE VALVE 1 INCH	4.00	EACH		$	
1920	14019		W FIRE HYDRANT ASSEMBLY	4.00	EACH		$	
1930	14060		W PIPE PVC 08 INCH (SDR 17)	6,267.00	LF		$	

161234

PROPOSAL BID ITEMS

Report Date 5/16/16

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1940	14066		W PIPE PVC SPECIAL (RESTRAINED JOINT 8-IN PVC SDR 17)	760.00	LF		$	
1950	14076		W REMOVE TRANSITE (AC) PIPE (NOT TO BE PAID AT TIE-IN LOCATIONS)	200.00	LF		$	
1960	14077		W SERV PE/PLST LONG SIDE 1 IN	1.00	EACH		$	
1970	14080		W SERV PE/PLST LONG SIDE 3/4 IN	2.00	EACH		$	
1980	14082		W SERV PE/PLST SHORT SIDE 1 IN	2.00	EACH		$	
1990	14084		W SERV PE/PLST SHORT SIDE 2 IN	3.00	EACH		$	
2000	14085		W SERV PE/PLST SHORT SIDE 3/4 IN	1.00	EACH		$	
2010	14094		W TIE-IN 06 INCH	4.00	EACH		$	
2020	14101		W TIE-IN SPECIAL (TIE-IN TO 6-IN ASBESTOS CONCRETE PIPE)	2.00	EACH		$	
2030	14103		W VALVE 03 INCH	1.00	EACH		$	
2040	14105		W VALVE 06 INCH	1.00	EACH		$	
2050	14106		W VALVE 08 INCH	7.00	EACH		$	
2060	14126		W ENCASEMENT SPECIAL (12" PVC CASING PIPE-OPEN CUT AT UTILITY AND ENTRANCE CROSSINGS)	858.00	LF		$	
2070	14131		W METER SPECIAL	7.00	EACH		$	
2080	14144		W LINE MARKER	4.00	EACH		$	

Section: 0009 - WATERLINE - NAS HAUL ROAD

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2090	14037		W PIPE DUCTILE IRON 08 INCH	135.00	LF		$	
2100	14074		W PLUG EXISTING MAIN	2.00	EACH		$	
2110	14088		W STRUCTURE REMOVAL (REMOVE EXISTING POST INDICATOR VALVE)	1.00	EACH		$	
2120	14089		W TAPPING SLEEVE AND VALVE SIZE 1	2.00	EACH		$	
2130	14124		W VALVE SPECIAL (INSTALL NEW POST INDICATOR VALVE)	1.00	EACH		$	
2140	14146		W SERV COPPER LONG SIDE 1-1/2 IN (RELOCATE EXISTING 1 1/2 IN WATER LINE)	1.00	EACH		$	
2150	16026		G PIPE STEEL 06 INCH	450.00	LF		$	
2160	16544		G TIE-IN POLYETHYLENE/PLASTIC 06 IN INST	2.00	EACH		$	

Section: 0010 - DEMOBILIZATION &/OR MOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0090	02568		MOBILIZATION	1.00	LS		$	
0100	02569		DEMOBILIZATION	1.00	LS		$	