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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	17

REFERENCE: U-3330

PROJECT: 36596

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *NASH*

PROJECT DESCRIPTION *US 301 BYPASS FROM NC 43-48 (BENVENUE RD) TO SR 1836 (MAY DR.)*

SITE DESCRIPTION *REPLACE BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CONSULTANT:

GEOSYNTEC CONSULTANTS

INVESTIGATED BY *NJOROGE WAINAINA*

DRAWN BY *C. TURLINGTON*

CHECKED BY *WESTON SHIN*

SUBMITTED BY *NJOROGE WAINAINA*

DATE *JUNE 2015*

NORTH CAROLINA PROFESSIONAL SEAL 014587 ENGINEER NJOROGE WA WAINAINA

DocuSigned by:
Njoroge Wainaina
AEC0C6E0A2E14F2...
SIGNATURE

6/10/2015
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3330	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [x] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [x] CASING [x] W/ ADVANCER
- [x] TRICONE 2 15/16" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [x] CORE BIT
- [x] 2¼ HOLLOW AUGERS

HAMMER TYPE:
- [x] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B ____ [ ] -H ____
- [x] -N 02

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-102, EL 97.35

ELEVATION: FEET

NOTES: TIN FILE NAME "u3330_is_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

FIAD - FILLED IN AFTER DRILLING.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	3

SITE PLAN

0 50 100

FEET

N

45+00

-L-

TO BATTLEBORO

BRIDGE 198

-Y1-

BRIDGE 196

BI-A-RL

EB2-A-RL

EBI-A-RL

EB2-B-RL

EBI-B-RL

BI-B-RL

15+00

20+00

SUNSET AVE 36' BST

SUNSET AVE 36' BST

TO WILSON

T FO

TC

W

15" CMP

CONC. HW

WOODS

INV=91.67'

BRIDGE SKEW ANGLE = 68°-28'-02"

0	20	40

FEET

VE = 4:1

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	4

BORINGS PROJECTED ALONG -Y1- PROFILE

EASTBOUND

US 301 BYPASS

EB1-A-RL
17+54
18' RT

B1-A-RL
18+17
5' RT

EB2-A-RL
19+05
15' RT

GROUND SURFACE

ROADWAY EMBANKMENT, BROWN, LOOSE, MOIST TO WET, CLAYEY SAND

RESIDUAL, BROWN, LOOSE, WET, CLAYEY SAND

RESIDUAL, LOOSE TO MEDIUM DENSE, WET, SAND

ROADWAY EMBANKMENT, BROWN, MEDIUM DENSE, MOIST TO WET, CLAYEY SAND

CRYSTALLINE ROCK, GRAY-WHITE, SLIGHT WEATHERING TO FRESH, HARD, WIDE TO VERY WIDE, FRACTURE SPACING; GRANITE

REC=98%
RQD=98%
RMR=84

REC=100%
RQD=98%
RMR=84

(A) WEATHERED ROCK, BROWN, GRANITE

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

120
110
100
90
80

17+00
18+00
19+00

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	5

BORINGS PROJECTED ALONG –YI– PROFILE

0 20 40
FEET
VE = 4:1

EASTBOUND

EB1–B–RL
17+24
41' RT

B1–B–RL
18+36
51' RT

EB2–B–RL
19+46
34' RT

GROUND SURFACE

ROADWAY EMBANKMENT, BROWN, LOOSE, MOIST TO WET, CLAYEY SAND

ROADWAY EMBANKMENT, BROWN, MOIST TO WET, CLAYEY SAND, LOOSE,

02/15

MATCH LINE A

EL 69.2 FT

REC=100%
RQD=86%
RMR=66

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

RESIDUAL, CLAYEY BROWN, LOOSE TO MEDIUM DENSE, WET, SAND

RESIDUAL, BROWN-GRAY, LOOSE, WET, SAND

WEATHERED ROCK, BROWN, GRANITE

CRYSTALLINE ROCK, MODERATELY HARD TO HARD, GRAY AND WHITE, SLIGHT TO MODERATE WEATHERING WITH CLOSE FRACTURE SPACING, GRANITE

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

120
110
100
90
80

17+00
18+00
19+00

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	6

CROSS SECTION THROUGH
END BENT 1 –EBL–

0 5 10
FEET
VE = 1:1

EB1–A–RL
17+54
18' RT

EB1–B–RL
17+24
41' RT

120
110
100
90
80

℄

MATCH LINE A

ASPHALT AND CONCRETE

GROUND SURFACE

ROADWAY EMBANKMENT, BROWN, LOOSE, MOIST TO WET, CLAYEY SAND

RESIDUAL, BROWN, LOOSE TO MEDIUM DENSE, CLAYEY SAND

RESIDUAL, BROWN, MEDIUM DENSE, WET, SAND

CRYSTALLINE ROCK, GRAY-WHITE, SLIGHT WEATHERING TO FRESH, HARD, WIDE TO VERY WIDE FRACTURE SPACING, GRANITE

REC=98%
RQD=98%
RMR=84

WEATHERED ROCK, BROWN, GRANITE

02/15

02/15

6 4 3 7 17 12 10 7

6 9 5 8 29

60/0.0

100/0.8

60/0.1

NOTE:

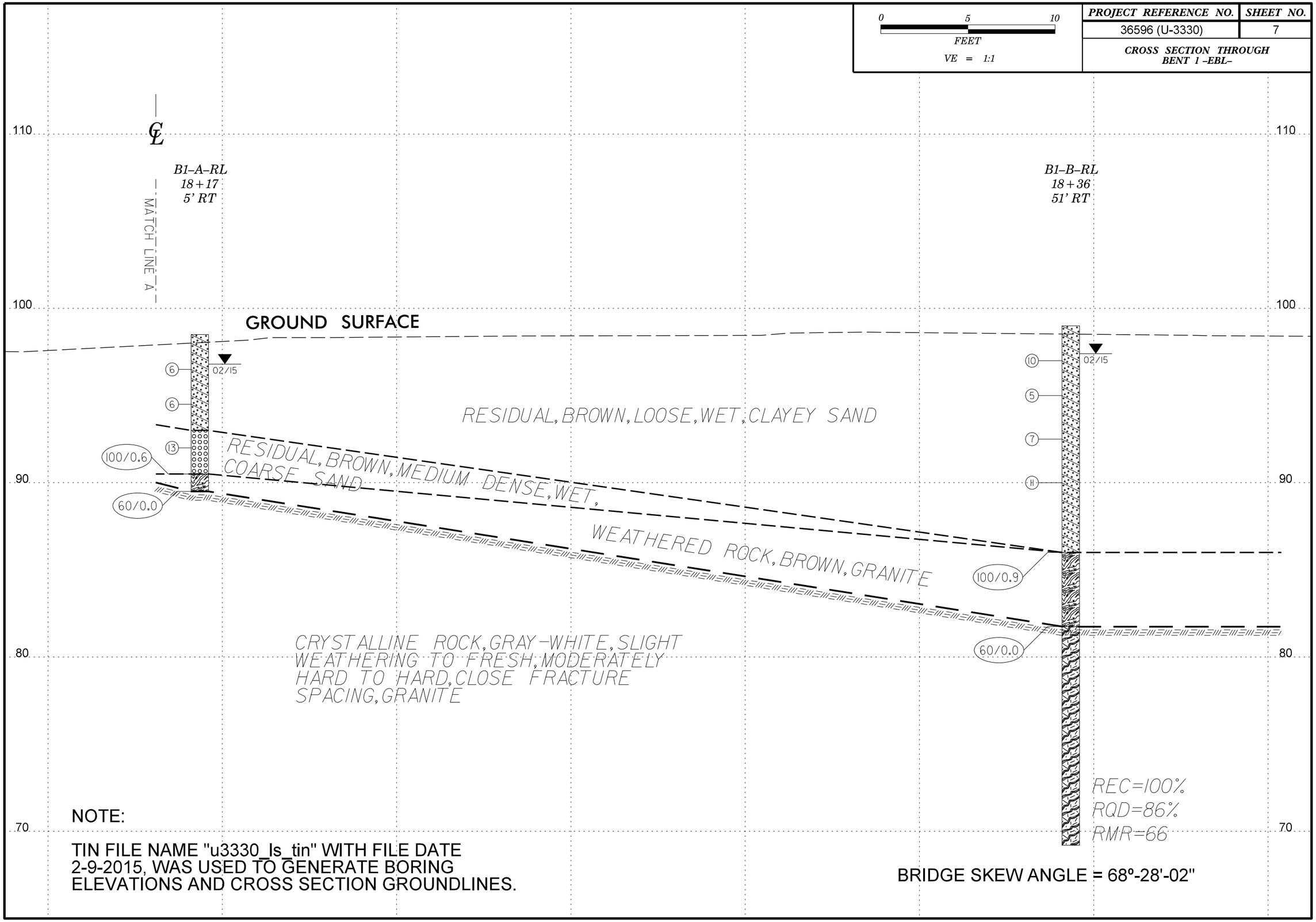
TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

BRIDGE SKEW ANGLE = 68°-28'-02"

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	7

CROSS SECTION THROUGH
BENT 1 –EBL–

0 5 10
FEET
VE = 1:1



NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

BRIDGE SKEW ANGLE = 68°-28'-02"

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	8

CROSS SECTION THROUGH
END BENT 2 –EBL–

0 10 20
FEET
VE = 2:1

℄ MATCH LINE A

EB2–A–RL
19+05
15' RT

EB2–B–RL
19+46
34' RT

ASPHALT AND CONCRETE

GROUND SURFACE

GROUND SURFACE

120

110

100

90

80

ROADWAY EMBANKMENT, MEDIUM DENSE, MOIST CLAYEY SAND

BROWN, LOOSE TO WET,

RESIDUAL, BROWN, TO WET,

MEDIUM DENSE, MOIST CLAYEY SAND

RESIDUAL, BROWN, LOOSE,

WET, SAND

CRYSTALLINE ROCK, GRAY–WHITE, SLIGHT WEATHERING TO FRESH, HARD, WIDE FRACTURE SPACING, GRANITE

WEATHERED ROCK, BROWN, GRANITE

REC=100%
RQD=100%
RMR=84

02/15

02/15

5 4 4 8 20 31 8 7 100/0.9

16 5 60/0.0 60/0.0

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

BRIDGE SKEW ANGLE = 68°-28'-02"

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)			**GROUND WTR (ft)**
BORING NO. EB1-A-RL	**STATION** 17+54	**OFFSET** 18 ft RT	**ALIGNMENT** -Y1- **0 HR.** 4.0
COLLAR ELEV. 104.6 ft	**TOTAL DEPTH** 22.6 ft	**NORTHING** 805,527	**EASTING** 2,348,046 **24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER WENDELL WHICHARD	**START DATE** 02/04/15	**COMP. DATE** 02/04/15	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
105										104.6 GROUND SURFACE	0.0
	103.6	1.0	2	3	3	6		M		**RESIDUAL** GRAY-BROWN, CLAYEY SAND	
100	100.3	4.3	4	4	5	9		W			
	97.8	6.8	2	2	3	5					
95	95.3	9.3	2	4	4	8		W			
90	90.3	14.3	14	12	17	29		W		90.3 GRAY-BROWN, COARSE SAND	14.3
	87.0	17.6	60/0.0			60/0.0				87.0 **CRYSTALLINE ROCK** (GRANITE) HARD, GRAY AND WHITE, FRESH WEATHERING, WITH WIDE TO VERY WIDE FRACTURE SPACING, GRANITE	17.6
85										82.0 REC = 98% RQD = 98% RMR = 84 Boring Terminated at Elevation 82.0 ft ON CRYSTALLINE ROCK	22.6

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)			**GROUND WTR (ft)**
BORING NO. EB1-A-RL	**STATION** 17+54	**OFFSET** 18 ft RT	**ALIGNMENT** -Y1- **0 HR.** 4.0
COLLAR ELEV. 104.6 ft	**TOTAL DEPTH** 22.6 ft	**NORTHING** 805,527	**EASTING** 2,348,046 **24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER WENDELL WHICHARD	**START DATE** 02/04/15	**COMP. DATE** 02/04/15	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ-2	**TOTAL RUN** 5.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
87											Begin Coring @ 17.6 ft	
85	87.0	17.6	5.0	*N=60/0.0* 4:09/1.0 2:45/1.0 3:29/1.0 3:57/1.0 4:03/1.0	(4.9) 98%	(4.9) 98%		(4.9) 98%	(4.9) 98%		87.0 **CRYSTALLINE ROCK** (GRANITE) HARD, GRAY AND WHITE, FRESH WEATHERING, WITH WIDE TO VERY WIDE FRACTURE SPACING, GRANITE	17.6
	82.0	22.6									82.0 RMR = 84 Boring Terminated at Elevation 82.0 ft ON CRYSTALLINE ROCK	22.6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** WESTON SHIN	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB1-B-RL	**STATION** 17+24	**OFFSET** 41 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 18.5
COLLAR ELEV. 115.9 ft	**TOTAL DEPTH** 38.6 ft	**NORTHING** 805,536	**EASTING** 2,348,009	**24 HR.** 17.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/02/15	**COMP. DATE** 02/02/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										115.9	GROUND SURFACE 0.0
											ROADWAY EMBANKMENT BROWN, CLAYEY SAND
	114.9	1.0	4	3	3	6		M			
	112.4	3.5	2	2	2	4		M			
	109.9	6.0	2	2	1	3		M			
	107.4	8.5	2	3	4	7		M		107.4	8.5
											RESIDUAL GRAY-BROWN ,CLAYEY SAND
	102.4	13.5	4	7	10	17		M			
	97.4	18.5	5	7	5	12		W			
	92.4	23.5	3	4	6	10		W			
	87.4	28.5	3	3	4	7		W			
	82.4	33.5	57	43/0.3		100/0.8		W		82.4	33.5
											WEATHERED ROCK (GRANITE)
	77.4	38.5	60/0.1			60/0.1				77.3	38.6
											CRYSTALLINE ROCK (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 77.3 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-A-RL	**STATION** 18+17	**OFFSET** 5 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 3.0
COLLAR ELEV. 98.5 ft	**TOTAL DEPTH** 9.0 ft	**NORTHING** 805,484	**EASTING** 2,348,094	**24 HR.** 1.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/12/15	**COMP. DATE** 02/12/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										98.5	GROUND SURFACE 0.0
											RESIDUAL GRAY-BROWN, CLAYEY SAND
	97.5	1.0						W			
	95.5	3.0	3	2	4	6		W			
	93.0	5.5	2	2	4	6		W		93.0	5.5
											COARSE SAND
	90.5	8.0	4	5	8	13		W		90.5	8.0
	89.5	9.0	49	51/0.1		100/0.6				89.5	**WEATHERED ROCK** (GRANITE) 9.0
			60/0.0			60/0.0					**CRYSTALLINE ROCK** (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 89.5 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B-RL	**STATION** 18+36	**OFFSET** 51 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 5.0
COLLAR ELEV. 99.0 ft	**TOTAL DEPTH** 29.8 ft	**NORTHING** 805,441	**EASTING** 2,348,069	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/12/15	**COMP. DATE** 02/12/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100										99.0 GROUND SURFACE	0.0
	98.0	1.0								**RESIDUAL** BROWN-GRAY, CLAYEY SAND	
			4	4	6	10		W			
95	96.0	3.0	2	2	3	5		W			
	93.5	5.5	3	3	4	7		W			
	91.0	8.0									
90			3	4	7	11		W			
	86.0	13.0								86.0	13.0
85			24	57	43/.4	100/.9		W		**WEATHERED ROCK** (GRANITE)	
	81.7	17.3	60/0.0			60/0.0				81.8	17.3
80										**CRYSTALLINE ROCK** (GRANITE) MODERATELY HARD TO HARD, GRAY AND WHITE, SLIGHT TO MODERATE WEATHERING, WITH CLOSE FRACTURE SPACING, GRANITE	
							RS-1			REC = 100% RQD = 86%	
75										RMR = 66	
70										69.2	29.8
										Boring Terminated at Elevation 69.2 ft ON CRYSTALLINE ROCK	

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B-RL	**STATION** 18+36	**OFFSET** 51 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 5.0
COLLAR ELEV. 99.0 ft	**TOTAL DEPTH** 29.8 ft	**NORTHING** 805,441	**EASTING** 2,348,069	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/12/15	**COMP. DATE** 02/12/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 12.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
81.75											Begin Coring @ 17.3 ft	
80	81.8	17.3	3.0	3:11/1.0 *N=60/0.0* 2:04/1.0 1:31/1.0	(3.0) 100%	(2.3) 77%		(12.5) 100%	(10.8) 86%		81.8 **CRYSTALLINE ROCK** (GRANITE) MODERATELY HARD TO HARD, GRAY AND WHITE, SLIGHT TO MODERATE WEATHERING, WITH CLOSE FRACTURE SPACING, GRANITE	17.3
	78.8	20.3									RMR = 66	
	78.7	20.3	4.5	1:00/1.0 1:16/1.0 1:33/1.0 1:29/1.0 1:50/1.0	(4.5) 100%	(3.6) 80%						
75							RS-1					
	74.2	24.8	5.0	1:31/1.0 1:16/1.0 1:30/1.0 1:32/1.0 1:59/1.0	(5.0) 100%	(4.9) 98%						
70												
	69.2	29.8									69.2	29.8
											Boring Terminated at Elevation 69.2 ft ON CRYSTALLINE ROCK	

NCDOT CORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-A-RL	**STATION** 19+05	**OFFSET** 15 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 14.0
COLLAR ELEV. 109.1 ft	**TOTAL DEPTH** 16.8 ft	**NORTHING** 805,408	**EASTING** 2,348,140	**24 HR.** 9.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/03/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
110										109.1 GROUND SURFACE	0.0
	104.3	4.8	5	7	9	16		M		**ROADWAY EMBANKMENT** BROWN, CLAYEY FINE SAND	
105											
	99.3	9.8	2	2	3	5		W		99.3 **RESIDUAL**	9.8
100	97.3	11.8	60/0.0			60/0.0				97.3 FINE TO COARSE SAND	11.8
										CRYSTALLINE ROCK (GRANITE) HARD, GRAY AND WHITE, FRESH WEATHERING, WITH MODERATELY CLOSE TO WIDE FRACTURE SPACING, GRANITE	
95										92.3 REC = 100% RQD = 98% RMR = 84 Boring Terminated at Elevation 92.3 ft ON CRYSTALLINE ROCK	16.8

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-A-RL	**STATION** 19+05	**OFFSET** 15 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 14.0
COLLAR ELEV. 109.1 ft	**TOTAL DEPTH** 16.8 ft	**NORTHING** 805,408	**EASTING** 2,348,140	**24 HR.** 9.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/03/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
97.3											Begin Coring @ 11.8 ft	
95	97.3	11.8	5.0	*N=60/0.0* 2:53/1.0 2:09/1.0 1:29/1.0 2:34/1.0 3:27/1.0	(5.0) 100%	(4.9) 98%		(5.0) 100%	(4.9) 98%		97.3 **CRYSTALLINE ROCK** (GRANITE) HARD, GRAY AND WHITE, FRESH WEATHERING, WITH MODERATELY CLOSE TO WIDE FRACTURE SPACING, GRANITE	11.8
	92.3	16.8									92.3 RMR = 84 Boring Terminated at Elevation 92.3 ft ON CRYSTALLINE ROCK	16.8

NCDOT CORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 196 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-B-RL	**STATION** 19+46	**OFFSET** 34 ft RT	**ALIGNMENT** -Y1-	**0 HR.** 2.5
COLLAR ELEV. 118.0 ft	**TOTAL DEPTH** 35.5 ft	**NORTHING** 805,364	**EASTING** 2,348,150	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/03/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
120										118.0	0.0
	117.0	1.0	5	3	2	5		M		GROUND SURFACE **ROADWAY EMBANKMENT** BROWN, CLAYEY SAND	
115	114.5	3.5	2	2	2	4		M			
	112.0	6.0	2	2	2	4		M			
110	109.5	8.5	3	3	5	8		M		109.5	8.5
	104.5	13.5	6	11	9	20		M		**RESIDUAL** BROWN, CLAYEY SAND	
105											
100	99.5	18.5	5	12	19	31		M			
95	94.5	23.5	3	4	4	8		W			
90	89.5	28.5	2	3	4	7		W		89.5 COARSE SAND	28.5
85	84.5	33.5	12	18	82/0.4	100/0.9				84.5 **WEATHERED ROCK** (GRANITE)	33.5
	82.5	35.5	60/0.0			60/0.0				82.5 **CRYSTALLINE ROCK** (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 82.5 ft ON CRYSTALLINE ROCK	35.5

ROCK TEST RESULTS

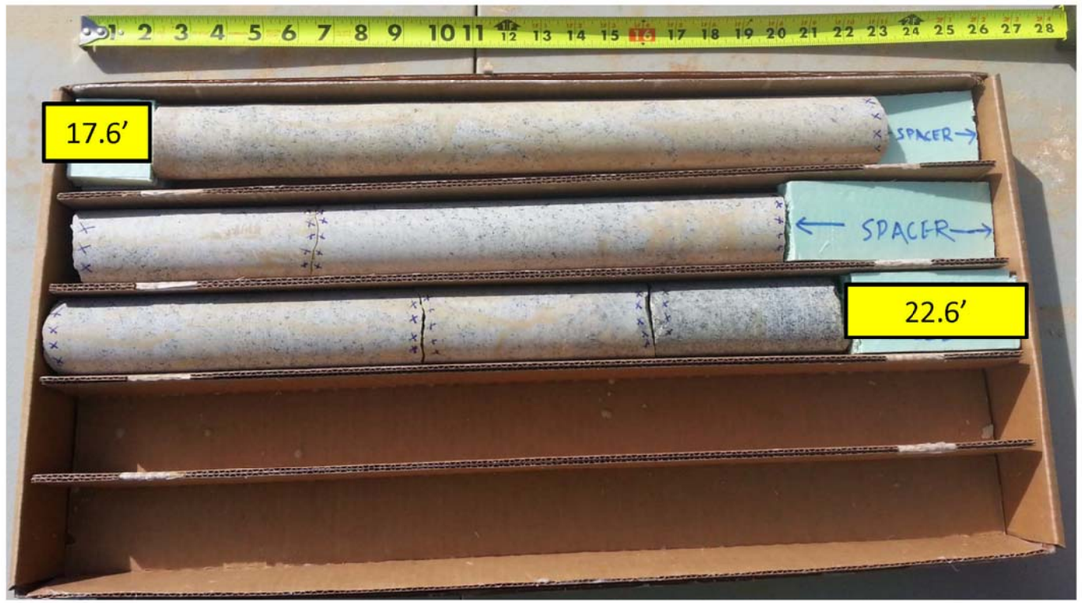
B1–B–RL

ROCK TEST RESULTS					
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNCONFINED COMP. STRENGTH, KSI
RS–1	51' RT	18+36	22.3–23.0	GRANITE	16.40

CORE PHOTOGRAPHS

EB1-A-RL

Box 1: 17.6-22.6 feet

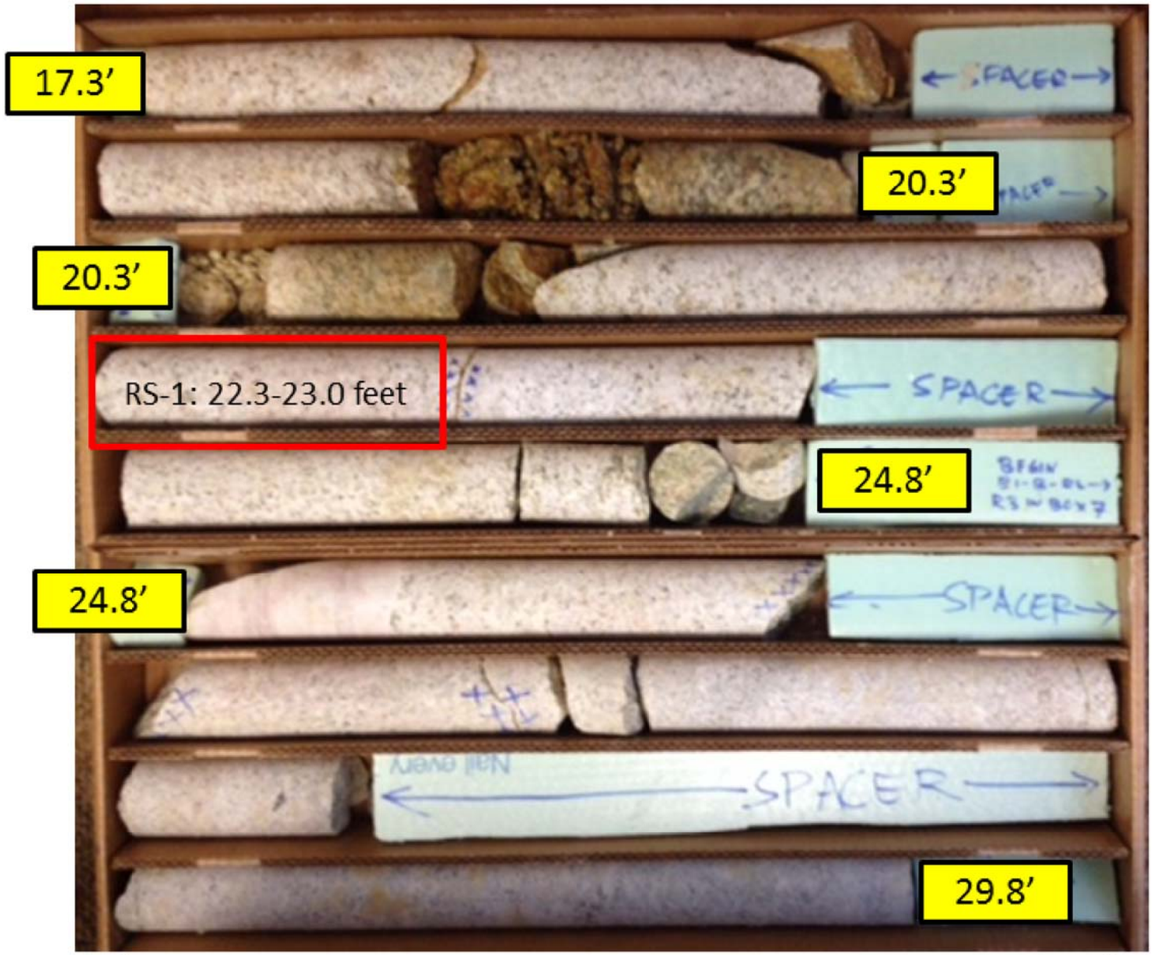


0 1 2

FEET

B1-B-RL

Boxes 1 & 2: 17.3-29.8 feet



0 1 2

FEET

CORE PHOTOGRAPHS

EB2-A-RL

Box 1: 11.8-16.8 feet

SITE PHOTOGRAPH
(LOOKING FROM SOUTH)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	17

REFERENCE: U-3330

PROJECT: 36596

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *NASH*

PROJECT DESCRIPTION *US 301 BYPASS FROM NC 43-48 (BENVENUE RD) TO SR 1836 (MAY DR.)*

SITE DESCRIPTION *REPLACE BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CONSULTANT:

GEOSYNTEC CONSULTANTS

INVESTIGATED BY *NJOROGE WAINAINA*

DRAWN BY *C. TURLINGTON*

CHECKED BY *WESTON SHIN*

SUBMITTED BY *NJOROGE WAINAINA*

DATE *JUNE 2015*

NORTH CAROLINA PROFESSIONAL SEAL 014587 ENGINEER NJOROGE WA WAINAINA

DocuSigned by: Njoroge Wainaina AEC0C6E0A2E14F2...

6/10/2015

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3330	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [■] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [■] CASING [■] W/ ADVANCER
- [■] TRICONE 2 15/16" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [■] CORE BIT
- [■] 2¼ HOLLOW AUGERS

HAMMER TYPE:
- [■] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [■] -N 02

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-102, EL 97.35

ELEVATION: FEET

NOTES: TIN FILE NAME "u3330_is_ttin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

FIAD - FILLED IN AFTER DRILLING.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-3330	3

SITE PLAN

0 50 100

FEET

N

45+00

TO BATTLEBORO

-L-

BRIDGE 198

BRIDGE 196

-YI-

BI-A-LL

BI-B-LL

EBI-A-LL

EBI-B-LL

EB2-A-LL

EB2-B-LL

15+00

20+00

SUNSET AVE 36' BST

SUNSET AVE 36' BST

T FO

TC

W

15" CMP

CONC.HW

WOODS

TO WILSON

INV=92.67'

BRIDGE SKEW ANGLE = 68º-28'-02"

WESTBOUND

0 20 40
FEET
VE = 4:1

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	4

BORINGS PROJECTED ALONG -Y1- PROFILE

EB1-A-LL
16+84
31' LT

B1-A-LL
17+97
49' LT

EB2-A-LL
19+11
34' LT

GROUND SURFACE

12 12 12 7 18 — 02/15

ROADWAY EMBANKMENT, MEDIUM DENSE, BROWN, MOIST TO WET, SILTY COARSE SAND

US 301 BYPASS

RESIDUAL, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, CLAYEY SAND

100/0.9 — A — 60/0.0

7 17 60/0.1 — 02/15

CRYSTALLINE ROCK, HARD, GRAY, FRESH WEATHERED, CLOSE TO WIDE FRACTURE SPACING, GRANITE

REC=96%
ROD=92%
RMR=63

GROUND SURFACE

5 8 6 8 — ROADWAY EMBANKMENT, BROWN, LOOSE, MOIST TO WET, SILTY SAND

16 — RESIDUAL, RED-BROWN, MEDIUM DENSE, MOIST TO WET, CLAYEY SAND

7 — RESIDUAL, RED-BROWN, LOOSE, WET, COARSE SAND

100/0.3 — 60/0.0 — A

A WEATHERED ROCK, BROWN, GRANITE

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

120
110
100
90
80

17+00 18+00 19+00

WESTBOUND

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	5

BORINGS PROJECTED ALONG -Y1- PROFILE

0 20 40
FEET
VE = 4:1

GROUND SURFACE

EB1-B-LL
17+43
17' LT

B1-B-LL
18+10
9' LT

EB2-B-LL
18+96
20' LT

ROADWAY EMBANKMENT, BROWN, MEDIUM DENSE, MOIST TO WET, SILTY SAND

US 301 BYPASS

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, CLAYEY SAND

WEATHERED ROCK, BROWN, GRANITE

REC=96%
RQD=96%
RMR=71

RESIDUAL, BROWN, LOOSE, WET, CLAYEY SAND

MEDIUM DENSE, WET, SAND

RESIDUAL, BROWN, LOOSE TO

CRYSTALLINE ROCK, GRAY-WHITE, FRESH, HARD, WIDE FRACTURE SPACING, GRANITE

SLIGHT WEATHERED TO

REC=96%
RQD=93%
RMR=79

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

0	10	20

FEET

VE = 2:1

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	6

CROSS SECTION THROUGH
END BENT 1 –WBL–

EB1–A–LL
16+84
31' LT

EB1–B–LL
17+43
17' LT

120

110

100

90

80

ASPHALT
AND CONCRETE

GROUND SURFACE

02/15

12

12

12

7

18

ROADWAY EMBANKMENT, BROWN, MEDIUM DENSE, MOIST TO WET, SILTY SAND

℄

MATCH LINE A

4

4

02/15

6

10

9

13

60/0.0

A

100/0.9

60/0.0

RESIDUAL, MEDIUM SAND

BROWN, LOOSE TO DENSE, WET, CLAYEY

B

CRYSTALLINE ROCK, GRAY–WHITE, SLIGHT WEATHERED TO FRESH, HARD, WIDE FRACTURE SPACING, GRANITE

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

(A) WEATHERED ROCK, BROWN, GRANITE

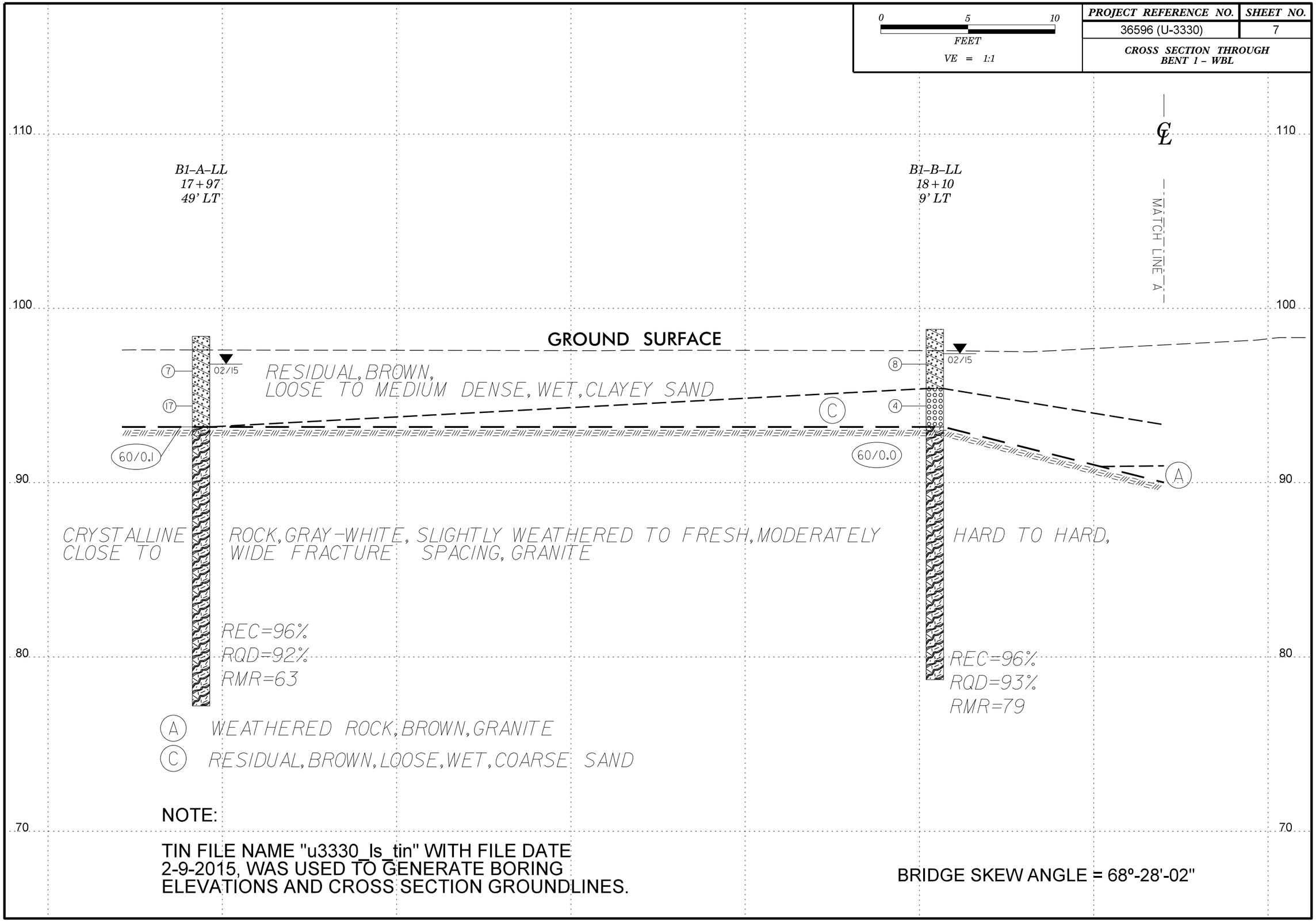
(B) RESIDUAL, BROWN, LOOSE TO MEDIUM DENSE, WET, SAND

BRIDGE SKEW ANGLE = 68º-28'-02"

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	7

CROSS SECTION THROUGH
BENT 1 – WBL

0 5 10
FEET
VE = 1:1



NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

BRIDGE SKEW ANGLE = 68º-28'-02"

PROJECT REFERENCE NO.	SHEET NO.
36596 (U-3330)	8

CROSS SECTION THROUGH
END BENT 2 –WBL–

0 10 20
FEET
VE = 2:1

EB2–B–LL
18+96
20' LT

EB2–A–LL
19+11
34' LT

ASPHALT AND CONCRETE

℄

MATCH LINE A

GROUND SURFACE

ROADWAY
LOOSE,

EMBANKMENT, BROWN,
MOIST TO WET, SILTY SAND

5
8
6
8
02/15

4
12
100/0.8
02/15

16

RESIDUAL, BROWN, MEDIUM DENSE,
MOIST TO WET, CLAYEY SAND

7

RESIDUAL, BROWN, LOOSE, WET, SAND

100/0.3
60/0.0

REC=96%
RQD=96%
RMR=71

A
D

CRYSTALLINE ROCK, GRAY–WHITE, SLIGHTLY WEATHERED TO FRESH, WIDE FRACTURE SPACING, GRANITE

120
110
100
90
80

(A) WEATHERED ROCK, BROWN, GRANITE

(D) RESIDUAL, BROWN, LOOSE, WET, SAND

NOTE:

TIN FILE NAME "u3330_ls_tin" WITH FILE DATE 2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

BRIDGE SKEW ANGLE = 68º-28'-02"

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB1-A-LL	**STATION** 16+84	**OFFSET** 31 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 1.3
COLLAR ELEV. 115.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 805,612	**EASTING** 2,348,043	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/06/15	**COMP. DATE** 02/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										115.6	GROUND SURFACE 0.0
	114.6	1.0	5	6	6	12		M			**ROADWAY EMBANKMENT** MEDIUM DENSE, BROWN, SILTY COARSE SAND
	112.1	3.5	4	5	7	12		M			
	109.6	6.0	4	6	6	12		W			
	107.1	8.5	3	2	5	7		W		107.1	8.5
	102.1	13.5	5	7	11	18		W			**RESIDUAL** BROWN, CLAYEY SAND
	97.1	18.5	3	4	96/0.4	100/0.9		W		97.1	18.5
	95.6	20.0	60/0.0			60/0.0				95.6	20.0
											WEATHERED ROCK (GRANITE)
											CRYSTALLINE ROCK (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 95.6 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB1-B-LL	**STATION** 17+43	**OFFSET** 17 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 0.0
COLLAR ELEV. 102.9 ft	**TOTAL DEPTH** 16.7 ft	**NORTHING** 805,557	**EASTING** 2,348,067	**24 HR.** 2.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/05/15	**COMP. DATE** 02/05/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										102.9	GROUND SURFACE 0.0
	101.9	1.0									**RESIDUAL** CLAYEY SAND
	100.5	2.4	3	2	2	4		W			
	98.0	4.9	2	2	2	4		W			
	95.5	7.4	2	3	3	6		W			
	93.0	9.9	3	4	6	10		W			
	88.0	14.9	2	4	5	9		W		88.0	14.9
	86.2	16.7	6	4	9	13		W		86.2	16.7
			60/0.0			60/0.0					DENSE, BROWN-RED, SAND
											CRYSTALLINE ROCK (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 86.2 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-A-LL	**STATION** 17+97	**OFFSET** 49 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 1.0
COLLAR ELEV. 98.4 ft	**TOTAL DEPTH** 21.2 ft	**NORTHING** 805,533	**EASTING** 2,348,125	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/12/15	**COMP. DATE** 02/12/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100										98.4	0.0
	97.4	1.0	3	3	4	7		W		**RESIDUAL** BROWN, CLAYEY SAND	
95	95.4	3.0	2	3	14	17		W		93.2	5.2
	93.2	5.2	60/0.1			60/0.1				**CRYSTALLINE ROCK** (GRANITE) HARD, GRAY, FRESH WEATHERING, CLOSE TO WIDE FRACTURE SPACING, GRANITE REC = 90% RQD = 86% RMR = 63	
90											
85											
80										77.2	21.2
										Boring Terminated at Elevation 77.2 ft ON CRYSTALLINE ROCK	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-A-LL	**STATION** 17+97	**OFFSET** 49 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 1.0
COLLAR ELEV. 98.4 ft	**TOTAL DEPTH** 21.2 ft	**NORTHING** 805,533	**EASTING** 2,348,125	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/12/15	**COMP. DATE** 02/12/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 16.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
93.2											Begin Coring @ 5.2 ft	
	93.2	5.2	1.0	3:22/1.0	(0.6)	(0.5)		(14.4)	(13.8)		93.2	5.2
	92.2	6.2	5.0	*N=60/0.1* 3:22/1.0	58%	46%		90%	86%		**CRYSTALLINE ROCK** (GRANITE) HARD, GRAY, FRESH WEATHERING, CLOSE TO WIDE FRACTURE SPACING, GRANITE RMR = 63	
90				2:33/1.0	(4.9)	(4.6)						
				2:56/1.0	98%	93%						
				4:41/1.0								
	87.2	11.2		5:13/1.0								
			5.0	3:52/1.0	(4.9)	(4.9)						
85				3:52/1.0	98%	98%						
				3:20/1.0								
				3:48/1.0								
	82.2	16.2		4:20/1.0								
				3:33/1.0								
			5.0	3:54/1.0	(4.0)	(3.8)						
80				3:25/1.0	80%	76%						
				3:53/1.0								
				4:29/1.0								
	77.2	21.2		5:52/1.0							77.2	21.2
											Boring Terminated at Elevation 77.2 ft ON CRYSTALLINE ROCK	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B-LL	**STATION** 18+10	**OFFSET** 9 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 1.0
COLLAR ELEV. 98.8 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 805,499	**EASTING** 2,348,101	**24 HR.** 1.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/11/15	**COMP. DATE** 02/11/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100										98.8	0.0
	97.8	1.0						W		GROUND SURFACE **RESIDUAL** RED-BROWN, CLAYEY SAND	
95	95.4	3.4	2	3	5	8		W		95.4 LOOSE, BROWN, COARSE SAND	3.4
	93.2	5.6	2 60/0.0	2	2	4 60/0.0				93.2 **CRYSTALLINE ROCK** (GRANITE) MODERATELY HARD TO HARD, GRAY AND WHITE, FRESH WEATHERING, WITH CLOSE TO WIDE FRACTURE SPACING, GRANITE REC = 96% RQD = 93% RMR = 79	5.6
90											
85							RS-1				
80										78.7 Boring Terminated at Elevation 78.7 ft ON CRYSTALLINE ROCK	20.1

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B-LL	**STATION** 18+10	**OFFSET** 9 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 1.0
COLLAR ELEV. 98.8 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 805,499	**EASTING** 2,348,101	**24 HR.** 1.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/11/15	**COMP. DATE** 02/11/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 14.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
93.2											Begin Coring @ 5.6 ft	
	93.2	5.6	4.5	*N=60/0.0* 3:41/1.0 2:21/1.0 2:20/1.0 1:22/1.0 1:11/0.5	(3.9) 87%	(3.9) 87%		(13.9) 96%	(13.6) 93%		93.2 **CRYSTALLINE ROCK** (GRANITE) MODERATELY HARD TO HARD, GRAY AND WHITE, FRESH WEATHERING, WITH CLOSE TO WIDE FRACTURE SPACING, GRANITE RMR = 79	5.6
90	88.7	10.1	5.0	3:43/1.0 3:29/1.0 3:25/1.0 3:26/1.0 2:55/1.0	(5.0) 100%	(4.6) 93%	RS-1					
85	83.7	15.1	5.0	2:47/1.0 2:53/1.0 3:33/1.0 2:02/1.0 3:01/1.0	(5.0) 100%	(5.0) 100%						
80	78.7	20.1									78.7 Boring Terminated at Elevation 78.7 ft ON CRYSTALLINE ROCK	20.1

NCDOT CORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-A-LL	**STATION** 19+11	**OFFSET** 34 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 2.8
COLLAR ELEV. 118.0 ft	**TOTAL DEPTH** 23.8 ft	**NORTHING** 805,433	**EASTING** 2,348,182	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/06/15	**COMP. DATE** 02/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
120										118.0 GROUND SURFACE	0.0
	117.0	1.0								**ROADWAY EMBANKMENT** BROWN, SILTY SAND	
115	114.5	3.5	5	2	3	5		M			
	112.0	6.0	2	4	4	8		M			
110	109.5	8.5	3	2	4	6		W			
			2	3	5	8		W			
105	104.5	13.5								104.5	13.5
			4	7	9	16		W		**RESIDUAL** RED-BROWN, CLAYEY SAND	
100	99.5	18.5								99.5	18.5
			3	3	4	7				RED-BROWN ,COARSE SAND	
95	94.5	23.5								94.5	23.5
	94.2	23.8	100/0.3			100/0.3				94.2 **WEATHERED ROCK** (GRANITE)	23.8
			60/0.0			60/0.0				**CRYSTALLINE ROCK** (GRANITE)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 94.2 ft ON CRYSTALLINE ROCK	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-B-LL	**STATION** 18+96	**OFFSET** 20 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 9.5
COLLAR ELEV. 109.8 ft	**TOTAL DEPTH** 12.8 ft	**NORTHING** 805,437	**EASTING** 2,348,162	**24 HR.** 9.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/05/15	**COMP. DATE** 02/05/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
110										109.8 GROUND SURFACE	0.0
	108.8	1.0								**ROADWAY EMBANKMENT** BROWN, SILTY SAND	
	107.1	2.7	3	2	2	4					
105			4	5	7	12					
	103.6	6.2								103.6	6.2
			2	3	97/0.3	100/0.8				**WEATHERED ROCK** (GRANITE)	
100										101.9	7.9
										CRYSTALLINE ROCK (GRANITE) HARD, GRAY AND WHITE, WITH FRESH WEATHERING, WITH WIDE TO VERY WIDE FRACTURE SPACING, GRANITE	
										REC = 96% RQD = 96%	
										RMR = 71	
										97.0 Boring Terminated at Elevation 97.0 ft ON CRYSTALLINE ROCK	12.8

NCDOT BORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** ROHIT WARRIER	
SITE DESCRIPTION BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-B-LL	**STATION** 18+96	**OFFSET** 20 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 9.5
COLLAR ELEV. 109.8 ft	**TOTAL DEPTH** 12.8 ft	**NORTHING** 805,437	**EASTING** 2,348,162	**24 HR.** 9.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 68% 02/20/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER WENDELL WHICHARD	**START DATE** 02/05/15	**COMP. DATE** 02/05/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
101.9											Begin Coring @ 7.9 ft	
100	101.9	7.9	5.0	5:30/1.0 4:37/1.0 4:20/1.0 4:46/1.0 5:44/1.0	(4.8) 96%	(4.8) 96%		(4.8) 98%	(4.8) 98%		101.9 **CRYSTALLINE ROCK** (GRANITE) HARD, GRAY AND WHITE, WITH FRESH WEATHERING, WITH WIDE TO VERY WIDE FRACTURE SPACING, GRANITE	7.9
	96.9	12.9									97.0 RMR = 71 Boring Terminated at Elevation 97.0 ft ON CRYSTALLINE ROCK	12.8

NCDOT CORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15

ROCK TEST RESULTS

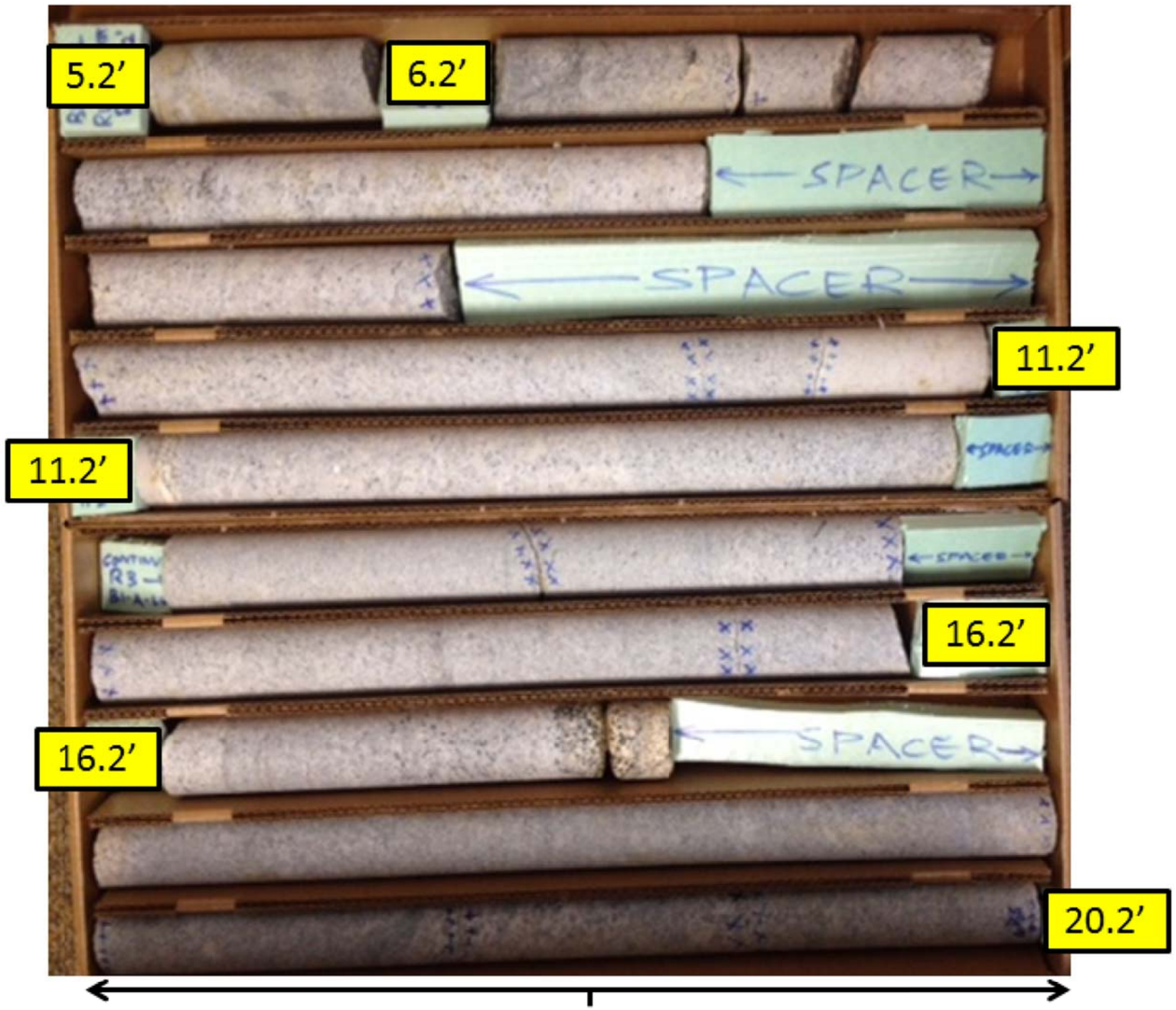
B1–B–LL

ROCK TEST RESULTS					
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNCONFINED COMP. STRENGTH, KSI
RS–1	9' LT	18+10	11.1–11.95	GRANITE	23.49

CORE PHOTOGRAPHS

B1-A-LL

Boxes 1 & 2: 5.2-20.2 feet



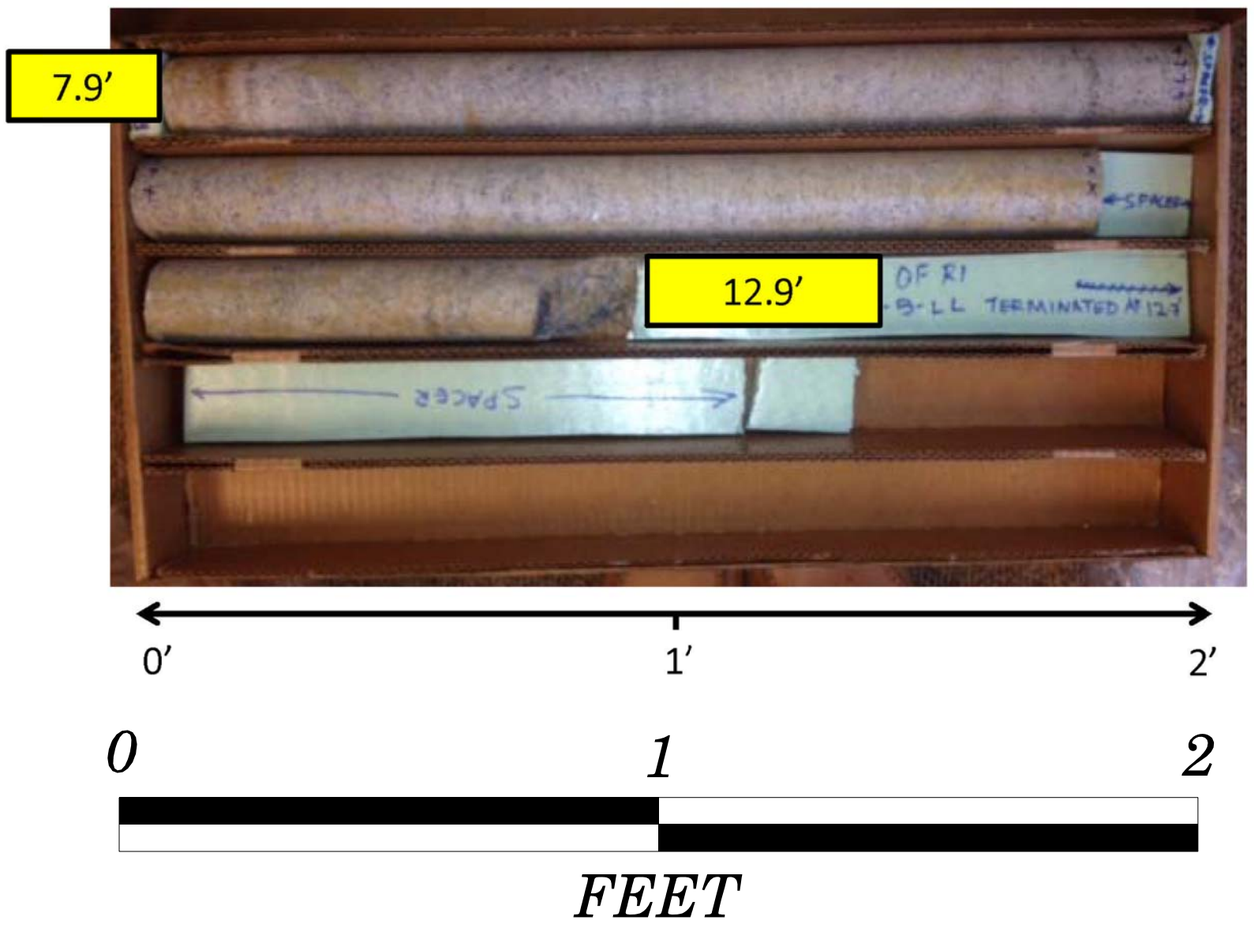
B1-B-LL

Boxes 1 & 2: 5.6-20.1 feet

CORE PHOTOGRAPHS

EB2-B-LL

Box 1: 7.9-12.9 feet



SITE PHOTOGRAPH
(LOOKING FROM EAST)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	16

REFERENCE: U-3330

PROJECT: 36596

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *NASH*

PROJECT DESCRIPTION *US 301 BYPASS FROM NC 43-48 (BENVENUE RD.) TO SR 1836 (MAY DR.)*

SITE DESCRIPTION *BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J.R. SWARTLEY

O.B. OTI

D.G. PINTER

C. CONGLETON

INVESTIGATED BY *J.R. SWARTLEY*

DRAWN BY *T. WALKER*

CHECKED BY *N.T. ROBERSON*

SUBMITTED BY *N.T. ROBERSON*

DATE *FEBRUARY 2015*

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST Jarett Swartley

DocuSigned by:
Jarett Swartley
7F355C29F75A413...
SIGNATURE

8/31/2016
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3330	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N W

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: GPS-3

ELEVATION: 98.21 FEET

NOTES:

TOP OF NE RAIL = 100.2 feet

TOP OF SE RAIL = 100.1 feet

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-3330	3

SITE PLAN

0 50 100

FEET

NC GRID NAD 83/NSRS 2007

-Y5-

-L-

-Y4-

ISBKBUS

ISBKBUS

CURB

STONY CREEK

13+00

60+00

65+00

11+00

B1-A

B2-A

EB1-A

EB2-A

EB1-C

B2-C

B1-C

EB2-C

EB1-B

B2-B

B1-B

EB2-B

TOR = 100.1'

TOR = 100.2'

EXISTING R/W

WOODS

WOODS

WOODS

STONY CREEK

LAWRENCE CIRCLE

3' GR

SANITARY SEWER EASEMENT

SANITARY SEWER EASEMENT

MTL

CONC

SKEW=90°

PROJECT REFERENCE NO.	SHEET NO.
U-3330	4

PROFILE BORINGS PROJECTED ALONG –L–

0 20 40
FEET
VE = 2:1

EB1–C
60+00
8' LT

B1–C
60+60
9' LT

B2–C
61+45
9' LT

EB2–C
62+05
9' LT

PAVEMENT

PAVEMENT

STONY CREEK

WATER SURFACE 11/19/13

ALLUVIAL, GRAY, MOIST TO GRAY, SAT., VERY LOOSE,

WET, VERY SOFT TO SOFT, SANDY SILT

COARSE SAND

ALLUVIAL, GRAY, SAT., VERY LOOSE

RESIDUAL, BLACK, WHITE AND GRAY, WET, VERY STIFF, SAPROLITIC, SANDY SILT

WEATHERED ROCK (GRANITE)

ALLUVIAL, GRAY, MOIST TO HARD, SANDY CLAY

TO LOOSE, COARSE SAND

WHITE AND GRAY, WET, TO HARD, SAPROLITIC,

WET, MED. STIFF TO VERY STIFF AND SILTY CLAY

SANDY SILT

FIAD 01/15

FIAD 02/15

REC = 83%
RQD = 75%
RMR = 81

REC = 99%
RQD = 92%
RMR = 84

CRYSTALLINE ROCK, GRAY AND BLACK, FRESH TO MODERATELY SEVERELY WEATHERED, SOFT TO VERY HARD, CLOSE TO WIDE FRACTURE SPACING,

GRANITE

110
100
90
80
70
60
50
40
30

60+00
61+00
62+00

(A) ROADWAY EMBANKMENT, TAN AND ORANGE, MOIST, VERY SOFT TO MED. STIFF, SANDY CLAY

(B) ROADWAY EMBANKMENT, GRAY, MOIST, LOOSE TO MED. DENSE, SAND

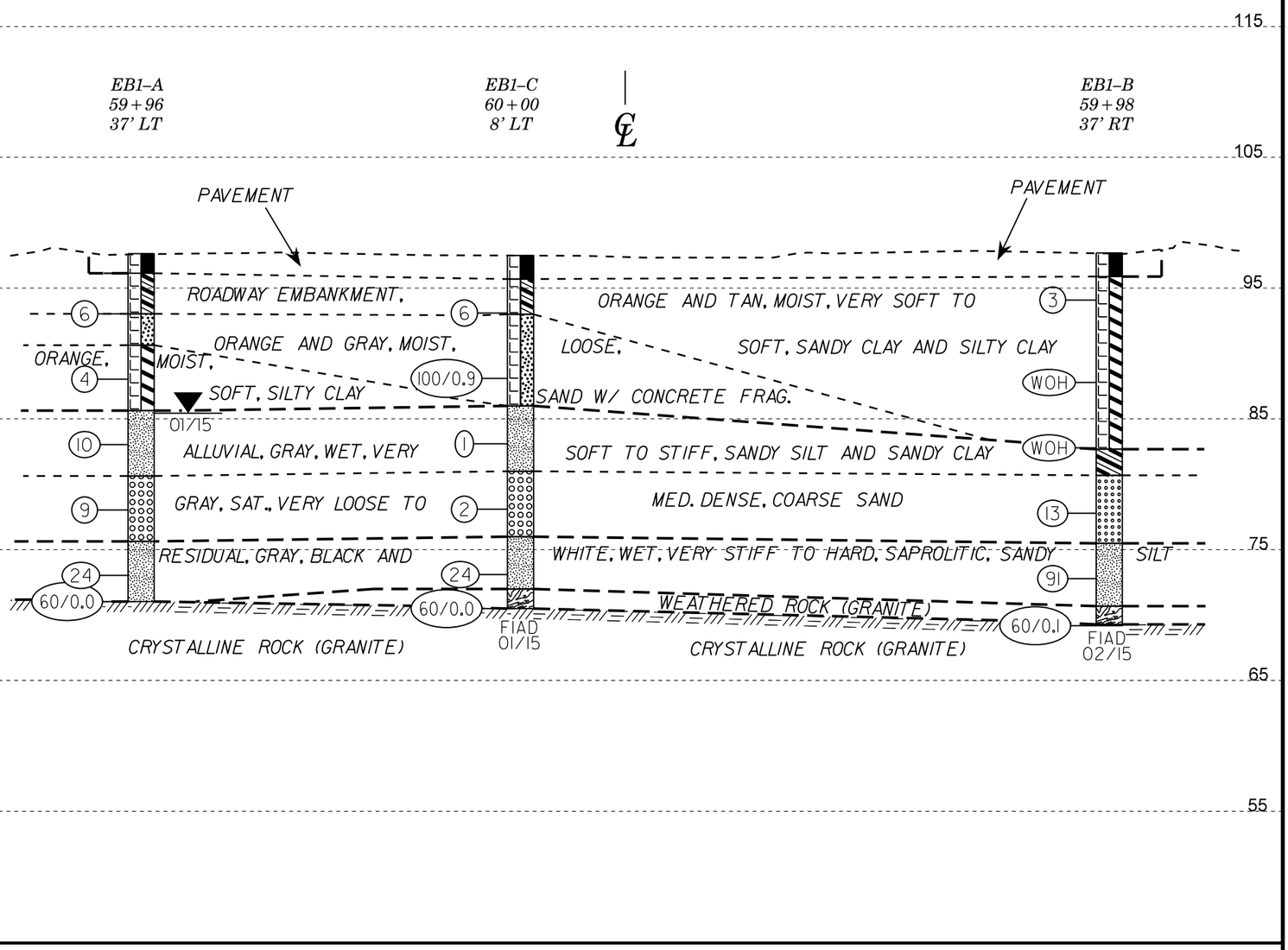
(C) RESIDUAL, BLACK, WHITE AND GRAY, WET, VERY STIFF, SAPROLITIC, SANDY SILT

(D) WEATHERED ROCK (GRANITE)

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

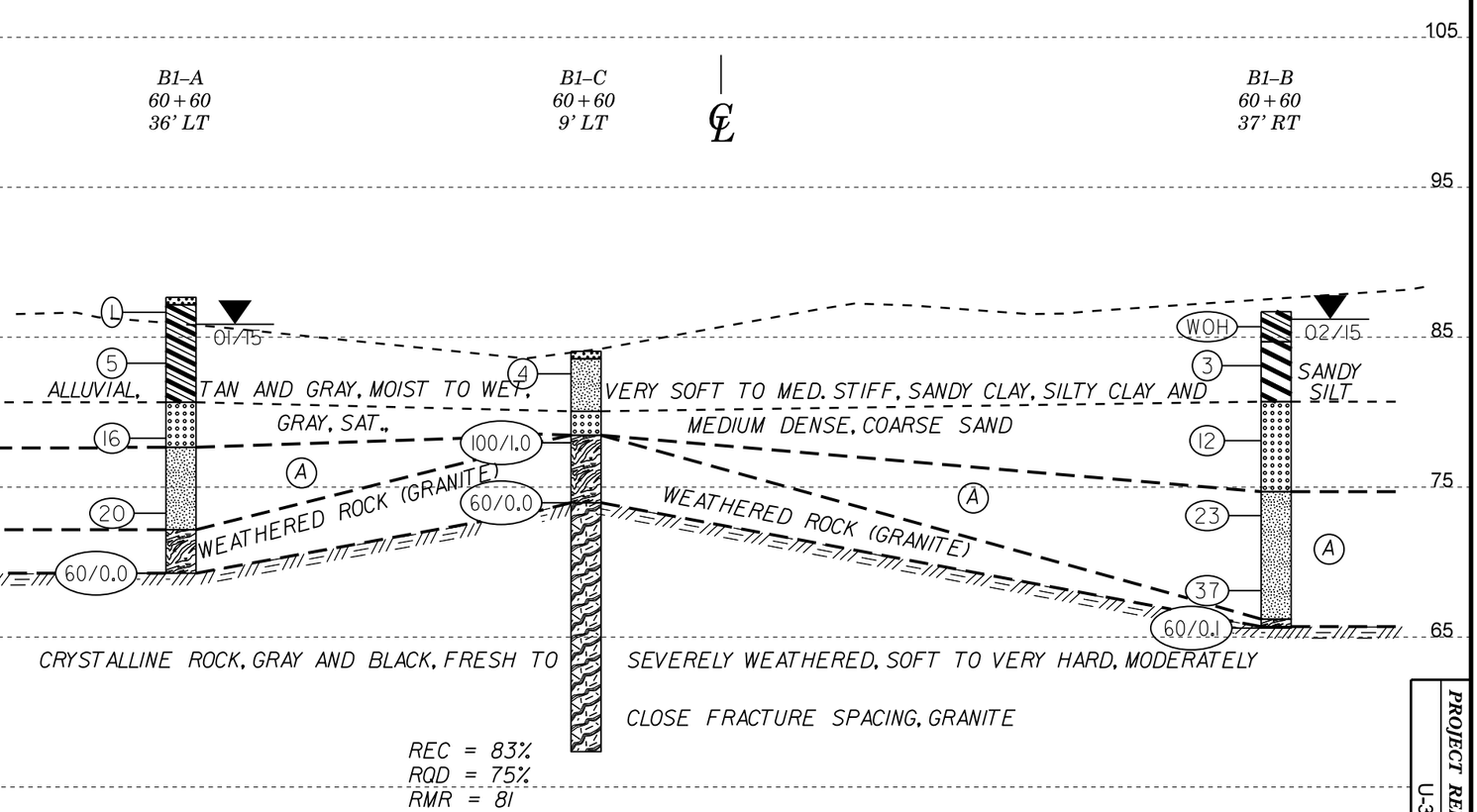
CROSS SECTION THROUGH END BENT 1



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH BENT 1



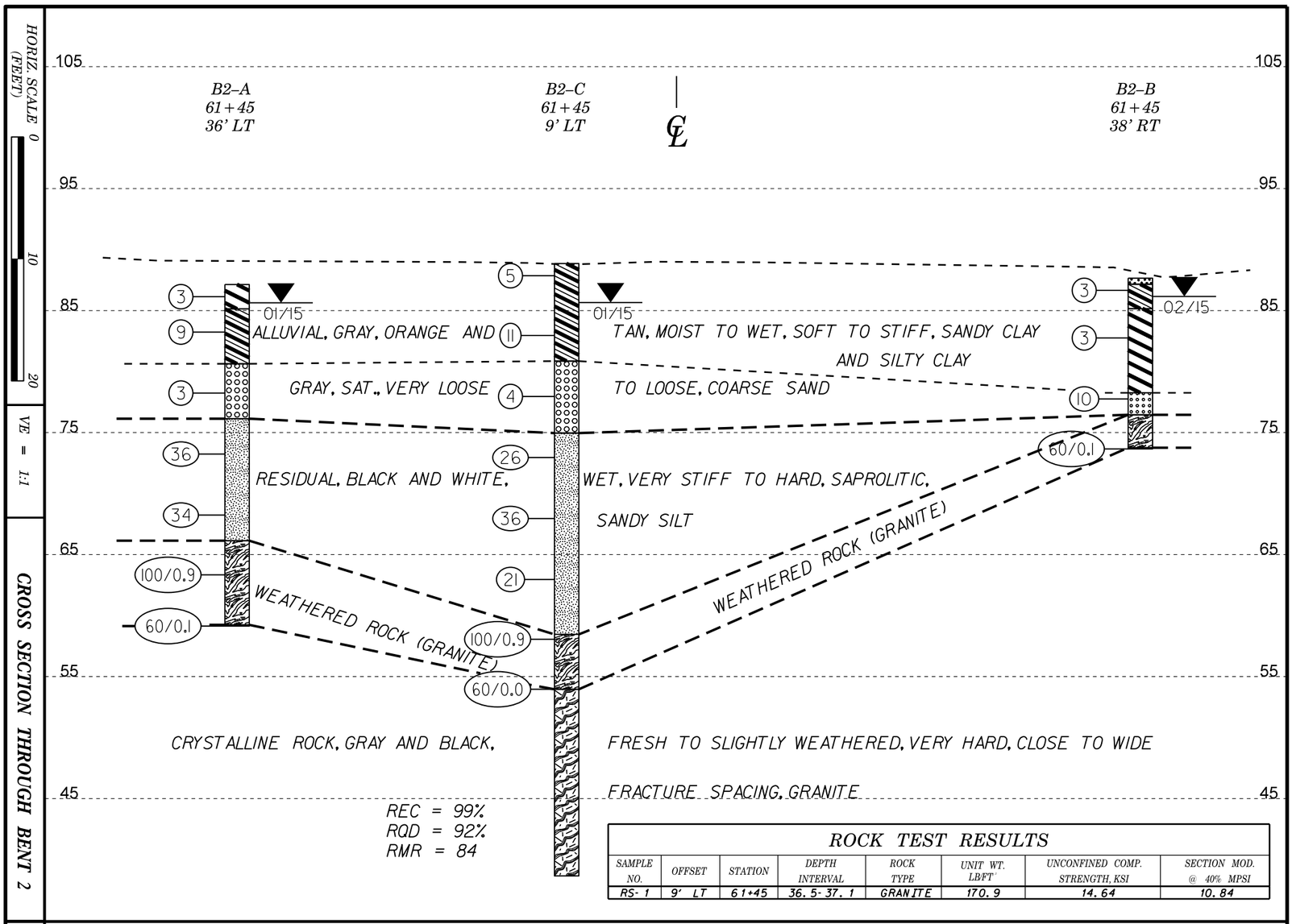
Ⓐ RESIDUAL, GRAY, BLACK AND WHITE, VERY STIFF TO HARD, SAPROLITIC, SANDY SILT

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-2	9' LT	60+60	18.0-18.4	GRANITE	159.1	20.8	3.41

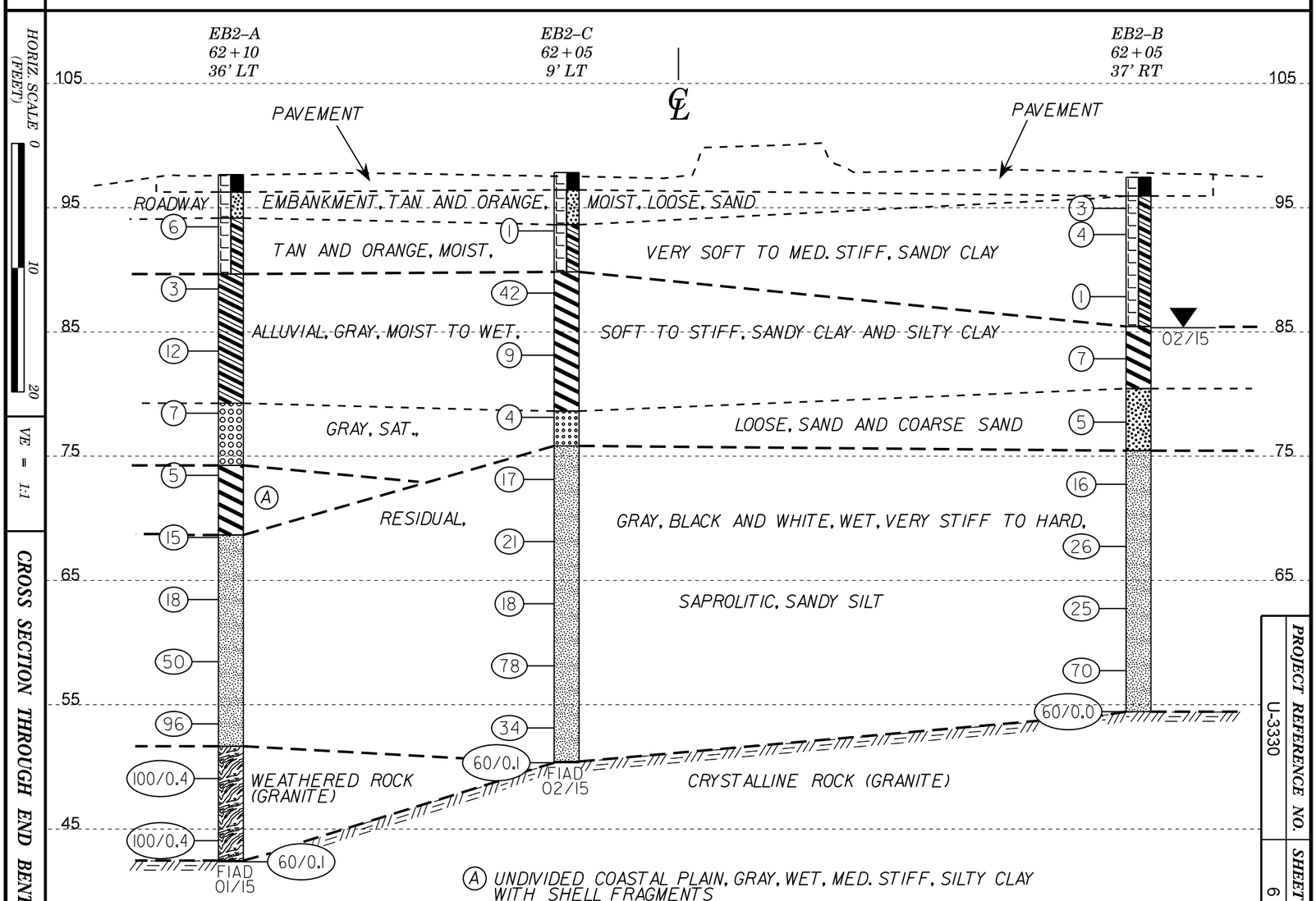
PROJECT REFERENCE NO. U-3330

SHEET NO. 5



ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-1	9' LT	61+45	36.5-37.1	GRANITE	170.9	14.64	10.84



PROJECT REFERENCE NO.	SHEET NO.
U-3330	6

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 59+96	**OFFSET** 37 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.7 ft	**TOTAL DEPTH** 26.6 ft	**NORTHING** 806,951	**EASTING** 2,348,943	**24 HR.** 12.2
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										97.7	0.0
										GROUND SURFACE (PAVEMENT)	
										96.2	1.5
										ROADWAY EMBANKMENT ORANGE, SANDY CLAY	
	94.1	3.6	WOH	3	3	6				93.1	4.6
										ORANGE AND TAN, SILTY SAND	
	89.1	8.6	1	2	2	4	SS-2			90.7	7.0
										ORANGE, SILTY CLAY	
	84.1	13.6	2	5	5	10	SS-3			85.7	12.0
										ALLUVIAL GRAY, SANDY SILT	
	79.1	18.6	2	5	4	9				80.7	17.0
										GRAY, COARSE SAND	
	74.1	23.6	6	8	16	24				75.7	22.0
										RESIDUAL GRAY, BLACK AND WHITE, SAPROLITIC, SANDY SILT	
	71.1	26.6	60/0.0			60/0.0				71.1	26.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 71.1 ft ON CRYSTALLINE ROCK	

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 59+98	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.7 ft	**TOTAL DEPTH** 28.5 ft	**NORTHING** 806,914	**EASTING** 2,349,007	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 02/03/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										97.7	0.0
										GROUND SURFACE (PAVEMENT)	
										95.9	1.8
										ROADWAY EMBANKMENT ORANGE, SILTY CLAY	
	95.1	2.6	1	2	1	3	SS-11			82.7	15.0
										ALLUVIAL ORANGE, SANDY CLAY GRAY SAND	
	88.8	8.9	WOH	WOH	WOH	0				80.7	17.0
	83.8	13.9	WOH	WOH	WOH	0				75.5	22.2
	78.8	18.9	2	4	9	13				**RESIDUAL** BLACK AND GRAY, SAPROLITIC, SANDY SILT	
	73.8	23.9	15	30	61	91				70.7	27.0
										WEATHERED ROCK (GRANITE)	
	69.3	28.4	60/0.1			60/0.1				69.3 69.2	28.4 28.5
										CRYSTALLINE ROCK (GRANITE)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 69.2 ft IN CRYSTALLINE ROCK	

GEOTECHNICAL BORING REPORT
BORE LOG

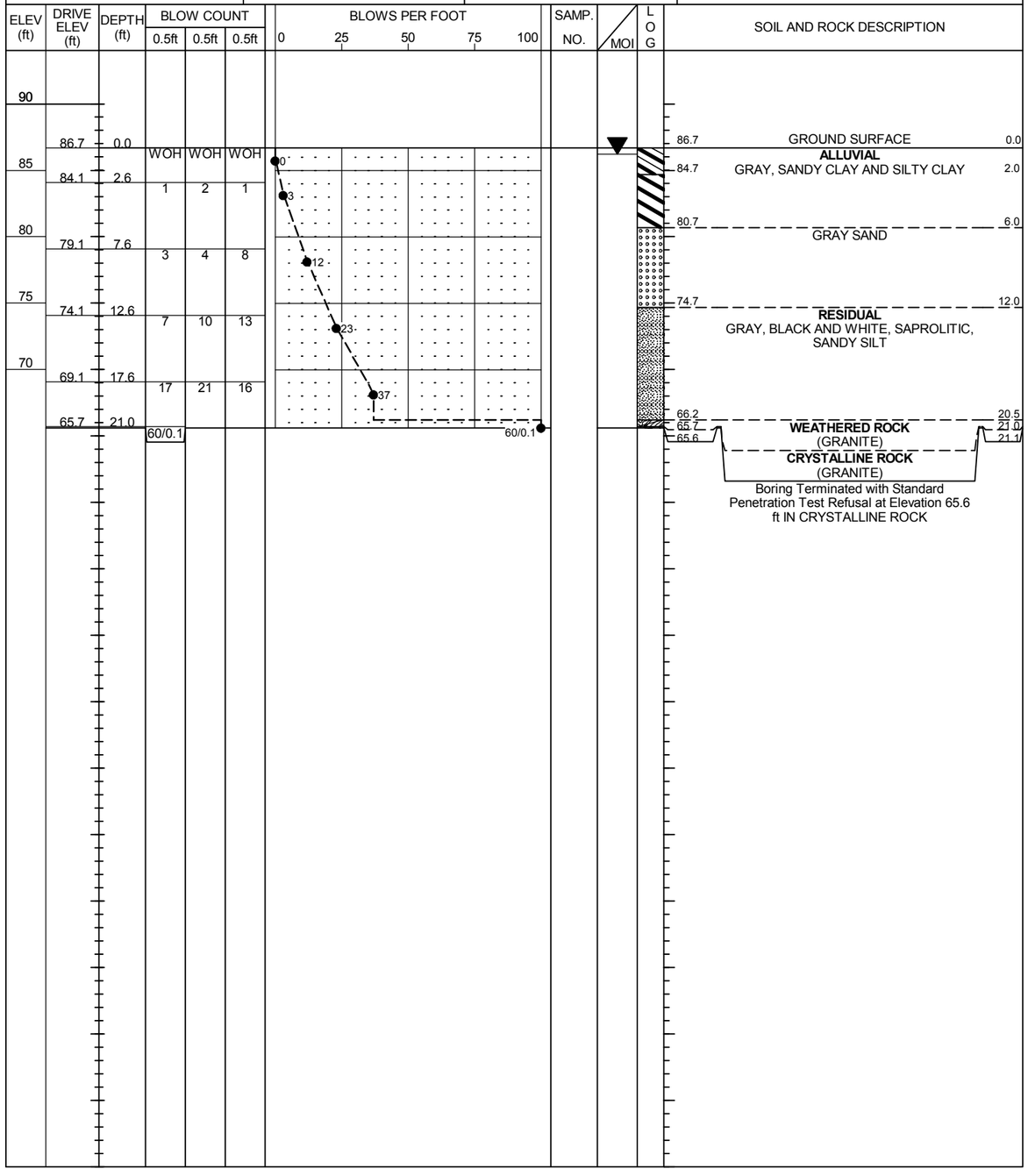
WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 60+00	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.5 ft	**TOTAL DEPTH** 27.0 ft	**NORTHING** 806,939	**EASTING** 2,348,970	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										97.5	0.0
										GROUND SURFACE	
										95.7	1.8
										(PAVEMENT)	
										ROADWAY EMBANKMENT	
										TAN, SANDY CLAY	
										93.0	4.5
										TAN, SILTY SAND	
	94.1	3.4	2	2	4	6					
										88.1	9.4
	89.1	8.4	WOH	2	98/0.4	100/0.9				87.5	10.0
						FILL				86.0	11.5
										ALLUVIAL	
	84.1	13.4	WOH	WOH	1	1	SS-8			GRAY, SANDY SILT	
										81.0	16.5
	79.1	18.4	3	1	1	2				GRAY, COARSE SAND	
										76.0	21.5
	74.1	23.4	6	10	14	24				**RESIDUAL**	
										GRAY, BLACK, AND WHITE, SAPROLITIC, SANDY SILT	
										72.0	25.5
	70.5	27.0	60/0.0			60/0.0				**WEATHERED ROCK** (GRANITE)	
										70.5	27.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 70.5 ft ON CRYSTALLINE ROCK	

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 60+60	**OFFSET** 36 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 87.7 ft	**TOTAL DEPTH** 18.4 ft	**NORTHING** 807,005	**EASTING** 2,348,977	**24 HR.** 1.8
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	87.7	0.0								87.7 GROUND SURFACE 0.0
			1	0	1	1				87.2 **ALLUVIAL** 0.5
										TAN, SILTY SAND
	84.3	3.4	2	2	3	5				TAN, SANDY CLAY
										80.7 GRAY SAND 7.0
	79.3	8.4	2	3	13	16				77.7 **RESIDUAL** 10.0
										GRAY, BLACK AND WHITE, SAPROLITIC, SANDY SILT
	74.3	13.4	6	8	12	20				72.2 **WEATHERED ROCK** 15.5
										(GRANITE)
	69.3	18.4	60/0.0			60/0.0				69.3 18.4
										Boring Terminated with Standard Penetration Test Refusal at Elevation 69.3 ft ON CRYSTALLINE ROCK

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 60+60	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 86.7 ft	**TOTAL DEPTH** 21.1 ft	**NORTHING** 806,967	**EASTING** 2,349,039	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER Pinter, D. G.	**START DATE** 02/03/15	**COMP. DATE** 02/04/15	**SURFACE WATER DEPTH** N/A



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 60+60	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 84.1 ft	**TOTAL DEPTH** 26.7 ft	**NORTHING** 806,991	**EASTING** 2,349,000	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** 1.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
85										84.1 GROUND SURFACE	0.0
	83.6	0.5	2	1	3	4	SS-9			83.6 ALLUVIAL GRAY, SILTY SAND / GRAY, SANDY SILT	0.5
80	79.0	5.1	16	84/0.5		100/1.0				80.1 GRAY SAND	4.0
										78.5 WEATHERED ROCK (GRANITE)	5.6
75	74.0	10.1	60/0.0			60/0.0				74.0 CRYSTALLINE ROCK GRAY, FRESH TO MODERATELY SEVERELY WEATHERED, SOFT TO VERY HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE	10.1
70										REC = 83% RQD = 75% RMR = 81	
65							RS-2				
60										57.4 Boring Terminated at Elevation 57.4 ft IN CRYSTALLINE ROCK	26.7

NCDOT BORE DOUBLE U3330_GEO_BRDG_STONEY_CREEK_SPT_BORINGS.GPJ NC_DOT.GDT 8/26/16

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 60+60	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 84.1 ft	**TOTAL DEPTH** 26.7 ft	**NORTHING** 806,991	**EASTING** 2,349,000	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** 1.6ft	
CORE SIZE NWD3	**TOTAL RUN** 16.6 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
73.96											Begin Coring @ 10.1 ft	
	74.0	10.1	1.6	N=60/0.0	(1.6)	(1.5)		(13.7)	(12.4)		74.0 CRYSTALLINE ROCK	10.1
	72.4	11.7	5.0	:32/0.6 :53/1.0	100%	94%		83%	75%		GRAY, FRESH TO MODERATELY SEVERELY WEATHERED, SOFT TO VERY HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE	
70				1:14/1.0 1:13/1.0 1:11/1.0	(2.6) 52%	(2.3) 46%						
	67.4	16.7	5.0	:59/1.0 :34/1.0 1:14/1.0	(4.5) 90%	(3.7) 74%	RS-2					
65				1:24/1.0 2:15/1.0 3:27/1.0 5:40/1.0								
	62.4	21.7	5.0	9:00/1.0 31:00/1.0 3:45/1.0 4:15/1.0	(5.0) 100%	(4.9) 98%						
60				7:00/1.0								
	57.4	26.7									57.4 Boring Terminated at Elevation 57.4 ft IN CRYSTALLINE ROCK	26.7

NCDOT CORE SINGLE U3330_GEO_BRDG_STONEY_CREEK_SPT_BORINGS.GPJ NC_DOT.GDT 8/26/16

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 61+45	**OFFSET** 36 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 87.1 ft	**TOTAL DEPTH** 28.0 ft	**NORTHING** 807,078	**EASTING** 2,349,021	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
90											
	87.1	0.0	WOH	WOH	3	3				87.1 GROUND SURFACE	0.0
85	84.2	2.9	3	4	5	9				**ALLUVIAL** 85.1 TAN AND ORANGE, SANDY CLAY AND SILTY CLAY	2.0
80	79.2	7.9	2	1	2	3				80.6 GRAY, COARSE SAND	6.5
75	74.2	12.9	4	9	27	36				76.1 **RESIDUAL** GREEN AND GRAY, SAPROLITIC, SANDY SILT	11.0
70	69.2	17.9	10	15	19	34					
65	64.2	22.9	18	82/0.4		100/0.9				66.1 **WEATHERED ROCK** (GRANITE)	21.0
60	59.2	27.9	60/0.1			60/0.1				59.2 **CRYSTALLINE ROCK** (GRANITE) 59.1	27.9 28.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 59.1 ft IN CRYSTALLINE ROCK

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 61+45	**OFFSET** 38 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 87.7 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 807,039	**EASTING** 2,349,084	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 02/04/15	**COMP. DATE** 02/04/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
90										
	87.7	0.0	1	2	1	3				87.7 GROUND SURFACE 0.0
85	83.8	3.9	2	1	2	3				87.2 **ALLUVIAL** 0.5 BROWN, SILTY SAND 85.2 2.5 ORANGE AND GRAY, SANDY CLAY AND SILTY CLAY
80	78.8	8.9	WOH	4	6	10				78.3 GRAY, COARSE SAND 9.4
75	73.8	13.9	60/0.1			60/0.1				76.5 **WEATHERED ROCK** (GRANITE) 11.2
										73.8 13.9 73.7 **CRYSTALLINE ROCK** (GRANITE) 14.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 73.7 ft IN CRYSTALLINE ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 61+45	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 88.9 ft	**TOTAL DEPTH** 50.2 ft	**NORTHING** 807,064	**EASTING** 2,349,044	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
90											
	88.9	0.0	WOH	2	3	5				88.9 GROUND SURFACE	0.0
85										**ALLUVIAL** TAN, SANDY CLAY	
	84.0	4.9	3	5	6	11	SS-10				
80										80.9 GRAY, COARSE SAND	8.0
	79.0	9.9	3	2	2	4					
75										75.0 **RESIDUAL** GRAY, GREEN AND BLACK, SAPROLITIC, SANDY SILT	13.9
	74.0	14.9	7	11	15	26					
70											
	69.0	19.9	6	13	23	36					
65											
	64.0	24.9	6	8	13	21					
60											
	59.0	29.9	21	79/0.4		100/0.9				58.5 **WEATHERED ROCK** (GRANITE)	30.4
55											
	54.0	34.9	60/0.0			60/0.0	RS-1			54.0 **CRYSTALLINE ROCK** GRAY, FRESH TO SLIGHTLY WEATHERED, VERY HARD, CLOSE TO WIDE FRACTURE SPACING, GRANITE REC = 99% RQD = 92% RMR = 84	34.9
50											
45											
40										38.7 Boring Terminated at Elevation 38.7 ft IN CRYSTALLINE ROCK	50.2

NCDOT BORE DOUBLE U3330_GEO_BRDG_STONEY_CREEK_SPT_BORINGS.GPJ NC_DOT.GDT 8/26/16

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 61+45	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 88.9 ft	**TOTAL DEPTH** 50.2 ft	**NORTHING** 807,064	**EASTING** 2,349,044	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NWD3	**TOTAL RUN** 15.3 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
53.96												
	54.0	34.9	1.6	*N=60/0.0*	(1.5)	(0.9)		(15.1)	(14.0)		Begin Coring @ 34.9 ft	
	52.4	36.5		:47/0.6	94%	56%		99%	92%		54.0 **CRYSTALLINE ROCK**	34.9
50			5.0	1:20/1.0			RS-1				GRAY, FRESH TO SLIGHTLY WEATHERED, VERY HARD, CLOSE TO WIDE FRACTURE SPACING, GRANITE	
				1:02/1.0	(4.9)	(4.4)						
				1:47/1.0	98%	88%						
				1:23/1.0								
	47.4	41.5		1:47/1.0								
				1:48/1.0								
45			5.0	1:37/1.0	(5.0)	(5.0)						
				1:55/1.0	100%	100%						
				2:04/1.0								
				2:15/1.0								
	42.4	46.5		3:00/1.0								
40			3.7	3:10/1.0	(3.7)	(3.7)						
				5:00/1.0	100%	100%						
				7:08/1.0								
	38.7	50.2		20:00/0.7							38.7 Boring Terminated at Elevation 38.7 ft IN CRYSTALLINE ROCK	50.2

NCDOT CORE SINGLE U3330_GEO_BRDG_STONEY_CREEK_SPT_BORINGS.GPJ NC_DOT.GDT 8/26/16

GEOTECHNICAL BORING REPORT
BORE LOG

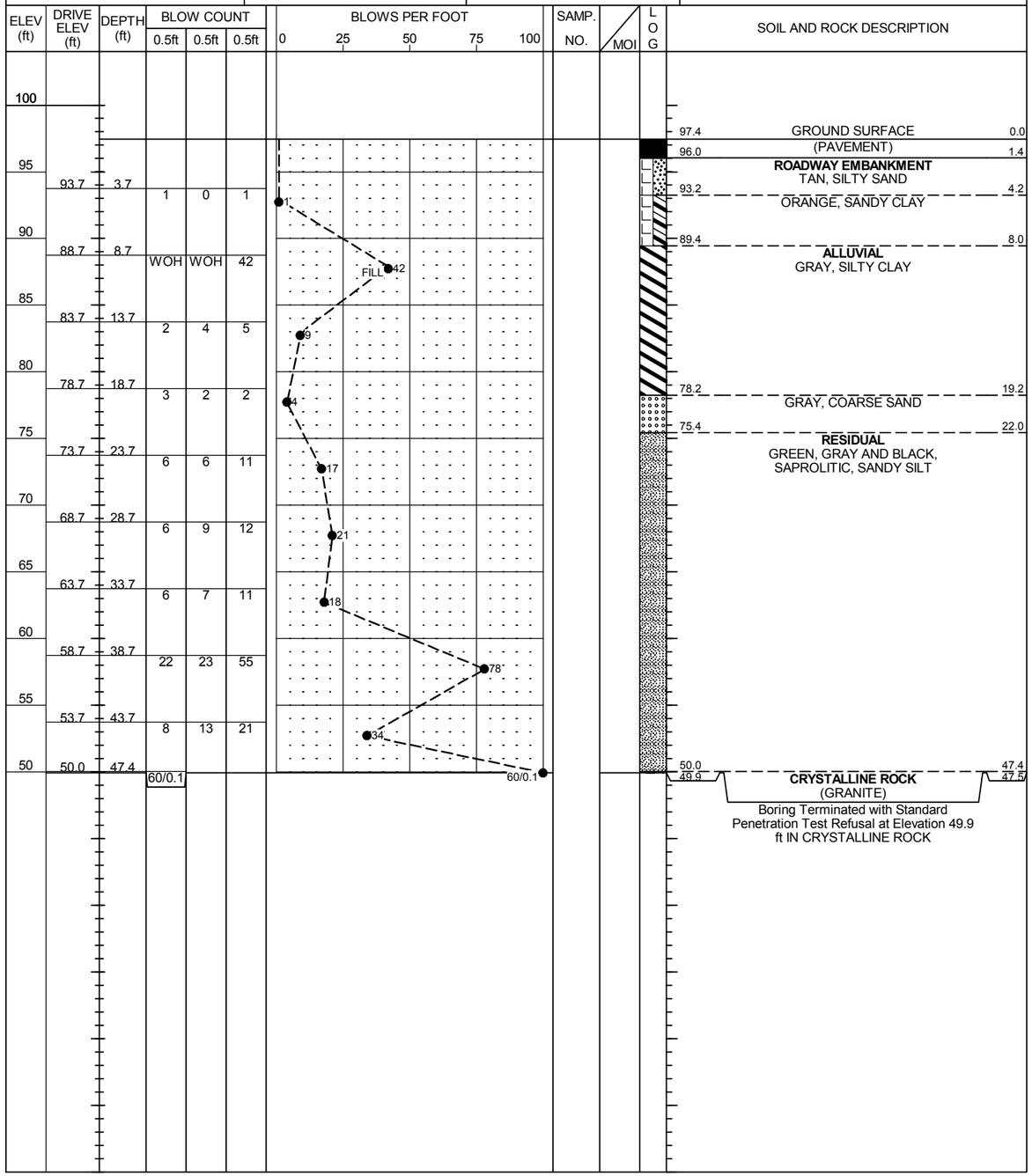
WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 62+10	**OFFSET** 36 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.7 ft	**TOTAL DEPTH** 55.3 ft	**NORTHING** 807,133	**EASTING** 2,349,054	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 01/20/15	**COMP. DATE** 01/20/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										97.7 GROUND SURFACE	0.0
										96.3 (PAVEMENT)	1.4
										ROADWAY EMBANKMENT	
	94.5	3.2	3	3	3	6				94.2 TAN, SILTY SAND	3.5
										ORANGE, SANDY CLAY	
	89.5	8.2	WOH	1	2	3	SS-1			89.7 **ALLUVIAL**	8.0
										GRAY, ORANGE AND YELLOW, SANDY CLAY	
	84.5	13.2	3	5	7	12					
	79.5	18.2	3	4	3	7				79.3 GRAY, COARSE SAND	18.4
	74.5	23.2	3	3	2	5				74.3 **UNDIVIDED COASTAL PLAIN**	23.4
										GRAY, SILTY CLAY WITH SHELL FRAGMENTS	
	69.5	28.2	5	7	8	15				68.7 **RESIDUAL**	29.0
	64.5	33.2	4	9	9	18				GRAY, WHITE AND BLACK, SAPROLITIC, SANDY SILT	
	59.5	38.2	9	15	35	50					
	54.5	43.2	26	28	68	96				51.7 **WEATHERED ROCK**	46.0
	49.5	48.2	100/0.4			100/0.4				(GRANITE)	
	44.5	53.2	100/0.4			100/0.4					
	42.5	55.2	60/0.1			60/0.1				42.5 **CRYSTALLINE ROCK** 42.4	55.2 55.3
										(GRANITE)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 42.4 ft IN CRYSTALLINE ROCK	

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 62+05	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.8 ft	**TOTAL DEPTH** 43.0 ft	**NORTHING** 807,091	**EASTING** 2,349,114	**24 HR.** 12.1
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 02/05/15	**COMP. DATE** 02/05/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										97.8 GROUND SURFACE	0.0
	96.3	1.5								96.3 (PAVEMENT)	1.5
			WOH	WOH	3	3				**ROADWAY EMBANKMENT**	
	94.2	3.6								TAN AND ORANGE, SANDY CLAY	
			WOH	2	2	4					
	89.2	8.6									
			WOH	WOH	1	1					
	84.2	13.6								85.8 **ALLUVIAL**	12.0
			2	3	4	7				GRAY, SILTY CLAY	
	79.1	18.7								80.8 GRAY, SILTY SAND	17.0
			2	1	4	5					
	74.1	23.7								75.8 **RESIDUAL**	22.0
			4	7	9	16				GRAY AND GREEN SAPROLITIC, SANDY SILT	
	69.1	28.7									
			9	11	15	26					
	64.1	33.7									
			7	11	14	25					
	59.1	38.7									
			44	45	25	70					
	54.8	43.0	60/0.0			60/0.0				54.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 54.8 ft ON CRYSTALLINE ROCK	43.0
										Other Samples: ST-1 (8.6 - 10.6) ST-2 (10.6 - 12.6)	

WBS 36596.1.2	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 62+05	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 97.4 ft	**TOTAL DEPTH** 47.5 ft	**NORTHING** 807,115	**EASTING** 2,349,075	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER Pinter, D. G.	**START DATE** 02/02/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A



PROJ. NO. - 36596.1.2
ID NO. - U-3330
COUNTY - NASH

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-2	**37'LT**	**59+96**	**8.6'-9.7'**	**A-7-6(6)**	**41**	**24**	**30.3**	**27.1**	**16.4**	**26.3**	**94**	**74**	**43**	**-**	**-**
SS-3	**37'LT**	**59+96**	**13.6'-15.1'**	**A-4(5)**	**29**	**10**	**7.1**	**25.7**	**37.0**	**30.3**	**96**	**94**	**70**	**-**	**-**

EB1-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	**8'LT**	**60+00**	**13.4'-14.9'**	**A-4(3)**	**25**	**9**	**13.5**	**29.9**	**28.3**	**28.3**	**100**	**94**	**64**	**-**	**-**

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-11	**37'RT**	**59+98**	**2.6'-4.1'**	**A-7-6(6)**	**43**	**24**	**36.0**	**22.8**	**12.9**	**28.3**	**97**	**73**	**43**	**-**	**-**

B1-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9	**9'LT**	**60+60**	**0.5'-1.5'**	**A-4(1)**	**23**	**7**	**16.4**	**39.8**	**21.6**	**22.2**	**100**	**94**	**49**	**-**	**-**

B2-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	**9'LT**	**61+45**	**4.9'-6.4'**	**A-6(11)**	**31**	**15**	**1.2**	**21.8**	**38.6**	**38.4**	**100**	**100**	**84**	**-**	**-**

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	**36'LT**	**62+10**	**8.2'-9.7'**	**A-6(13)**	**38**	**20**	**14.7**	**16.6**	**30.3**	**38.4**	**100**	**91**	**73**	**-**	**-**

CORE PHOTOGRAPHS

B1-C

BOXES 1 & 2: 10.1 - 26.7 FEET

0 1 2
FEET

B2-C

BOXES 1 & 2: 34.9 - 50.2 FEET

0 1 2
FEET

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	16

REFERENCE: U-3330

PROJECT: 36591

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY NASH

PROJECT DESCRIPTION US 301 BYPASS FROM SR 1836 (MAY DR.) TO NC 43-48 (BENVENUE RD.)

SITE DESCRIPTION NOISE WALL 2 ALONG US 301 BYPASS FROM -L- STA 30+81 TO STA 38+46

CONTENTS

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2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

B. KEANEY

B. HOWEY

C. JONES

B. THOMPSON

D. TIGNOR

INVESTIGATED BY HDR ENGINEERING, INC. F&R, INC.

DRAWN BY CBJ

CHECKED BY ECH

SUBMITTED BY HDR ENGINEERING, INC.

DATE 3/2016

NORTH CAROLINA PROFESSIONAL SEAL 20175 ENGINEER ELIZABETH C. HOWEY

DocuSigned by:
Elizabeth C. Howey 3/23/2016
F80E690821524F3...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3330	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 2- 1/4" HSA

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B ____ [ ] -H ____
- [X] -N 0-3

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: • SEE NOTE

ELEVATION: _____ FEET

NOTES:

BORING AND GROUND SURFACE ELEVATIONS DERIVED FROM GEOPAK AND TIN FILE "U3330_ls_tin_tin" DATED 10/10/14

FIAD - FILLED IN AFTER DRILLING

DATE: 8-15-14

8/6/13

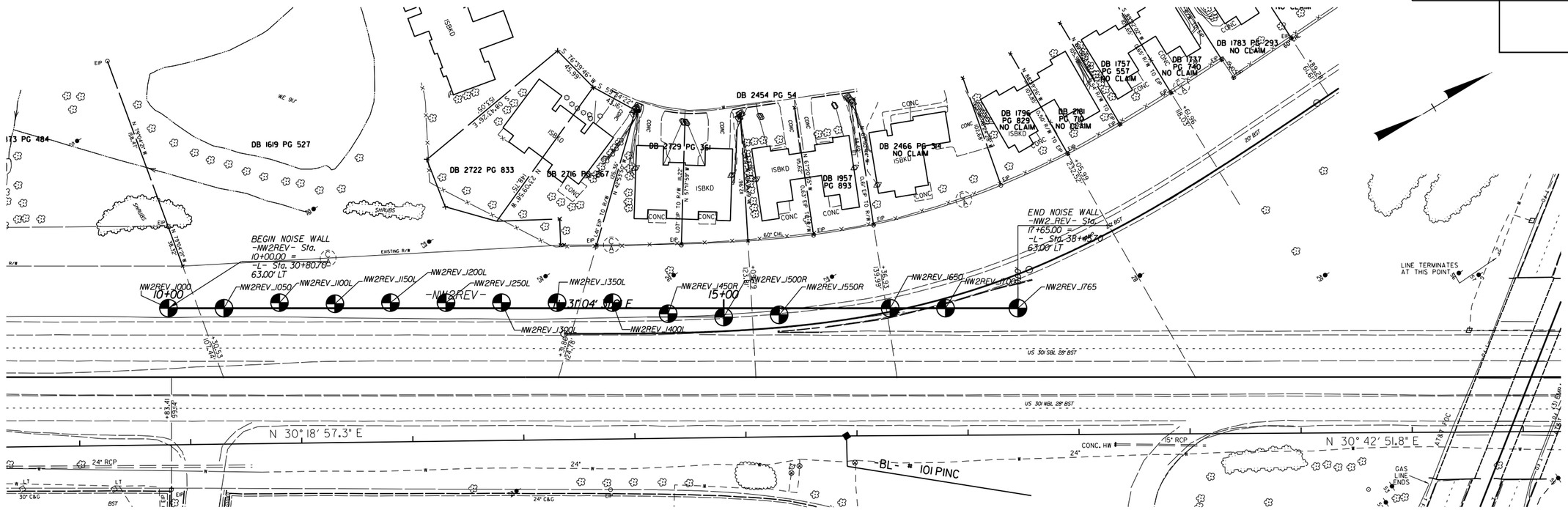
PROJECT REFERENCE NO.	SHEET NO.
U-3330	3

PEDEA ENGINEER

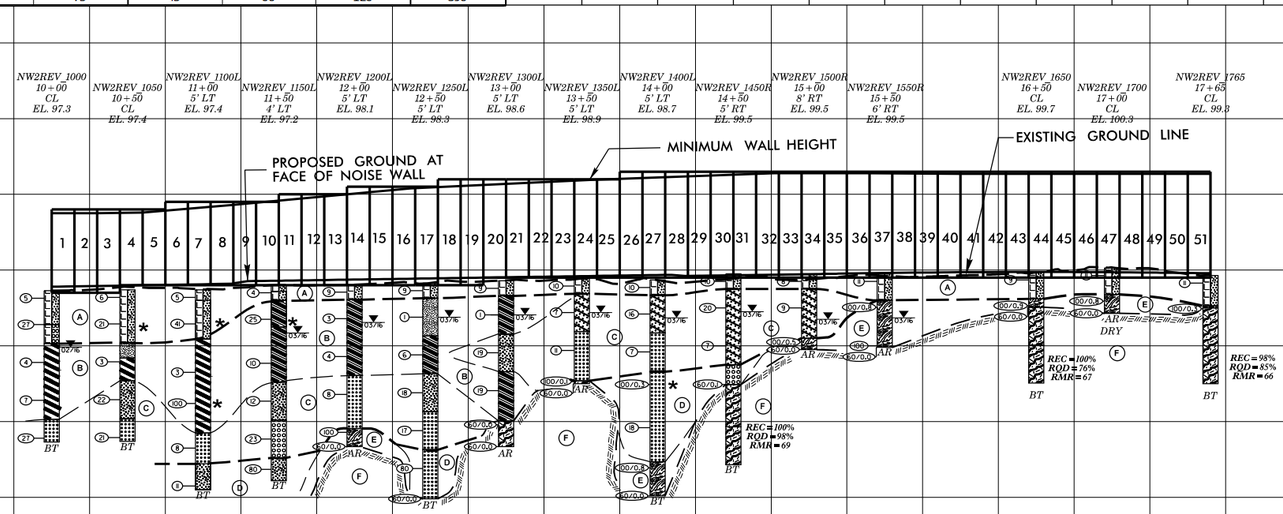
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN AND PROFILE OF NOISE WALL 2REV



NOISE WALL 2REV DESIGN DATA						
PANEL NUMBER	1-5	6-10	11-13	14-17	18-25	26-51
TOP ELEVATION	108'	109'	110'	111'	112'	113'
PANEL LENGTH	75'	75'	45'	60'	120'	390'



(A) ROADWAY EMBANKMENT
LIGHT BROWN TO GRAY, FINE TO COARSE SAND (A-2-4,A-1-b) LITTLE SILT, TRACE GRAVEL AND CLAY, LOOSE TO DENSE

(B) COASTAL PLAIN
GRAY WITH YELLOW, CLAY TO FINE SANDY CLAY (A-6 TO A-7-6) AND FINE SANDY SILT (A-4), WITH TRACE GRAVEL VERY SOFT TO VERY STIFF

(C) COASTAL PLAIN
TAN AND GRAY WITH YELLOW AND RED, FINE TO COARSE, SILTY SAND AND CLAYEY SAND (A-1-b, A-3, A-2-4, A-2-6), TRACE GRAVEL LOOSE TO MEDIUM DENSE

(D) RESIDUAL
GRAY AND WHITE, RED AND BROWN, SILTY SAND AND FINE TO COARSE SAND (A-2-4, A-3,A-1-b), MEDIUM DENSE TO VERY DENSE

(E) WEATHERED ROCK (GRANITE)

(F) CRYSTALLINE ROCK (GRANITE)
GRAY, BLACK, AND WHITE, VERY SLIGHT TO FRESH WEATHERING HARD TO VERY HARD, CLOSELY TO WIDELY FRACTURED

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1000	**STATION** 10+00	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** 11.0
COLLAR ELEV. 97.3 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 805,122	**EASTING** 2,347,811	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/26/16	**COMP. DATE** 02/26/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100											
	97.3	0.0								97.3	0.0
			3	3	2	5		D		GROUND SURFACE **ROADWAY EMBANKMENT** Brown, fine SAND (A-2-4), little silt, loose	
95	93.8	3.5	3	9	18	27		D		92.8	4.5
										Gray, fine to coarse SAND (A-1-b) with coarse gravel, some clay, medium dense	
90	88.8	8.5	1	2	2	4		M		90.3 **COASTAL PLAIN** Gray, yellow marbling, CLAY (A-7-6), little organics, soft to medium	7.0
85	83.8	13.5	4	3	4	7		M			
80	78.8	18.5	4	9	18	27		W		80.3 White, fine to coarse SAND (A-3), medium dense 77.3	17.0 20.0
										Boring Terminated at Elevation 77.3 ft IN SAND (COASTAL PLAIN)	

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1050	**STATION** 10+50	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** 10.0
COLLAR ELEV. 97.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 805,024	**EASTING** 2,347,751	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/26/16	**COMP. DATE** 02/26/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
100										
	97.4	0.0								97.4 GROUND SURFACE 0.0
			3	4	2	6		D		**ROADWAY EMBANKMENT** Light brown to brown, fine to coarse SAND (A-2-4), little silt, trace fine gravel and clay, loose to medium dense
95	93.9	3.5	3	13	8	21		D		Hard drilling from 5.0' to 7.5' (likely boulder)
90	88.9	8.5	WOH	1	2	3		D		90.4 7.0 **COASTAL PLAIN** 88.4 Gray, fine sandy SILT (A-4), very soft 9.0 Gray, CLAY (A-7-6), yellow marbling, soft
85	83.9	13.5	8	12	10	22		D		85.4 12.0 Gray, fine SAND (A-2-4), medium dense
80	78.9	18.5	14	7	14	21		W		80.4 17.0 Red and brown, fine to coarse SAND (A-3), medium dense 77.4 20.0
										Boring Terminated at Elevation 77.4 ft IN SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1100	**STATION** 11+00	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** FIAD
COLLAR ELEV. 97.4 ft	**TOTAL DEPTH** 6.5 ft	**NORTHING** 804,553	**EASTING** 2,347,468	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/26/16	**COMP. DATE** 02/26/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
100										
	97.4	0.0	3	3	2	5				97.4 0.0 GROUND SURFACE
95										**ROADWAY EMBANKMENT** Dark brown to dark gray, fine to coarse SAND (A-2-4), trace fine to coarse gravel, silt and organics, loose to dense
	93.9	3.5	7	28	13	41				Boring terminated due to boulder at 6.5'
										90.9 6.5 Boring Terminated BY AUGER REFUSAL at Elevation 90.9 ft IN SAND (ROADWAY EMBANKMENT)

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1100L	**STATION** 11+00	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 8.0
COLLAR ELEV. 96.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 804,555	**EASTING** 2,347,463	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/26/16	**COMP. DATE** 02/26/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
100										
										96.0 0.0 GROUND SURFACE
95										See boring NW2REV_1100 for soil description from 0'-8.5'
	87.5	8.5	WOH	WOH	3	3		D		89.5 6.5 **COASTAL PLAIN** Gray, CLAY (A-7-6), contains trace organics, soft
90										
85	82.5	13.5	100			100		D		No recovery at 13.5', assumed same as above, believed to be boulder
80	77.5	18.5	4	3	5	8		W		78.5 17.5 Light brown to tan, fine to coarse SAND (A-3) with little silt, loose to medium dense
75	72.5	23.5	5	5	6	11		W		74.0 22.0 **RESIDUAL** Gray and white, silty fine SAND (A-2-4) with mica, saprolitic
										71.0 25.0 Boring Terminated at Elevation 71.0 ft IN SAND (RESIDUAL)

Notes
1) Boring offset from NW2REV_1100 approximately 5 feet west

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1150	**STATION** 11+50	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** FIAD
COLLAR ELEV. 98.0 ft	**TOTAL DEPTH** 5.5 ft	**NORTHING** 804,981	**EASTING** 2,347,726	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
100										
	98.0	0.0	1	2	2	4		D		98.0 / 0.0 GROUND SURFACE
95										**ROADWAY EMBANKMENT**
	94.5	3.5	2	10	15	25		D		96.0 / 2.0 Brown, fine SAND (A-2-4), trace silt, little organics, loose
										Yellow and brown, CLAY (A-6) with sand, little gravel, very stiff
										92.5 / 5.5 Hard drilling from 5.0' to 5.5' (likely boulder)
										Boring terminted due to boulder at 5.5'
										Boring Terminated BY AUGER REFUSAL at Elevation 92.5 ft IN CLAY (ROADWAY EMBANKMENT)

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1150L	**STATION** 11+50	**OFFSET** 4 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 8.0
COLLAR ELEV. 97.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 804,598	**EASTING** 2,347,489	**24 HR.** 5.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
100										
										97.2 / 0.0 GROUND SURFACE
										See boring NW2REV_1150 for soil description from 0'-8.5'
95										
										91.7 / 5.5 **COASTAL PLAIN**
90										Gray, CLAY (A-6), with fine sand, stiff
	88.7	8.5	2	4	6	10		M		
85										85.2 / 12.0 Gray, fine SAND (A-2-4), little silt, trace organics, medium dense
	83.7	13.5	3	4	8	12		W		
80										80.2 / 17.0 Light brown, gravelly fine to coarse SAND (A-1-b), medium dense
	78.7	18.5	14	15	8	23		W		
75										75.2 / 22.0 **RESIDUAL**
	74.7	22.5	13	19	61	80		W		Gray, silty SAND (A-2-4), little rock fragments, very dense
										72.2 / 25.0 Boring Terminated at Elevation 72.2 ft IN SAND (RESIDUAL)

Notes
1) Boring offset from NW2REV_1150 approximately 4 feet west

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1200L	**STATION** 12+00	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 9.0
COLLAR ELEV. 98.1 ft	**TOTAL DEPTH** 21.4 ft	**NORTHING** 804,938	**EASTING** 2,347,700	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100											
	98.1	0.0	1	5	4	9		D		98.1 GROUND SURFACE	0.0
95										**ROADWAY EMBANKMENT**	
	94.6	3.5	1	2	1	3		D		96.1 Brown, fine to coarse SAND (A-2-4), trace silt and fine gravel, loose	2.0
90										**COASTAL PLAIN**	
	89.6	8.5	WOH	2	2	4		M		Gray with light brown marbling, CLAY (A-6), trace fine sand, soft	
85										86.1	12.0
	84.6	13.5	3	4	4	8		W		Gray, red, and brown, fine to coarse SAND (A-3), trace silt, loose to medium dense	
80										79.1	19.0
	79.6	18.5	15	59	52	100				**WEATHERED ROCK**	
	76.7	21.4	60/0.0			60/0.0				76.7 Gray, GRANITE Hard drilling from 19.5' to 21.4'	21.4
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 76.7 ft ON CRYSTALLINE ROCK (GRANITE)	
										Auger refusal at 21.4'	

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1250L	**STATION** 12+50	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 9.0
COLLAR ELEV. 98.3 ft	**TOTAL DEPTH** 28.5 ft	**NORTHING** 804,895	**EASTING** 2,347,674	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
100											
	98.3	0.0	2	6	3	9		D		98.3 GROUND SURFACE	0.0
95										**ROADWAY EMBANKMENT**	
	94.8	3.5	WOH	WOH	1	1		D		96.3 Dark brown, fine to coarse SAND (A-2-4), little fine to coarse gravel, loose	2.0
90								M		**COASTAL PLAIN**	
	89.8	8.5	1	2	4	6				Dark gray, SILT (A-4), little fine sand, trace organics, very soft	
85								D		91.3 Gray, sandy CLAY (A-6), medium stiff	7.0
	84.8	13.5	3	6	12	18				86.3	12.0
80								W		Light brown, fine to coarse SAND (A-2-4), trace silt, medium dense	
	79.8	18.5	5	8	9	17				81.3	17.0
75								W		Light brown, fine to coarse SAND (A-3), trace gravel, medium dense	
	74.8	23.5	17	36	44	80				76.3	22.0
70								W		**RESIDUAL**	
	69.8	28.5	60/0.0			60/0.0				Red and brown, fine to coarse SAND (A-3), very dense	
										69.8	28.5
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 69.8 ft ON CRYSTALLINE ROCK (GRANITE)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1300L	**STATION** 13+00	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 17.0
COLLAR ELEV. 98.6 ft	**TOTAL DEPTH** 21.9 ft	**NORTHING** 805,122	**EASTING** 2,347,811	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100											
	98.6	0.0	2	4	5	9		D		98.6 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
										96.6 Light brown, fine to coarse SAND (A-2-4), trace fine gravel and silt, medium dense	2.0
95	95.1	3.5	3	1	WOH	1		D		**COASTAL PLAIN**	
										Yellow and light brown, sandy CLAY (A-6), very soft	
										91.6	7.0
90	90.1	8.5	4	8	11	19		D		Light yellow and brown, fine to coarse SAND (A-2-4), little silt, trace gravel, medium dense	
										86.6	12.0
85	85.1	13.5	7	8	11	19		W		Gray, CLAY (A-6), little fine sand, very stiff	
80	80.1	18.5	34	60/0.0		60/0.0		W		79.6	19.0
	76.7	21.9	60/0.0			60/0.0				**CRYSTALLINE ROCK** Gray, CRYSTALLINE ROCK (GRANITE) 76.7	21.9
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 76.7 ft IN CRYSTALLINE ROCK (GRANITE)	
										Auger refusal at 21.9'	

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1350L	**STATION** 13+50	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 6.5
COLLAR ELEV. 98.9 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 804,810	**EASTING** 2,347,622	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
100										
	98.9	0.0	2	5	5	10		D		98.9 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT
										96.9 Light brown, fine to coarse SAND (A-2-4), little silt, trace fine gravel, medium dense 2.0
95	95.4	3.5	1	3	4	7		D		**COASTAL PLAIN**
										Light brown, clayey fine SAND (A-2-6), loose
										91.9 7.0
90	90.4	8.5	5	6	5	11		M		Light brown, red and brown, fine to coarse SAND (A-3), trace gravel, medium dense to very dense
85	85.4	13.5	100/0.1			100/0.1				85.4 13.5
	85.0	13.9	60/0.0			60/0.0				**CRYSTALLINE ROCK** Gray, CRYSTALLINE ROCK (GRANITE) 85.0 13.9
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 85.0 ft IN CRYSTALLINE ROCK (GRANITE)
										Auger refusal at 13.9'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1400L	**STATION** 14+00	**OFFSET** 5 ft LT	**ALIGNMENT** -NW2REV-	**0 HR.** 7.0
COLLAR ELEV. 98.7 ft	**TOTAL DEPTH** 28.5 ft	**NORTHING** 804,767	**EASTING** 2,347,597	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D. Tignor	**START DATE** 02/29/16	**COMP. DATE** 02/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100	98.7	0.0	3	5	5	10		D		98.7 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
										96.7 Brown, fine to coarse SAND (A-2-4), trace fine gravel, loose	2.0
95	95.2	3.5	5	5	11	16		D		**COASTAL PLAIN**	
										Light brown, clayey SAND (A-2-6), trace gravel, medium dense	
90	90.2	8.5	3	4	3	7		M		91.7 Light brown, fine SAND (A-3), loose	7.0
85	85.2	13.5	100/0.3			100/0.3		D		86.7 **RESIDUAL** Light brown, fine to coarse SAND (A-3), very dense	12.0
80	80.2	18.5	5	8	10	18		D			
75	75.2	23.5	12	36	64/0.3	100/0.8		D		74.7 **WEATHERED ROCK** Light gray and light brown, GRANITE	24.0
	70.2	28.5	60/0.0			60/0.0				70.2 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 70.2 ft ON CRYSTALLINE ROCK (GRANITE)	28.5

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1450R	**STATION** 14+50	**OFFSET** 5 ft RT	**ALIGNMENT** -NW2REV-	**0 HR.** 12.0
COLLAR ELEV. 99.5 ft	**TOTAL DEPTH** 25.2 ft	**NORTHING** 804,850	**EASTING** 2,347,653	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100											
	99.5	0.0	4	4	6	10 20		D		99.5 GROUND SURFACE	0.0
95	96.0	3.5	5	10	10			D		**ROADWAY EMBANKMENT** Brown, coarse to fine SAND (A-2-4), little clay, trace fine gravel, loose	2.0
	91.0	8.5	2	3	4	7		D		97.5 **COASTAL PLAIN** Light brown to yellow-brown, coarse to fine clayey SAND (A-2-6), trace gravel, medium dense to loose	
90										87.5	12.0
	86.0	13.5	1	8	60/0.1	60/0.1 60/0.0		W		**RESIDUAL** Light brown, medium to coarse SAND (A-1-b), trace silt, some rock fragments	
85	84.3	15.2	60/0.0							85.0 **CRYSTALLINE ROCK** Gray, black, and white, CRYSTALLINE ROCK (GRANITE) Hard drilling from 14.6' to 15.2'	14.5
80											
75										74.3 Boring Terminated at Elevation 74.3 ft IN CRYSTALLINE ROCK (GRANITE)	25.2
										Auger refusal at 15.2'	

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1450R	**STATION** 14+50	**OFFSET** 5 ft RT	**ALIGNMENT** -NW2REV-	**0 HR.** 12.0
COLLAR ELEV. 99.5 ft	**TOTAL DEPTH** 25.2 ft	**NORTHING** 804,850	**EASTING** 2,347,653	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE 1.775	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
84.3											Begin Coring @ 15.2 ft	
	84.3	15.2	5.0	3.50/1.0 3.00/1.0 2.50/1.0 4.25/1.0 7.00/1.0	(5.0) 100%	(4.8) 96%					**CRYSTALLINE ROCK** Gray, black, and white, very slight to fresh weathering, hard, closely to widely fractured, CRYSTALLINE ROCK (GRANITE)	
80	79.3	20.2									RMR = 69 *(continued)*	
			5.0	3.50/1.0 3.50/1.0 3.00/1.0 4.00/1.0 7.50/1.0	(5.0) 100%	(5.0) 100%						
75	74.3	25.2									74.3 Boring Terminated at Elevation 74.3 ft IN CRYSTALLINE ROCK (GRANITE)	25.2

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1500R	**STATION** 15+00	**OFFSET** 8 ft RT	**ALIGNMENT** -NW2REV-	**0 HR.** 8.0
COLLAR ELEV. 99.5 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 804,893	**EASTING** 2,347,678	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
100										
	99.5	0.0	4	3	5	8		D		99.5 / 0.0 GROUND SURFACE
										ROADWAY EMBANKMENT
										97.5 / 2.0 Brown, coarse to fine SAND (A-2-4), trace silt, trace organics (grass and roots), loose
95	96.0	3.5	2	3	6	9		D		**COASTAL PLAIN**
										Reddish-brown, clayey SAND, (A-2-6), loose
	91.0	8.5	100/0.5			100/0.5		M		91.0 / 8.5
90	89.5	10.0	60/0.0			60/0.0				89.5 / 10.0 **WEATHERED ROCK** Dark brown, GRANITE
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 89.5 ft ON CRYSTALLINE ROCK (GRANITE)
										Auger refusal at 10.0'

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1550R	**STATION** 15+50	**OFFSET** 6 ft RT	**ALIGNMENT** -NW2REV-	**0 HR.** 7.0
COLLAR ELEV. 99.5 ft	**TOTAL DEPTH** 9.7 ft	**NORTHING** 804,935	**EASTING** 2,347,705	**24 HR.** 5.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
100										
	99.5	0.0	3	4	7	11		D		99.5 / 0.0 GROUND SURFACE
										ROADWAY EMBANKMENT
										Brown, coarse to fine SAND (A-2-4), trace silt, medium dense
95	96.0	3.5	33	67/0.3		100/0.8		D		96.0 / 3.5 **WEATHERED ROCK**
										Gray to white, GRANITE
	91.0	8.5								
90	89.8	9.7	25	75/0.5		100		M		89.8 / 9.7
			60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 89.8 ft ON CRYSTALLINE ROCK (GRANITE)
										Auger refusal at 9.7'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1650	**STATION** 16+50	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** Dry
COLLAR ELEV. 99.7 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 805,024	**EASTING** 2,347,751	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100										99.7 GROUND SURFACE	0.0
	99.7	0.0	2	4	5	9		D		**ROADWAY EMBANKMENT** Light brown, coarse to fine clayey SAND (A-2-4), loose	
	96.2	3.5								96.2	3.5
95	95.1	4.6	57	43/0.4		100/0.9		D		95.1 **WEATHERED ROCK** Light brown, gray, and white, GRANITE	4.6
			60/0.0			60/0.0				**CRYSTALLINE ROCK** Gray, black, and white, CRYSTALLINE ROCK (GRANITE)	
							RS-1				
90											
										85.1	14.6
										Boring Terminated at Elevation 85.1 ft IN CRYSTALLINE ROCK (GRANITE)	
										Auger refusal at 4.6'	

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1650	**STATION** 16+50	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** Dry
COLLAR ELEV. 99.7 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 805,024	**EASTING** 2,347,751	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE 1.775	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
95											Begin Coring @ 4.6 ft	
	95.1	4.6	5.0	3.00/1.0 3.00/1.0 4.00/1.0 6.25/1.0 5.00/1.0	(5.0) 100%	(2.6) 52%					95.1 **CRYSTALLINE ROCK** Gray, black, and white, very slight to fresh weathering, hard to very hard, closely to widely fractured, CRYSTALLINE ROCK (GRANITE),	4.6
90	90.1	9.6					RS-1				RMR=67	
			5.0	3.00/1.0 2.25/1.0 2.50/1.0 3.00/1.0 3.00/1.0	(5.0) 100%	(5.0) 100%						
	85.1	14.6									85.1	14.6
											Boring Terminated at Elevation 85.1 ft IN CRYSTALLINE ROCK (GRANITE)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1700	**STATION** 17+00	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** Dry
COLLAR ELEV. 100.3 ft	**TOTAL DEPTH** 6.0 ft	**NORTHING** 805,066	**EASTING** 2,347,777	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
105										
100	100.3	0.0	2	4	7	11		D		ELEV. (ft) 100.3 GROUND SURFACE DEPTH (ft) 0.0
	96.8	3.5	50	50/0.3		100/0.8		D		**ROADWAY EMBANKMENT** Light brown, coarse to fine SAND (A-2-4), trace silt, little organics (grass and roots), medium dense — 96.8 / 3.5
95	94.3	6.0	60/0.0			60/0.0				**WEATHERED ROCK** White to gray, GRANITE — 94.3 / 6.0
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 94.3 ft ON CRYSTALLINE ROCK (GRANITE)
										Auger refusal at 6.0'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1765	**STATION** 17+65	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** Dry
COLLAR ELEV. 99.3 ft	**TOTAL DEPTH** 14.3 ft	**NORTHING** 805,122	**EASTING** 2,347,811	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
100	99.3	0.0								99.3 GROUND SURFACE	0.0
			4	4	7	11		D		**ROADWAY EMBANKMENT** Light brown, coarse to fine SAND (A-2-4), little silt, little fine gravel, medium dense	
95	95.8	3.5	6	100/0.3		100/0.3	RS-2	D		95.3	4.0
										95.0 **WEATHERED ROCK** Light gray, GRANITE **CRYSTALLINE ROCK** Gray, black, and white, CRYSTALLINE ROCK (GRANITE)	4.3
90											
85										85.0	14.3
										Boring Terminated at Elevation 85.0 ft IN CRYSTALLINE ROCK (GRANITE) Auger refusal at 4.3'	

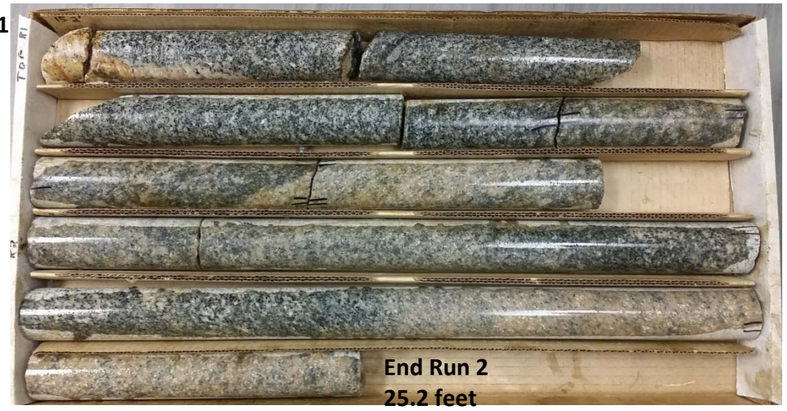
WBS 36591.1.1	**TIP** U-3330	**COUNTY** NASH	**GEOLOGIST** B. Thompson	
SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)				**GROUND WTR (ft)**
BORING NO. NW2REV_1765	**STATION** 17+65	**OFFSET** CL	**ALIGNMENT** -NW2REV-	**0 HR.** Dry
COLLAR ELEV. 99.3 ft	**TOTAL DEPTH** 14.3 ft	**NORTHING** 805,122	**EASTING** 2,347,811	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D. Tignor	**START DATE** 03/01/16	**COMP. DATE** 03/01/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE 1.775	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
95											Begin Coring @ 4.3 ft	
	95.0	4.3	5.0	3.00/1.0 4.00/1.0 3.25/1.0 3.50/1.0 5.25/1.0	(4.8) 96%	(4.0) 80%	RS-2				**CRYSTALLINE ROCK** Gray, black, and white, very slight weathering, hard, closely fractured, CRYSTALLINE ROCK (GRANITE) RMR=66	
90	90.0	9.3	5.0	5.25/1.0 4.75/1.0 7.25/1.0 3.25/1.0 3.00/1.0	(5.0) 100%	(4.5) 90%					85.0	14.3
85	85.0	14.3									Boring Terminated at Elevation 85.0 ft IN CRYSTALLINE ROCK (GRANITE)	

CORE PHOTOGRAPHS: NW2REV_1450R, NW2REV_1650, and NW2REV_1765: Station 14+50 to 17+65

Begin Run 1
15.2 feet

End Run 1 &
Begin Run 2
20.2 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

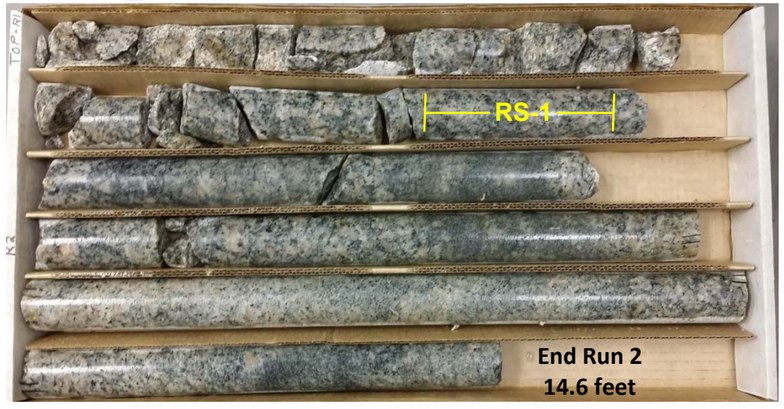
SCALE IN FEET

BORING NW2REV_1450R
Station 14+50, 5 RT
Run 1: 15.2-20.2 feet
100% REC, 96% RQD

Run 2: 20.2-25.2 feet
100% REC, 100% RQD

Begin Run 1
4.6 feet

End Run 1 &
Begin Run 2
9.6 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

BORING NW2REV_1650
Station 16+50
Run 1: 4.6-9.6 feet
100% REC, 52% RQD

Run 2: 9.6-14.6 feet
100% REC, 100% RQD

Begin Run 1
4.3 feet

End Run 1 &
Begin Run 2
9.3 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

BORING NW2REV_1765
Station 17+65
Run 1: 4.3-9.3 feet
96% REC, 80% RQD

Run 2: 9.3-14.3 feet
100% REC, 90% RQD

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.:
TIP NO.: U-3330
COUNTY: Nash
DESCRIPTION: Noise Wall 2 - US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	RMR
RS-1	NW2REV_1650	-NW2REV-	16+50	CL	7.8-8.2	Granite	PPmg	52%	4.05	1.78	163.9	16,080	67
RS-2	NW2REV_1765	-NW2REV-	17+65	CL	6.1-6.5	Granite	PPmg	80%	3.75	1.78	164.9	11,490	66

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	4

REFERENCE: U-3330

PROJECT: 36596

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *NASH*

PROJECT DESCRIPTION *US 301 BYPASS FROM NC 43-48 (BENVENUE RD.) TO SR 1836 (MAY DR.)*

SITE DESCRIPTION *RETAINING WALL ONE LEFT OF -L- STA. 59+00*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

D.G. PINTER

J.R. SWARTLEY

O.B. OTI

INVESTIGATED BY *J.R. SWARTLEY*

DRAWN BY *T.T. WALKER*

CHECKED BY *N.T. ROBERSON*

SUBMITTED BY *N.T. ROBERSON*

DATE *JANUARY 2017*

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST Jarett Swartley

DocuSigned by:
Jarett Swartley
7F355C29F75A413...
SIGNATURE

2/1/2017
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3330	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1			A-3	A-2			A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b			A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: GPS-3

ELEVATION: 98.21 FEET

NOTES:

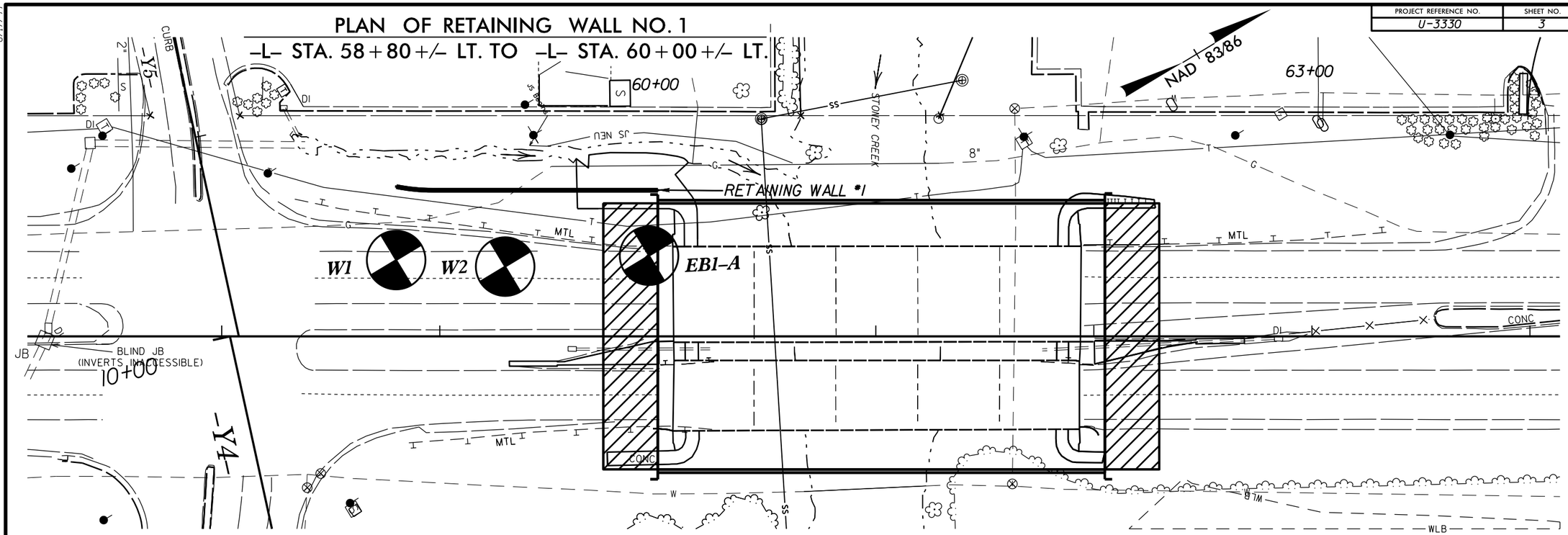
DATE: 8-15-14

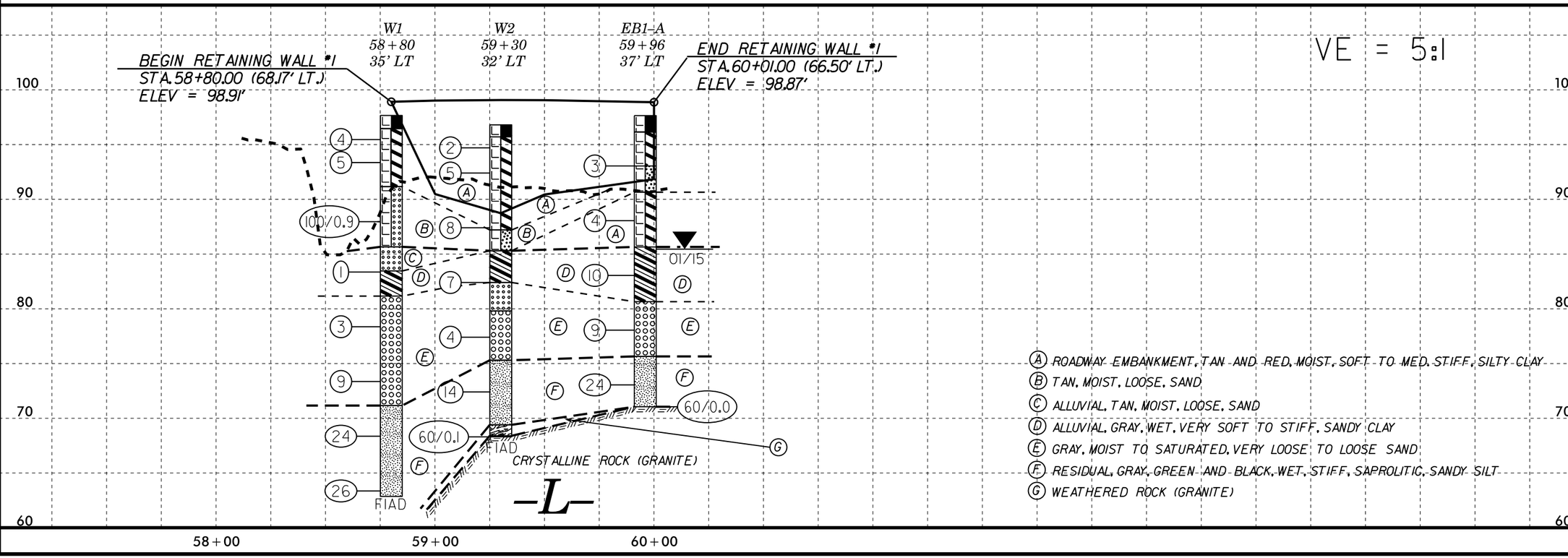
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-3330	3

PLAN OF RETAINING WALL NO. 1

–L– STA. 58+80 +/– LT. TO –L– STA. 60+00 +/– LT.





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PROJ. NO. - 36596.1.2
ID NO. - U-3330
COUNTY - NASH

W-1

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-7	**35'LT**	**58+80**	**3.3-4.8**	**A-7-6(16)**	**50**	**31**	**14.9**	**27.3**	**19.4**	**38.4**	**99**	**89**	**61**	**-**	**-**

W-2

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-4	**32'LT**	**59+30**	**3.4-4.9**	**A-7-6(14)**	**48**	**29**	**26.1**	**19.6**	**20.0**	**34.3**	**100**	**81**	**59**	**-**	**-**
SS-5	**32'LT**	**59+30**	**18.4-19.9**	**A-1-b(0)**	**20**	**NP**	**83.9**	**12.6**	**1.4**	**2.0**	**78**	**21**	**4**	**-**	**-**
SS-6	**32'LT**	**59+30**	**23.4-24.9**	**A-4(0)**	**32**	**NP**	**36.2**	**26.3**	**27.5**	**10.1**	**98**	**76**	**42**	**-**	**-**

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-2	**37'LT**	**59+96**	**8.6-9.1**	**A-7-6(6)**	**41**	**24**	**30.3**	**27.1**	**16.4**	**26.3**	**94**	**74**	**43**	**-**	**-**
SS-3	**37'LT**	**59+96**	**13.6-15.1**	**A-4(5)**	**29**	**10**	**7.1**	**25.7**	**37.0**	**30.3**	**96**	**94**	**70**	**-**	**-**