STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35014.1.1(U-4019)	1	22

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 35014.1.1(U-4019) F.A. PROJ. STP-1613(3)

COUNTY NASH

PROJECT DESCRIPTION WIDEN BRIDGES ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK AND US 64

SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK

INVENTORY

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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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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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SUBMITTED BY N.T. ROBERSON

DATE DECEMBER 2009

NORTH CAROLINA LICENSED SEAL 2037 GEOLOGIST CHRISTINA M. BRUINSMA

12-22-09

PROJECT: 35014.1.1

ID: U-4019

DRAWN BY: T.T. WALKER, C. M. BRUINSMA

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

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35014.1.1(U-4019)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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 A 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 0.50 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
GRAIN SIZE 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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
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
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT PMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [X] CME-550X
- [ ] _____

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.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N WXL
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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: BM #2, RR SPIKE IN BASE OF 24" OAK
-BL- STATION 26+54.01, 49.76' RT
ELEVATION: 111.02 FT.

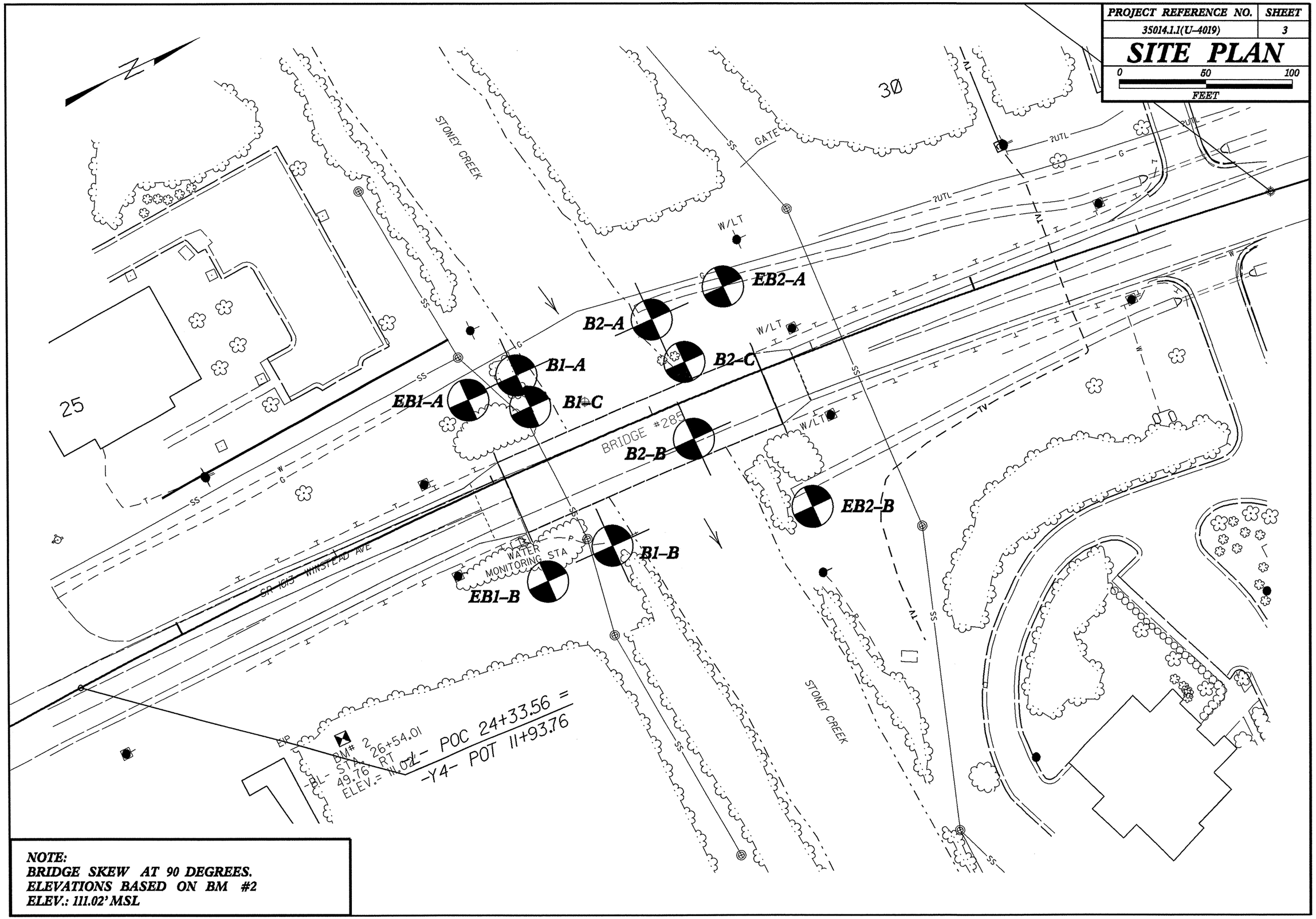
NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	3

SITE PLAN

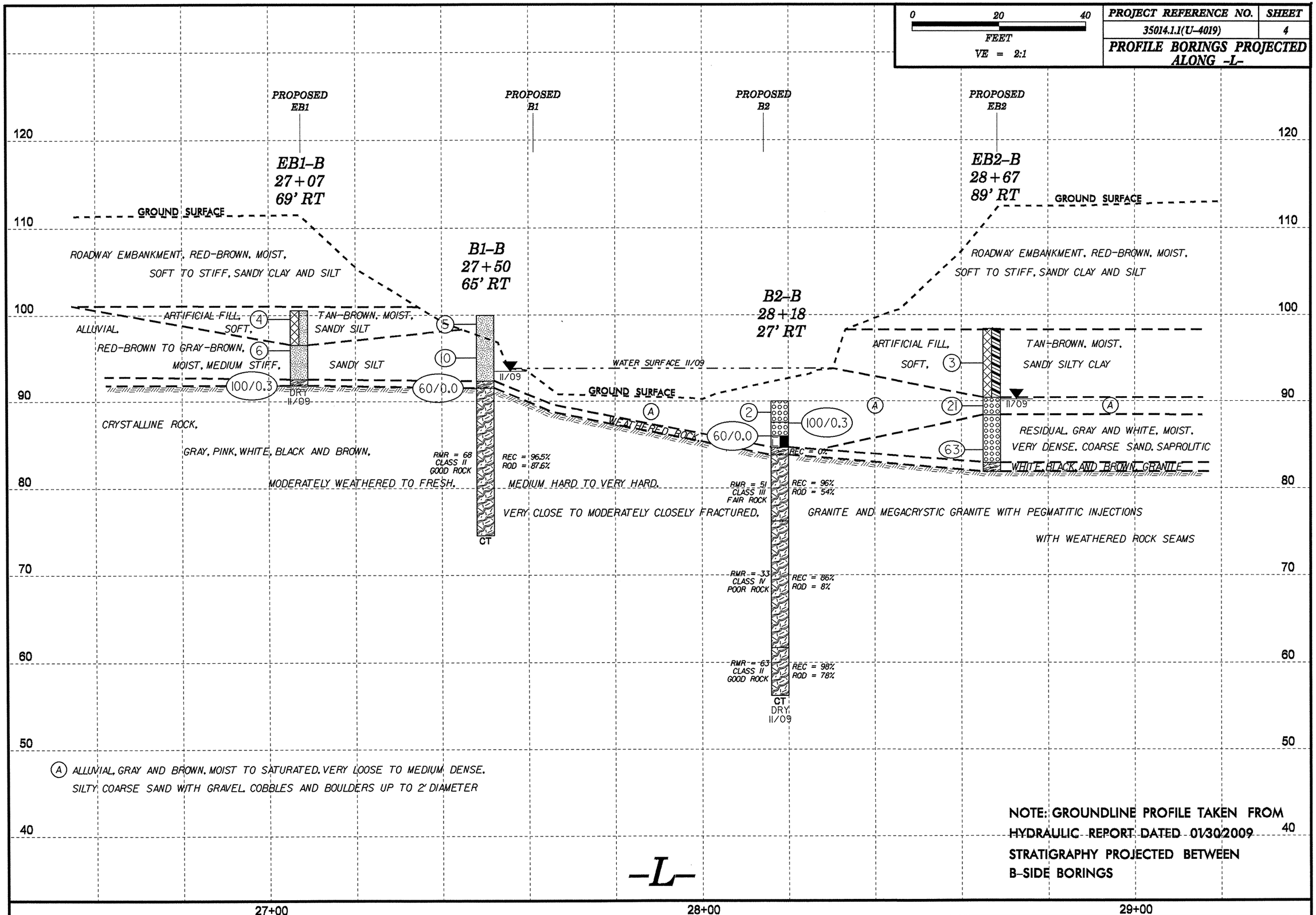
0 50 100
FEET



NOTE:
BRIDGE SKEW AT 90 DEGREES.
ELEVATIONS BASED ON BM #2
ELEV.: 111.02' MSL

PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	4

PROFILE BORINGS PROJECTED ALONG -L-



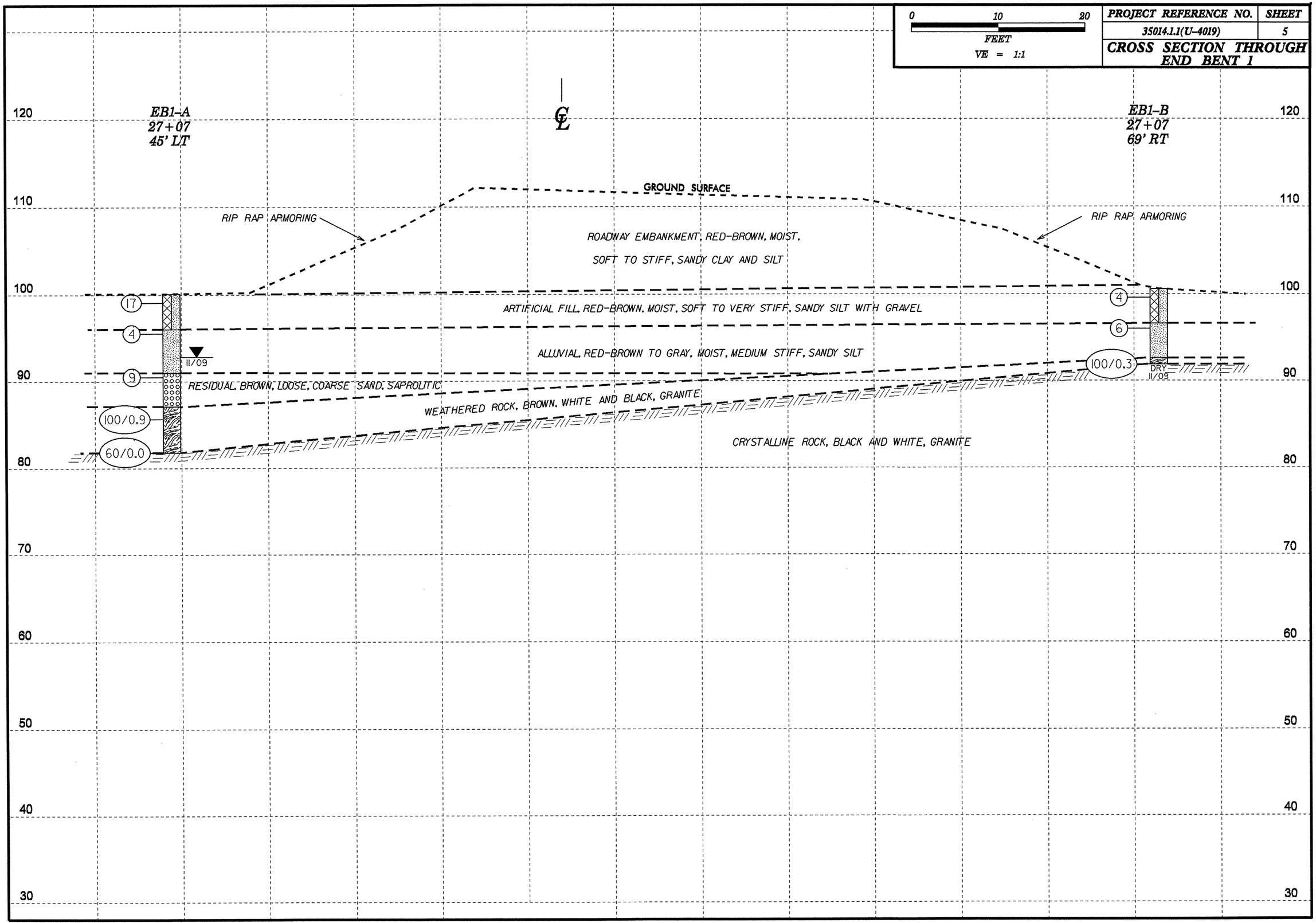
(A) ALLUVIAL, GRAY AND BROWN, MOIST TO SATURATED, VERY LOOSE TO MEDIUM DENSE, SILTY COARSE SAND WITH GRAVEL, COBBLES AND BOULDERS UP TO 2' DIAMETER

NOTE: GROUNDLINE PROFILE TAKEN FROM HYDRAULIC REPORT DATED 01/30/2009

STRATIGRAPHY PROJECTED BETWEEN B-SIDE BORINGS

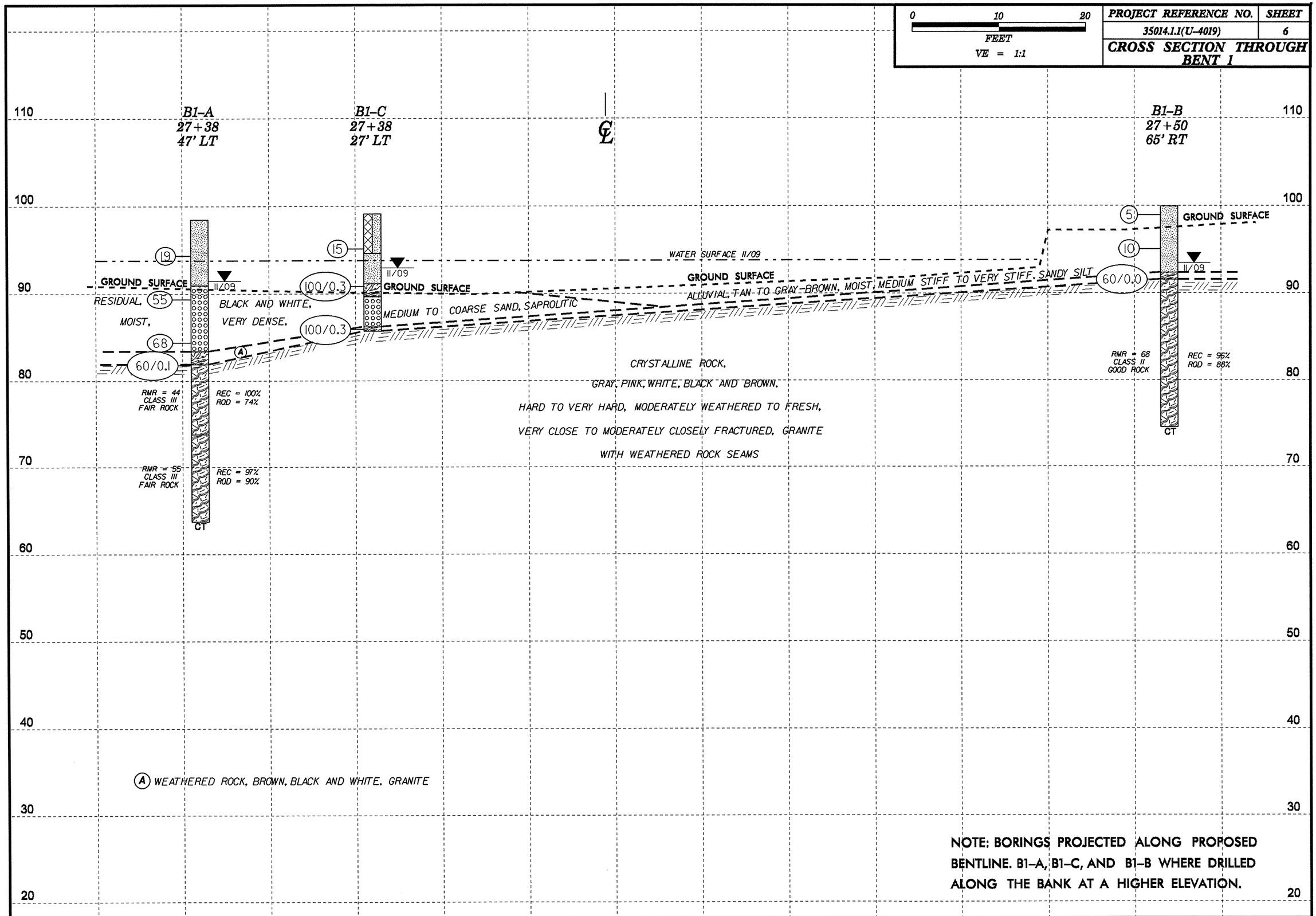
PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	5

CROSS SECTION THROUGH END BENT 1



PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	6

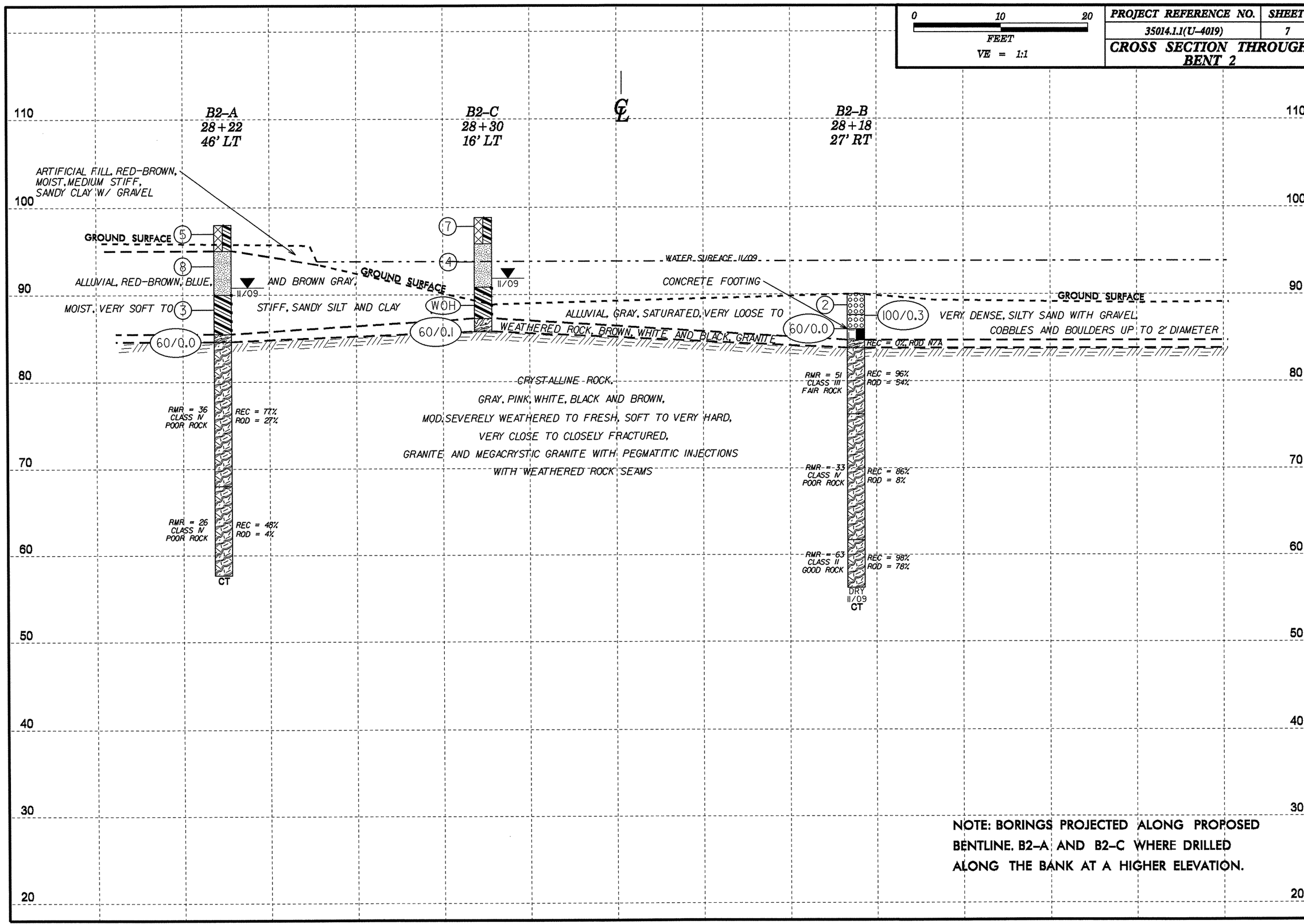
CROSS SECTION THROUGH BENT 1



NOTE: BORINGS PROJECTED ALONG PROPOSED BENTLINE. B1-A, B1-C, AND B1-B WHERE DRILLED ALONG THE BANK AT A HIGHER ELEVATION.

PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	7

CROSS SECTION THROUGH BENT 2

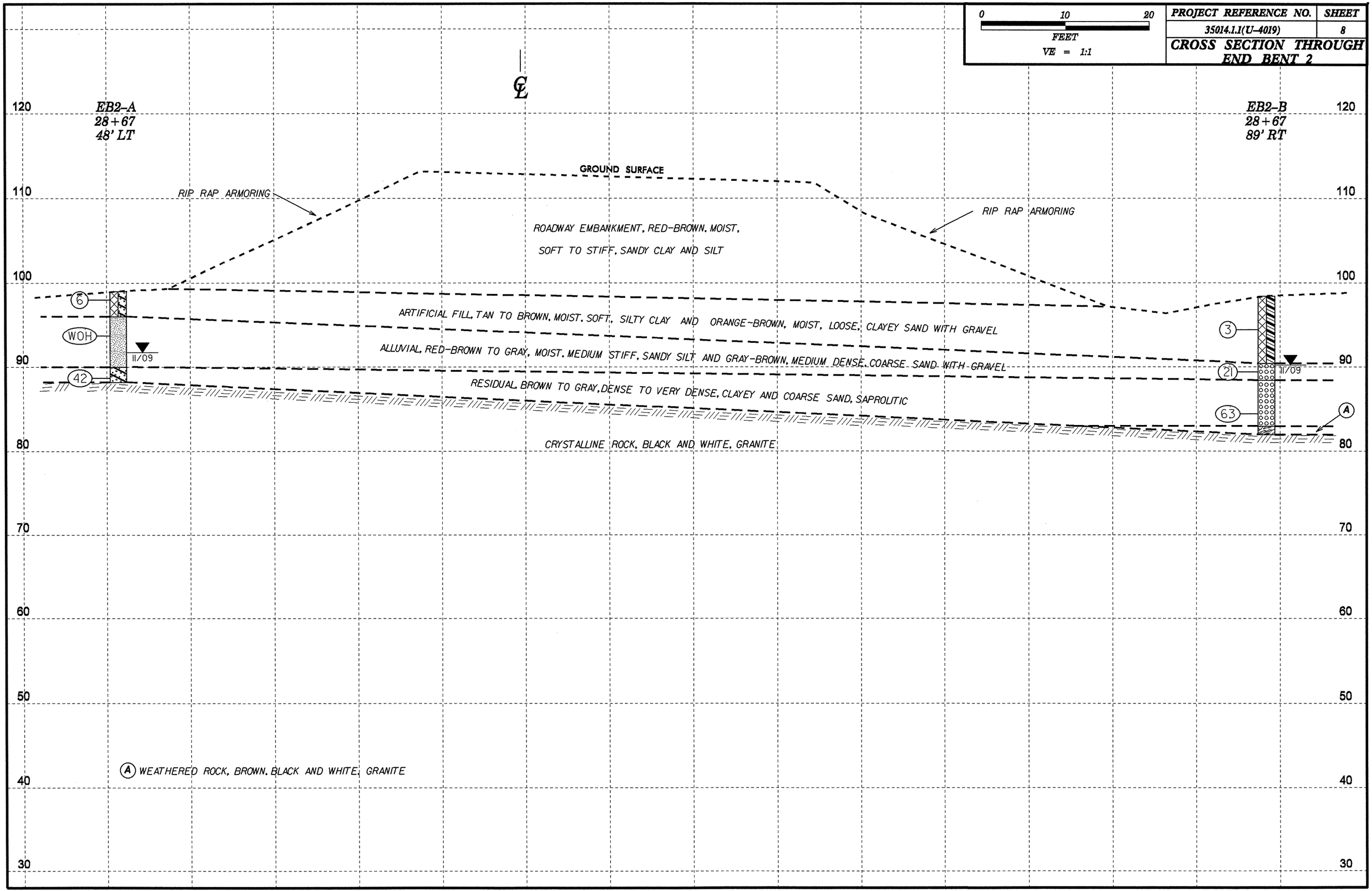


NOTE: BORINGS PROJECTED ALONG PROPOSED BENTLINE. B2-A AND B2-C WHERE DRILLED ALONG THE BANK AT A HIGHER ELEVATION.

PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	8

CROSS SECTION THROUGH END BENT 2

0 10 20
FEET
VE = 1:1



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 27+07	**OFFSET** 45ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 100.1 ft	**TOTAL DEPTH** 18.3 ft	**NORTHING** 809,342	**EASTING** 2,340,314
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 11/09/09	**COMP. DATE** 11/09/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.3 ft

GROUND WTR (ft)	
0 HR.	13.8
24 HR.	7.3

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
105												
100	100.1	0.0								100.1	GROUND SURFACE	0.0
			1	6	11	17	SS-10	M			**ARTIFICIAL FILL** RED-BROWN, SANDY SILT WITH GRAVEL	
	96.5	3.6								96.0		4.1
95			3	2	2	4	SS-11	M			**ALLUVIAL** GRAY, SANDY SILT	
	91.5	8.6								91.0		9.1
90			3	6	3	9	SS-12	M			**RESIDUAL** BROWN, COARSE SAND, SAPROLITIC	
	86.5	13.6								87.1		13.0
85			13	87/0.4		100/0.9					**WEATHERED ROCK** BROWN AND TAN, GRANITE	
	81.8	18.3								81.8		18.3
80			60/0			60/0					Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 81.8 ft ON CRYSTALLINE ROCK (GRANITE)	
75												
70												
65												
60												
55												
50												
45												
40												
35												
30												
25												

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 27+07	**OFFSET** 69ft RT	**ALIGNMENT** -L-
COLLAR ELEV. 100.6 ft	**TOTAL DEPTH** 8.7 ft	**NORTHING** 809,340	**EASTING** 2,340,428
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 11/10/09	**COMP. DATE** 11/10/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 8.7 ft

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
105												
100	100.6	0.0								100.6	GROUND SURFACE	0.0
			2	1	3	4		M			**ARTIFICIAL FILL** RED-BROWN, SANDY SILT WITH GRAVEL	
	97.0	3.6								96.6		4.0
95			2	3	3	6	SS-13	M			**ALLUVIAL** RED-BROWN, SANDY SILT	
	92.2	8.4								92.6		8.0
			100/0.3			100/0.3				91.9	**WEATHERED ROCK** BROWN AND TAN, GRANITE	8.7
90											Boring Terminated BY AUGER REFUSAL at Elevation 91.9 ft ON CRYSTALLINE ROCK (GRANITE)	
85												
80												
75												
70												
65												
60												
55												
50												
45												
40												
35												
30												
25												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 27+38	**OFFSET** 47ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 98.5 ft	**TOTAL DEPTH** 34.7 ft	**NORTHING** 809,373	**EASTING** 2,340,312 / **24 HR.** 7.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/18/09	**COMP. DATE** 11/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 16.6 ft

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
	95.4	3.1	6	9	10	19	SS-16	M		**ALLUVIAL** TAN-BROWN, SANDY SILT	
	90.4	8.1	15	16	39	55	SS-17	M		91.0 **RESIDUAL** BLACK AND WHITE, MEDIUM TO COARSE SAND	7.5
	85.4	13.1	18	28	40	68		M		83.4	15.1
	81.9	16.6	60/0.1			60/0.1				81.9 **WEATHERED ROCK** WHITE AND BLACK, GRANITE	16.6
										CRYSTALLINE ROCK BLACK, WHITE, BROWN AND TAN, GRANITE WITH WEATHERED ROCK SEAMS RMR: 44 (Class III - FAIR ROCK)	
							RS-1			73.8 BLACK AND WHITE, GRANITE RMR: 55 (Class III - FAIR ROCK)	24.7
										63.8 Boring Terminated at Elevation 63.8 ft IN CRYSTALLINE ROCK (GRANITE)	34.7

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 27+38	**OFFSET** 47ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 98.5 ft	**TOTAL DEPTH** 34.7 ft	**NORTHING** 809,373	**EASTING** 2,340,312	**24 HR.** 7.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 11/18/09	**COMP. DATE** 11/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 16.6 ft	
CORE SIZE NWXL	**TOTAL RUN** 18.0 ft	**DRILLER** Conley, H. R.		

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)
81.8											Begin Coring @ 16.7 ft	
	81.8	16.7	3.0	1:06 1:22 1:00	(3.0) 100%	(1.5) 50%					**CRYSTALLINE ROCK** BLACK, WHITE, BROWN AND TAN, MODERATE TO SLIGHTLY WEATHERED, HARD, VERY CLOSELY TO CLOSELY FRACTURED, GRANITE WITH WEATHERED ROCK SEAMS	
	78.8	19.7	5.0	1:23 1:12 1:16 1:01 1:48	(5.0) 100%	(4.4) 88%					WR SEAMS AT: 17.2 - 18.1' 19.3 - 19.7' 23.4 - 24.1'	
	73.8	24.7	5.0	1:42 2:05 2:17 3:15 2:00	(5.0) 100%	(5.0) 100%	RS-1	(9.7) 97%	(9.0) 90%		73.8 RMR: 44 (Class III - FAIR ROCK) *(continued)* BLACK AND WHITE, SLIGHTLY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSELY TO CLOSELY FRACTURED, GRANITE RMR: 55 (Class III - FAIR ROCK)	24.7
	68.8	29.7	5.0	2:08 3:27 2:00 1:58 2:06	(4.7) 94%	(4.0) 80%						
	63.8	34.7									63.8 Boring Terminated at Elevation 63.8 ft IN CRYSTALLINE ROCK (GRANITE)	34.7

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 27+38	**OFFSET** 27ft LT	**ALIGNMENT** -L- / **0 HR.** 8.5
COLLAR ELEV. 99.2 ft	**TOTAL DEPTH** 13.5 ft	**NORTHING** 809,373	**EASTING** 2,340,332 / **24 HR.** 6.2
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 11/09/09	**COMP. DATE** 11/09/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.5 ft

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										99.2 GROUND SURFACE	0.0
	96.2	3.0	5	8	7	15		M		**ARTIFICIAL FILL** RED-BROWN, SANDY SILT WITH GRAVEL	94.7 / 4.5
95										**ALLUVIAL** BROWN, SANDY SILT	91.2 / 8.0
	91.2	8.0	100/0.3			100/0.3				**WEATHERED ROCK** BLACK, WHITE AND BROWN, GRANITE	89.7 / 9.5
90										**RESIDUAL** BLACK AND WHITE, MEDIUM TO COARSE SAND, SAPROLITIC	86.2 / 13.0
	86.2	13.0	100/0.3			100/0.3				**WEATHERED ROCK** BLACK AND WHITE, GRANITE	85.7 / 13.5
85										Boring Terminated BY AUGER REFUSAL at Elevation 85.7 ft ON CRYSTALLINE ROCK (GRANITE)	
80											
75											
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 27+50	**OFFSET** 65ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 100.0 ft	**TOTAL DEPTH** 25.4 ft	**NORTHING** 809,383	**EASTING** 2,340,425 / **24 HR.** 6.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/13/09	**COMP. DATE** 11/13/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 8.4 ft

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	100.0	0.0	1	2	3	5 10	SS-14	M		100.0 GROUND SURFACE 0.0
										ALLUVIAL GRAY-BROWN TO TAN, SANDY SILT
95	96.1	3.9	6	6	4			M		
	91.6	8.4	60/0			60/0				92.4 7.6
										91.6 8.4 **WEATHERED ROCK** BLACK AND WHITE, GRANITE
90										**CRYSTALLINE ROCK** GRAY, PINK, WHITE AND BLACK, GRANITE RMR: 68(CLASS II - GOOD ROCK)
85										
							RS-2			
80										
75										74.6 25.4 Boring Terminated at Elevation 74.6 ft IN CRYSTALLINE ROCK (GRANITE)
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH		**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 27+50	**OFFSET** 65ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 100.0 ft	**TOTAL DEPTH** 25.4 ft	**NORTHING** 809,383	**EASTING** 2,340,425	**24 HR.** 6.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer			**HAMMER TYPE** Automatic
START DATE 11/13/09	**COMP. DATE** 11/13/09	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 8.4 ft
CORE SIZE NWXL	**TOTAL RUN** 17.0 ft	**DRILLER** Conley, H. R.		

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)
91.6											Begin Coring @ 8.4 ft
90	91.6 / 89.6	8.4 / 10.4	2.0	1:20 2:00	(2.0) 100%	(2.0) 100%		(16.4) 96%	(14.9) 88%		91.6 8.4 **CRYSTALLINE ROCK** GRAY, PINK, WHITE AND BLACK, SLIGHTLY WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSELY TO MOD. CLOSELY FRACTURED, GRANITE
85	84.6	15.4	5.0	3:00 4:00 5:30 2:45 2:30	(5.0) 100%	(5.0) 100%					WR SEAM FROM 19.4-20.0'
80	79.6	20.4	5.0	4:10 4:15 2:15 2:30 1:50	(4.4) 88%	(3.9) 78%	RS-2				RMR: 68(CLASS II - GOOD ROCK)
75	74.6	25.4	5.0	1:15 1:55 2:00 2:15 2:15	(5.0) 100%	(4.0) 80%					74.6 25.4 Boring Terminated at Elevation 74.6 ft IN CRYSTALLINE ROCK (GRANITE)
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											
15											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 28+22	**OFFSET** 46ft LT	**ALIGNMENT** -L- / **0 HR.** 8.0
COLLAR ELEV. 98.0 ft	**TOTAL DEPTH** 40.3 ft	**NORTHING** 809,458	**EASTING** 2,340,315 / **24 HR.** 7.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/04/09	**COMP. DATE** 11/04/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.4 ft

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)
	98.0	0.0								GROUND SURFACE
			WOH	1	4	5		M		**ARTIFICIAL FILL** RED-BROWN, SANDY CLAY WITH GRAVEL
	94.3	3.7								
			1	3	5	8	SS-6	M		**ALLUVIAL** BROWN-GRAY, CLAYEY SILT
	89.3	8.7								BROWN-GRAY, SANDY CLAY WITH WOOD
			1	1	2	3		W		
	84.6	13.4								**WEATHERED ROCK** BLACK AND WHITE, GRANITE
			60/0			60/0				**CRYSTALLINE ROCK** GRAY, WHITE, BLACK AND BROWN, GRANITE RMR: 36 (CLASS IV - POOR ROCK)
							RS-3			
										PINK, TAN AND BLACK, MEGACRYSTIC GRANITE RMR: 26 (CLASS IV - POOR ROCK)
										Boring Terminated at Elevation 57.7 ft IN CRYSTALLINE ROCK (GRANITE)

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 28+22	**OFFSET** 46ft LT	**ALIGNMENT** -L- / **0 HR.** 8.0
COLLAR ELEV. 98.0 ft	**TOTAL DEPTH** 40.3 ft	**NORTHING** 809,458	**EASTING** 2,340,315 / **24 HR.** 7.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/04/09	**COMP. DATE** 11/04/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.4 ft
CORE SIZE NWXL	**TOTAL RUN** 26.9 ft	**DRILLER** Conley, H. R.	

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) %	DESCRIPTION AND REMARKS (ELEV. ft / DEPTH ft)
84.6										Begin Coring @ 13.4 ft
	84.6	13.4	1.9	1:29 2:11/0.9	(1.9) 100%	(0.8) 42%		(12.8) 77%	(4.4) 27%	**CRYSTALLINE ROCK** GRAY, WHITE, BLACK AND BROWN, MOD. TO VERY SLIGHTLY WEATHERED, HARD, VERY CLOSELY TO CLOSELY FRACTURED, GRANITE RMR: 36 (CLASS IV - POOR ROCK)
	82.7	15.3	5.0	3:56 1:27 1:13 1:17 1:56	(5.0) 100%	(3.2) 64%	RS-3			
80	77.7	20.3	5.0	1:00 1:02 0:58 1:57 2:21	(3.3) 66%	(0.4) 8%				
75	72.7	25.3	5.0	1:01 1:00 0:48 0:54 1:00	(2.9) 58%	(0.0) 0%				
70	67.7	30.3	5.0	0:51 0:45 0:53 1:01 1:04	(3.1) 62%	(0.4) 8%		(4.9) 48%	(0.4) 4%	PINK, TAN AND BLACK, MOD. SEVERE TO MOD. WEATHERED, SOFT TO MOD. HARD, VERY CLOSELY TO CLOSELY FRACTURED, MEGACRYSTIC GRANITE RMR: 26 (CLASS IV - POOR ROCK)
65	62.7	35.3	5.0	0:45 0:45 0:45 0:45 0:45	(1.5) 30%	(0.0) 0%				
60	57.7	40.3								Boring Terminated at Elevation 57.7 ft IN CRYSTALLINE ROCK (GRANITE)
55										
50										
45										
40										
35										
30										
25										
20										
15										
10										
5										

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 28+30	**OFFSET** 16ft LT	**ALIGNMENT** -L- / **0 HR.** 6.7
COLLAR ELEV. 98.9 ft	**TOTAL DEPTH** 13.1 ft	**NORTHING** 809,465	**EASTING** 2,340,346 / **24 HR.** 7.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 11/03/09	**COMP. DATE** 11/03/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.0 ft

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								98.9 GROUND SURFACE 0.0
			1	3	4	7	SS-4	M		**ARTIFICIAL FILL** RED-BROWN, SANDY CLAY WITH GRAVEL 95.9 3.0
95	94.8	4.1	1	2	2	4		M		**ALLUVIAL** BLUE-GRAY, FINE SANDY CLAYEY SILT 90.9 8.0
90	89.8	9.1	WOH	WOH	WOH	0	SS-5	22%		RED-BROWN AND GRAY, SANDY CLAY WITH SAND LENSES 87.3 11.6
85	85.9	13.0	60/0.1			60/0.1				**WEATHERED ROCK** GRAY, WHITE AND BLACK, GRANITE 85.9 13.0 85.8 13.1
										CRYSTALLINE ROCK WHITE AND BLACK, GRANITE
80										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 85.8 ft IN CRYSTALLINE ROCK (GRANITE)
75										
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 28+18	**OFFSET** 27ft RT	**ALIGNMENT** -L-
COLLAR ELEV. 90.0 ft	**TOTAL DEPTH** 33.8 ft	**NORTHING** 809,451	**EASTING** 2,340,388
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/17/09	**COMP. DATE** 11/17/09	**SURFACE WATER DEPTH** 3.8ft	**DEPTH TO ROCK** 6.2 ft

GROUND WTR (ft)	
0 HR.	N/A
24 HR.	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.	WTR	LOG	ELEV. (ft)	SOIL AND ROCK DESCRIPTION / WATER SURFACE (11/17/09)	DEPTH (ft)
90										90.0	GROUND SURFACE	0.0
	89.7	0.3	1	1	1	2	SS-15	Sat.		87.6	**ALLUVIAL** GRAY, SILTY FINE TO COARSE SAND WITH GRAVEL UP TO 2" DIAMETER AND TRACE ORGANICS	2.4
	87.8	2.2	100/0.3			100/0.3		Sat.		86.0		4.0
	86.0	4.0	60/0			60/0				84.7	BOULDERS AND COBBLES	5.3
85										83.8	**ARTIFICIAL FILL (ENGINEERED)** CONCRETE FOOTING	6.2
											WEATHERED ROCK BROWN AND TAN, GRANITE	
80											**CRYSTALLINE ROCK** WHITE, PINK, BLACK AND GRAY, GRANITE	
							RS-4			76.2	RMR: 51 (CLASS III - FAIR ROCK)	13.8
75											PINK, TAN, GRAY AND BROWN, MEGACRYSTIC GRANITE WITH PEGMATITIC SEAMS RMR: 33 (CLASS IV - POOR ROCK)	
70												
65												
60										61.7		28.3
											PINK, GRAY, WHITE AND BLACK, GRANITE WITH PEGMATITIC SEAMS RMR: 63 (CLASS II - GOOD ROCK)	
							RS-5			56.2		33.8
55											Boring Terminated at Elevation 56.2 ft IN CRYSTALLINE ROCK (GRANITE)	
50												
45												
40												
35												
30												
25												
20												
15												
10												

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 28+18	**OFFSET** 27ft RT	**ALIGNMENT** -L-
COLLAR ELEV. 90.0 ft	**TOTAL DEPTH** 33.8 ft	**NORTHING** 809,451	**EASTING** 2,340,388
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 11/17/09	**COMP. DATE** 11/17/09	**SURFACE WATER DEPTH** 3.8ft	**DEPTH TO ROCK** 6.2 ft
CORE SIZE NWXL	**TOTAL RUN** 29.8 ft	**DRILLER** Conley, H. R.	

GROUND WTR (ft)	
0 HR.	N/A
24 HR.	N/A

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	ELEV. (ft)	DESCRIPTION AND REMARKS	DEPTH (ft)
86												Begin Coring @ 4.0 ft	
85	86.0	4.0	4.8	1:15 1:00 1:30 0:45 0:45/0.8	(3.9) 81%	(1.6) 33%		(0.0) 0%	(0.0) 0%		86.0	**ARTIFICIAL FILL (ENGINEERED)** CONCRETE FOOTING	4.0
	81.2	8.8						(7.3) 96%	N/A (4.1) 54%		84.7		5.3
80			5.0	1:00 1:00 1:15 1:00 1:15	(4.7) 94%	(2.5) 50%	RS-4				83.8	**WEATHERED ROCK** BROWN AND TAN, GRANITE	6.2
	76.2	13.8										**CRYSTALLINE ROCK** WHITE, PINK, BLACK AND GRAY, MODERATE TO SLIGHTLY WEATHERED, HARD, VERY CLOSELY TO CLOSELY FRACTURED, GRANITE	
75			5.0	0:50 1:00 0:50 1:10 2:00	(4.3) 86%	(0.0) 0%		(12.4) 86%	(1.2) 8%		76.2	RMR: 51 (CLASS III - FAIR ROCK)	13.8
	71.2	18.8										PINK, TAN, GRAY AND BROWN, MOD. SEVERELY TO MOD. WEATHERED, MED. HARD TO MOD. HARD, VERY CLOSELY TO CLOSELY FRACTURED, MEGACRYSTIC GRANITE WITH PEGMATITIC SEAMS	
70			5.0	0:55 0:55 1:30 1:30 2:00	(4.3) 86%	(0.8) 16%						RMR: 33 (CLASS IV - POOR ROCK)	
	66.2	23.8											
65			5.0	1:00 1:00 1:30 1:20 2:15	(4.3) 86%	(1.3) 26%							
	61.2	28.8									61.7		28.3
60			5.0	1:15 1:45 1:45 1:55 3:00	(4.9) 98%	(3.8) 76%	RS-5	(5.4) 98%	(4.3) 78%			PINK, GRAY, WHITE AND BLACK, VERY SLIGHTLY WEATHERED TO FRESH, HARD TO VERY HARD, CLOSELY TO CLOSELY FRACTURED GRANITE WITH PEGMATITIC SEAMS	
	56.2	33.8									56.2	RMR: 63 (CLASS II - GOOD ROCK)	33.8
55												Boring Terminated at Elevation 56.2 ft IN CRYSTALLINE ROCK (GRANITE)	
50													
45													
40													
35													
30													
25													
20													
15													
10													

NCDOT BORE DOUBLE U4019_GEO_BH_285.GPJ NC_DOT.GDT 12/21/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 28+67	**OFFSET** 48ft LT	**ALIGNMENT** -L-	**0 HR.** 9.6
COLLAR ELEV. 99.0 ft	**TOTAL DEPTH** 10.8 ft	**NORTHING** 809,503	**EASTING** 2,340,315	**24 HR.** 7.3
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 11/03/09	**COMP. DATE** 11/03/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 10.8 ft	

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	0.0								99.0 GROUND SURFACE	0.0
			2	3	3	6	SS-1	M		**ARTIFICIAL FILL** ORANGE-BROWN, SILTY CLAYEY SAND WITH GRAVEL 96.0	3.0
95	94.7	4.3	WOH	WOH	WOH	0	SS-2	M		**ALLUVIAL** BLUE-GRAY, CLAYEY SANDY SILT WITH TRACE ORGANIC MATTER; GRAVEL LAYER FROM 7.8 - 8.3' 90.0	9.0
90	89.7	9.3	5	5	37	42	SS-3	Sat.		**RESIDUAL** BROWN TO GRAY AND BLACK, SILTY CLAYEY SAND, SAPROLITIC 88.2	10.8
85										Boring Terminated BY AUGER REFUSAL at Elevation 88.2 ft ON CRYSTALLINE ROCK (GRANITE)	
80											
75											
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Oti, O. B.
SITE DESCRIPTION WIDEN BRIDGE NO. 285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 28+67	**OFFSET** 89ft RT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 98.4 ft	**TOTAL DEPTH** 16.5 ft	**NORTHING** 809,498	**EASTING** 2,340,452	**24 HR.** 8.2
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 11/06/09	**COMP. DATE** 11/06/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 16.5 ft	

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										98.4 GROUND SURFACE	0.0
95	95.4	3.0	1	1	2	3	SS-7	M		**ARTIFICIAL FILL** TAN-BROWN, SILTY CLAY 90.4	8.0
90	90.4	8.0	3	9	12	21	SS-8	Sat.		**ALLUVIAL** GRAY-BROWN, COARSE SAND WITH GRAVEL 88.4	10.0
85	85.4	13.0	13	30	33	63	SS-9	M		**RESIDUAL** GRAY AND WHITE, COARSE SAND, SAPROLITIC 82.9	15.5
										WEATHERED ROCK BLACK AND WHITE, GRANITE 81.9	16.5
										Boring Terminated BY AUGER REFUSAL at Elevation 81.9 ft ON CRYSTALLINE ROCK (GRANITE)	
80											
75											
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	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	27+07	45 LT	0.0-1.5	A-4(0)	22	5	19.2	39.8	16.8	24.2	85	77	41	-	-
SS-11	27+07	45 LT	4.1-5.1	A-4(0)	21	2	13.9	46.3	21.6	18.2	99	93	47	-	-
SS-12	27+07	45 LT	9.1-10.1	A-1-b(0)	31	NP	54.9	26.5	10.5	8.1	87	50	20	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-13	27+07	69 RT	3.6-5.1	A-4(1)	30	7	8.7	47.1	24.0	20.2	100	98	52	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	27+38	47 LT	3.1-4.6	A-4(1)	21	6	8.9	39.0	27.9	24.2	100	98	59	-	-
SS-17	27+38	47 LT	8.1-9.6	A-1-b(0)	23	NP	54.3	25.3	12.3	8.1	72	42	17	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-14	27+50	65 RT	0.0-1.5	A-4(1)	26	8	15.4	39.0	15.4	30.3	95	88	48	-	-

B2-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	28+22	46 LT	3.7-5.2	A-4(2)	24	5	2.0	31.5	36.2	30.3	100	100	76	-	-

B2-C

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4	28+30	16 LT	0.0-1.5	A-6(7)	38	18	21.4	26.1	20.2	32.3	98	86	55	-	-
SS-5	28+30	16 LT	9.1-10.6	A-6(1)	30	12	44.8	20.2	6.7	28.3	98	68	36	21.6	-

B2-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-15	28+18	27 RT	0.3-1.8	A-1-b(0)	25	NP	64.2	27.5	4.2	4.0	68	37	7	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	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	28+67	48 LT	0.0-1.5	A-2-6(0)	29	11	47.9	21.2	8.7	22.2	95	62	32	-	-
SS-2	28+67	48 LT	4.3-5.8	A-4(2)	29	10	19.8	35.8	20.2	24.2	99	86	50	-	-
SS-3	28+67	48 LT	9.3-10.8	A-2-6(1)	33	14	43.8	22.6	7.3	26.3	91	63	33	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	28+67	89 RT	3.0-4.5	A-6(8)	40	22	26.9	21.6	15.2	36.4	97	80	53	-	-
SS-8	28+67	89 RT	8.0-9.5	A-1-b(0)	20	3	52.9	23.6	15.4	8.1	81	50	22	-	-
SS-9	28+67	89 RT	13.0-14.5	A-1-b(0)	25	NP	55.2	26.5	12.3	6.1	84	49	19	-	-

B1-A

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-1	27+38	47 LT	24.7-25.4	2.8026	166	2.2	64300	23.3	9.55

B1-B

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-2	27+50	65 RT	16.7-17.4	2.8026	159.6	2.23	58300	21.1	7.01

B2-A

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-3	28+22	46 LT	17.6-18.0	2.8026	177.5	1.784	42200	14.85	7.86

B2-B

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-4	28+18	27 RT	11.9-12.5	2.8026	157.2	2.26	46500	16.83	2.77
RS-5	28+18	27 RT	30.0-30.6	2.8026	158.5	2.22	48300	17.45	9.33

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 35014.1.1 TIP: U-4019 COUNTY: Nash

DESCRIPTION(1): Bridge No. 285 on SR 1613 (N. Winstead Ave.) over Stoney Creek

EXISTING BRIDGE

Information from: Field Inspection x Microfilm ____ (reel ____ pos: ____)
Other (explain) Hydraulics Report

Bridge No.: 285 Length: 160 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Driven steel piles at endbents, concrete footings at interior bents

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None evident.

Interior Bents: Some scour on downstream side of existing bent 2 and 3 (concrete footings).

Channel Bed: Minimal scour in association with center of channel.

Channel Bank: Extensive scour of banks adjacent to existing Bent 1 and Bent 2.
Scour also evident where drainage comes from road elevations down to the banks.

EXISTING SCOUR PROTECTION

Type(3): Rip Rap placed along end bent slopes and side slopes

Extent(4): Wraps around under the bridge and along the side slopes up to 100 feet.

Effectiveness(5): Effective in preventing any scour of end bents.

Obstructions(6): None observed at the time of investigation.

DESIGN INFORMATION

Channel Bed Material(7): Silty sand, and coarse sand with gravel, cobbles and boulders up to 2' in diameter. Some boulders may have been placed as fill or scour protection in the past.

Channel Bank Material(8): Sandy silt and sandy clay.

Channel Bank Cover(9): Small to moderately sized trees, shrubs and grasses.

Floodplain Width(10): 500 feet

Floodplain Cover(11): Small to moderately sized trees, shrubs and grasses.

Stream is(12): Aggrading ____ Degrading x Static ____

Channel Migration Tendency(13): channel is currently straight, but may present a slight northward migration.

Observations and Other Comments:

DESIGN SCOUR ELEVATIONS(14) Feet x Meters ____

	BENTS B1	BENTS B2									
Left	87.1	84.7									
Right	89.3	84.7									

Comparison of DSE to Hydraulics Unit theoretical scour:
The GSE is 6.9 to 11.5 feet higher than the theoretical elevation shown on the Bridge and Hydraulic Design Report.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

See Sheet 11, "Soil Test Results", for samples: SS-15 (channel bed) SS-5,SS-16 (bank)

Template Revised 02/07/06

Reported by: Christina M. Bruinsma, L.G. Date: 11/25/2009

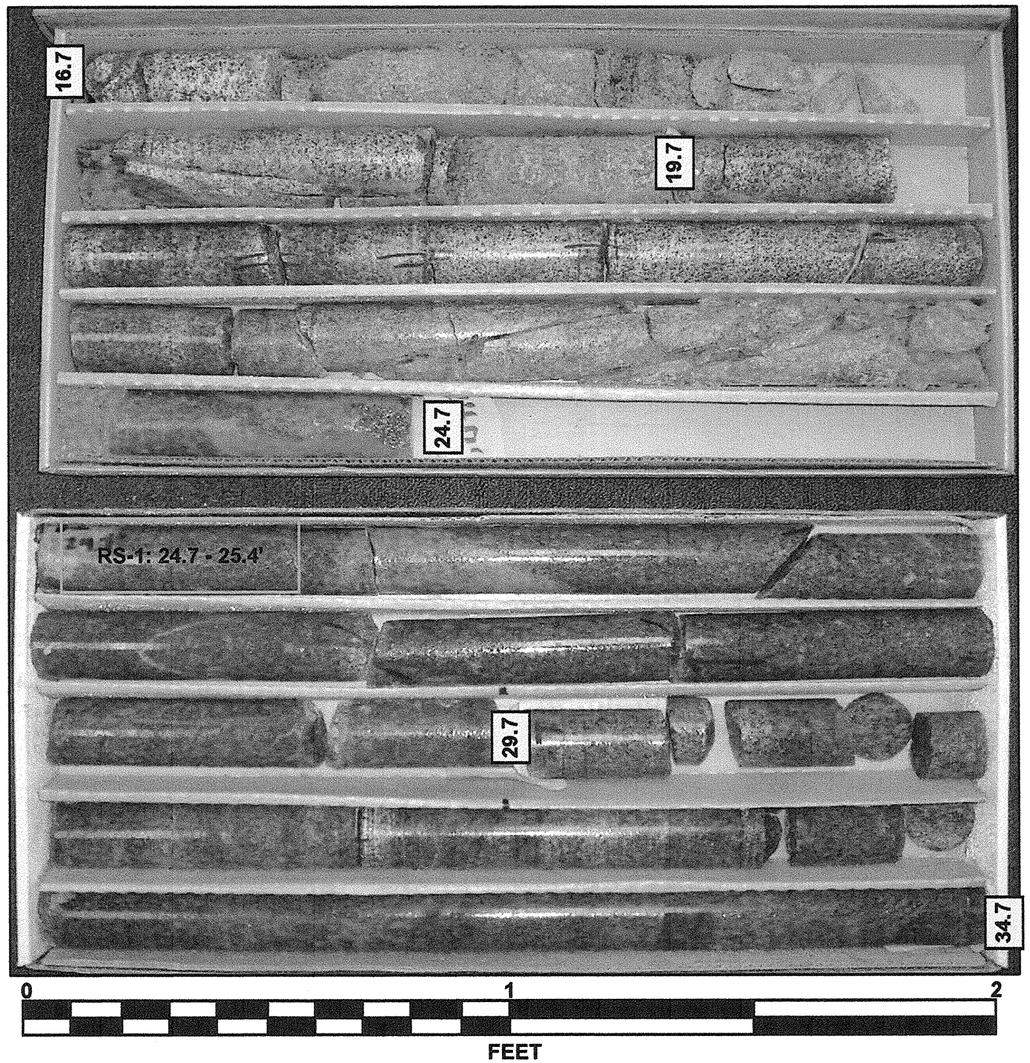
INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

CORE PHOTOGRAPHS

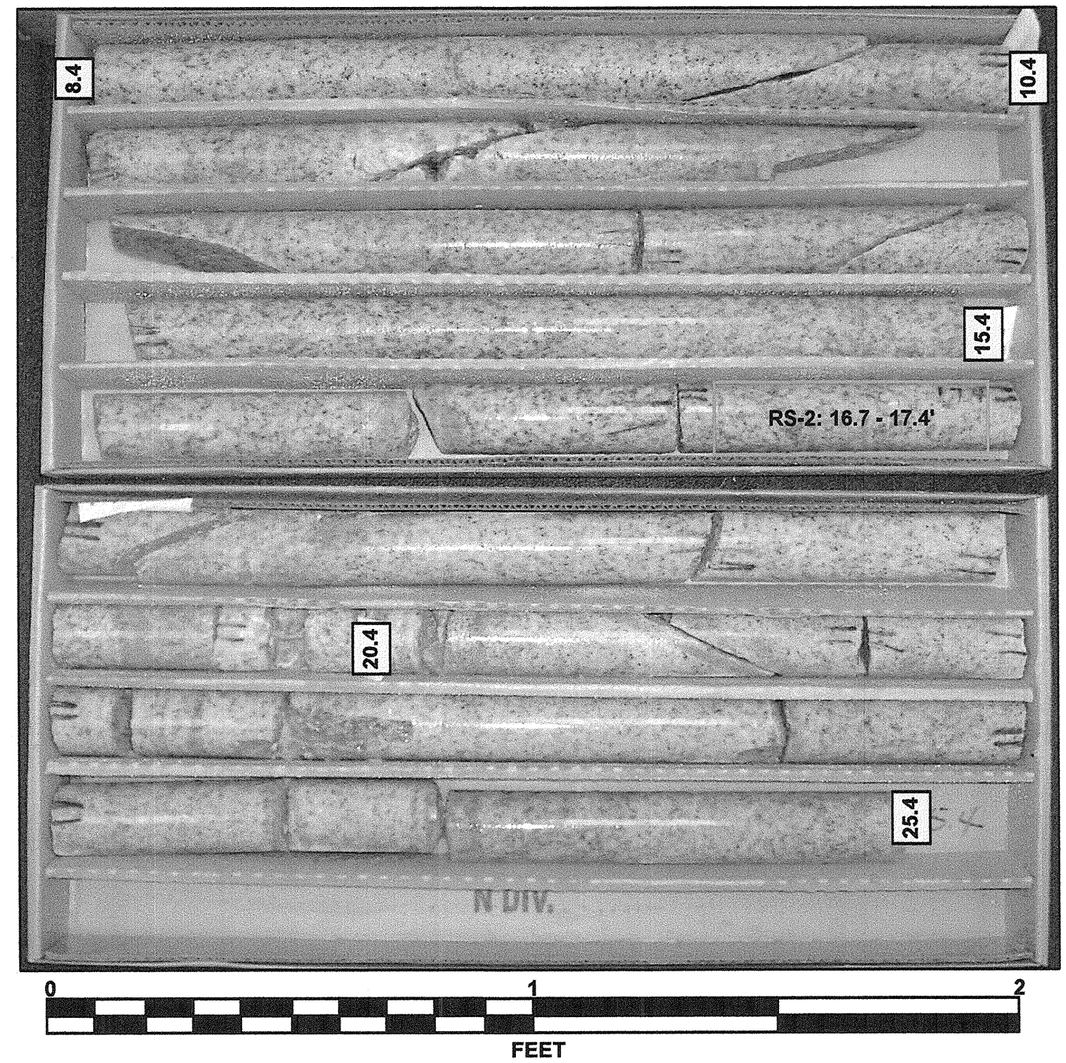
B1-A

BOXES 1 & 2: 16.7 - 34.7 FEET



B1-B

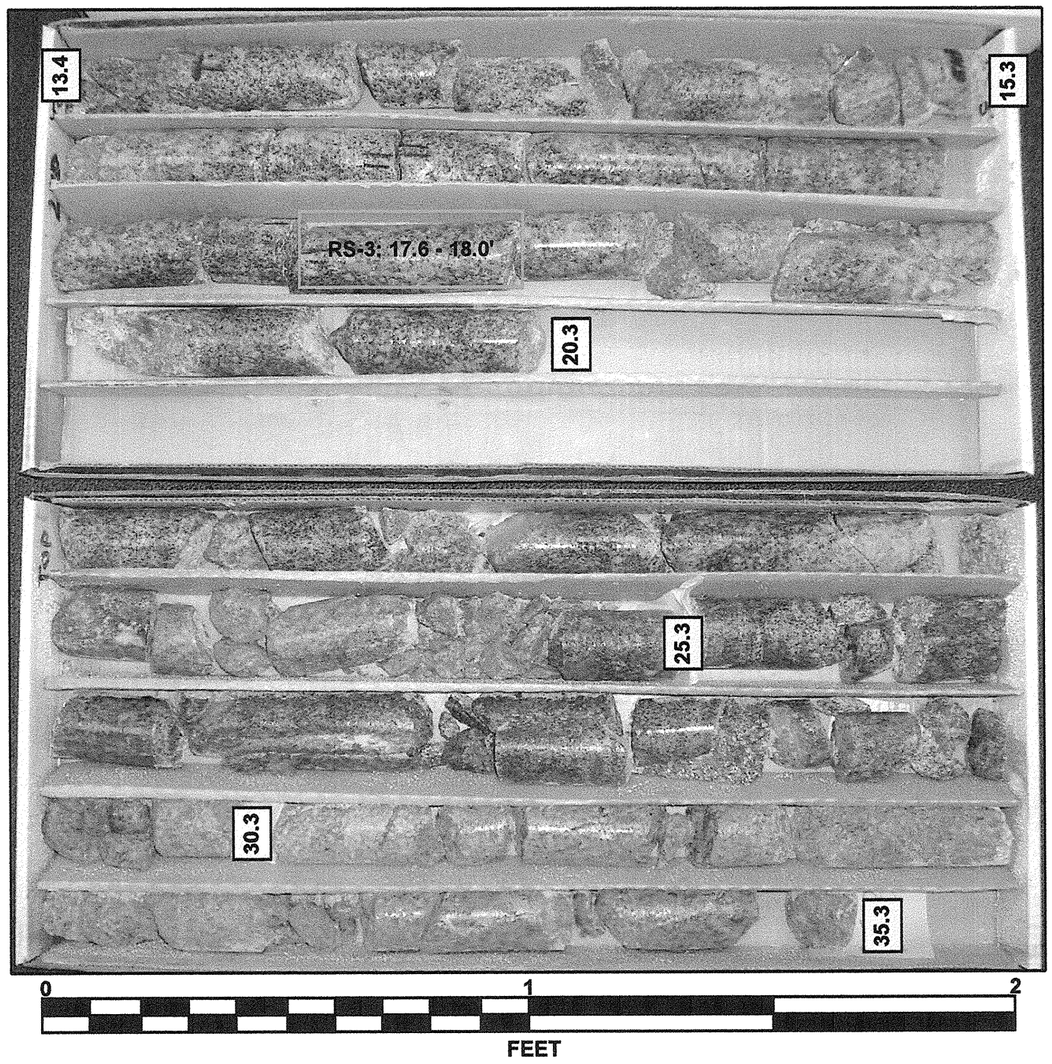
BOX 1 & 2: 8.4 - 25.4 FEET



CORE PHOTOGRAPHS

B2-A

BOXES 1 & 2: 13.4 - 35.3 FEET



B2-A

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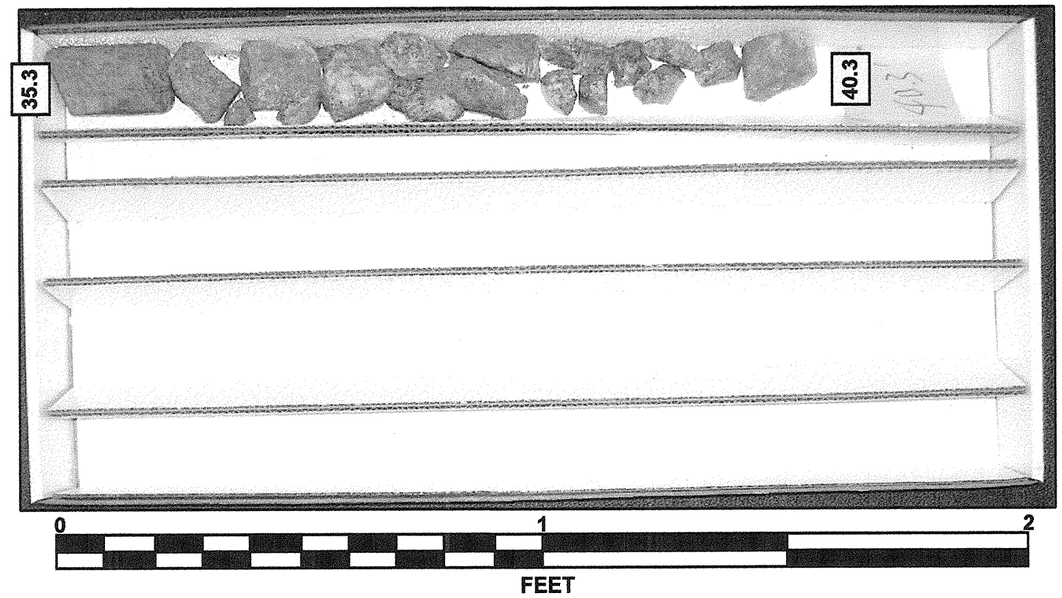
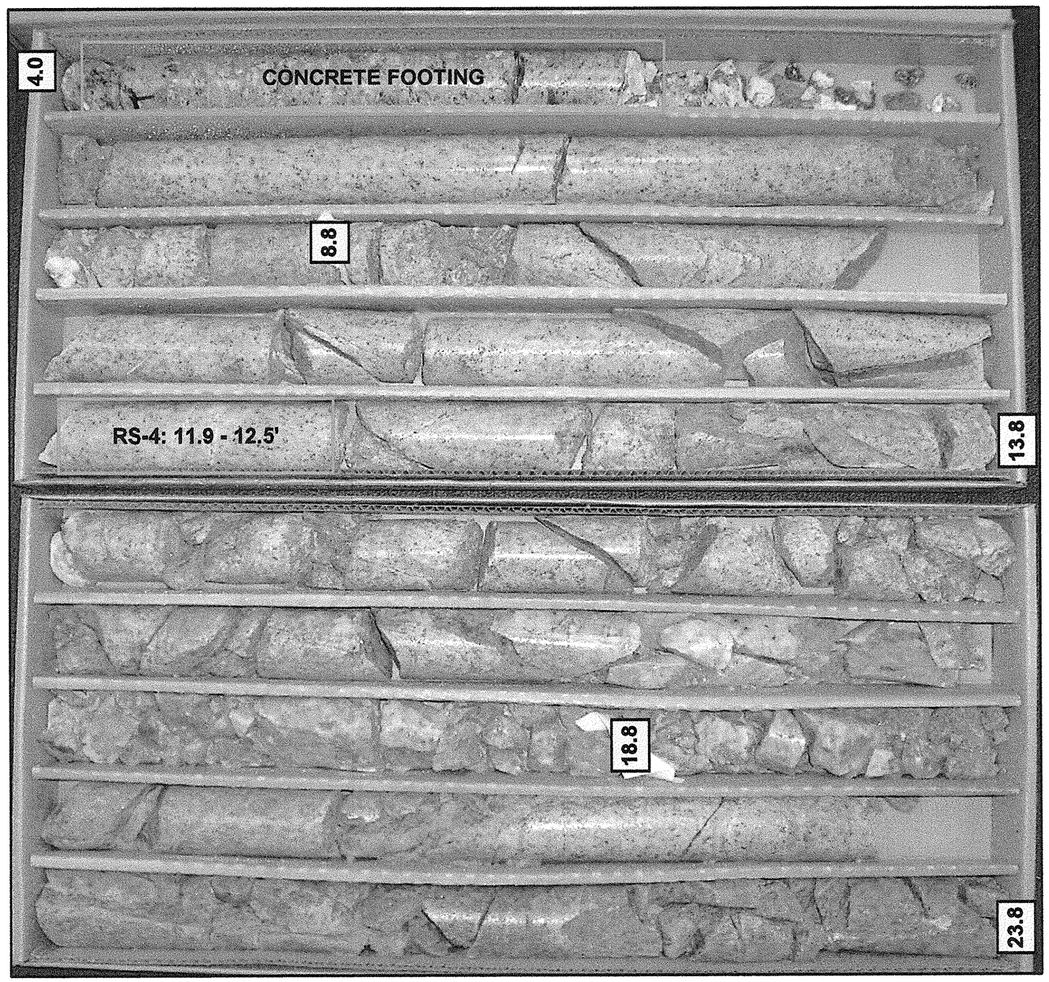


CORE PHOTOGRAPHS

B2-B

BOXES 1 & 2: 4.0 - 23.8 FEET



0 1 2
FEET

B2-B

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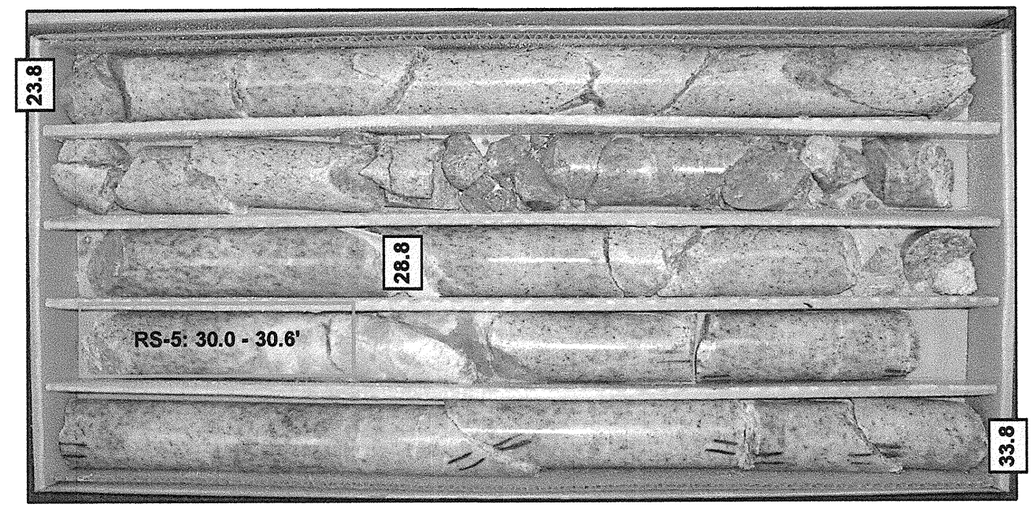

0 1 2
FEET

PLT-1 THROUGH PLT-6:
13.8 - 23.8'

SITE PHOTO

BRIDGE NO.285 ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK AT -L- STATION 27+40

LOOKING WEST

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35014.1.1(U-4019)	1	22

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 35014.1.1 F.A. PROJ. STP-1613(3)

COUNTY NASH

PROJECT DESCRIPTION WIDEN BRIDGES ON SR 1613 (N. WINSTEAD AVE.) OVER STONEY CREEK AND US 64

SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64

INVENTORY

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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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PERSONNEL
C.M. BRUINSMA
H. R. CONLEY
J. R. MATULA

INVESTIGATED BY C.M. BRUINSMA
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE DECEMBER 2009

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA M. BRUINSMA

12-29-09

ID: U-4019

PROJECT: 35014.1.1

DRAWN BY: T. T. WALKER, C. M. BRUINSMA

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT REFERENCE NO.	SHEET NO.
35014.1.1(U-4019)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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 A 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 0.50 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
GRAIN SIZE 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
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-550X
- [ ] _____

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.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N WXL
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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 U4019-7, -BL- STATION 57+68.56

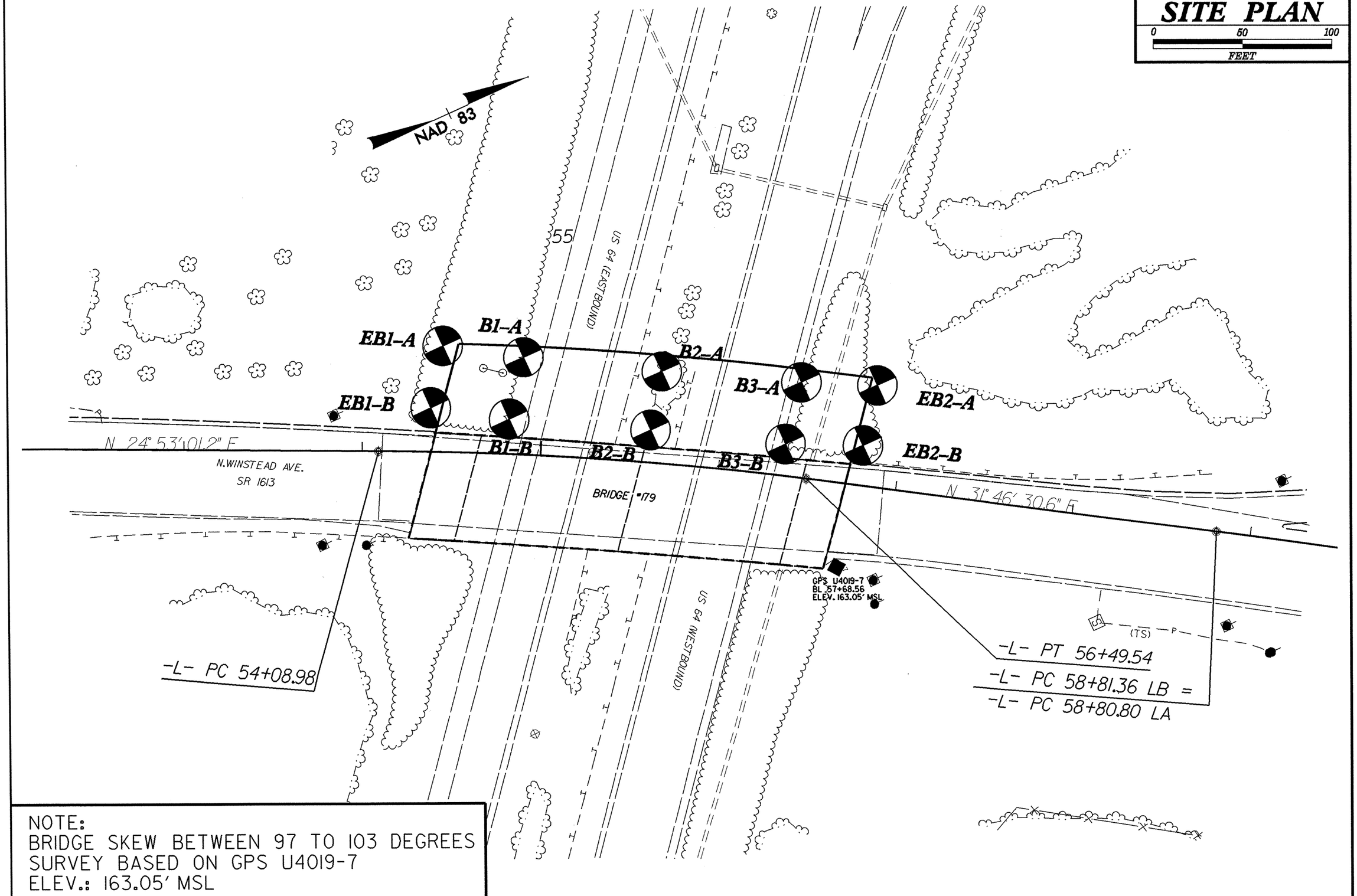
ELEVATION: 163.05 FT.

NOTES:

PROJECT REFERENCE NO.	SHEET
35014.1.1 (U-4019)	3

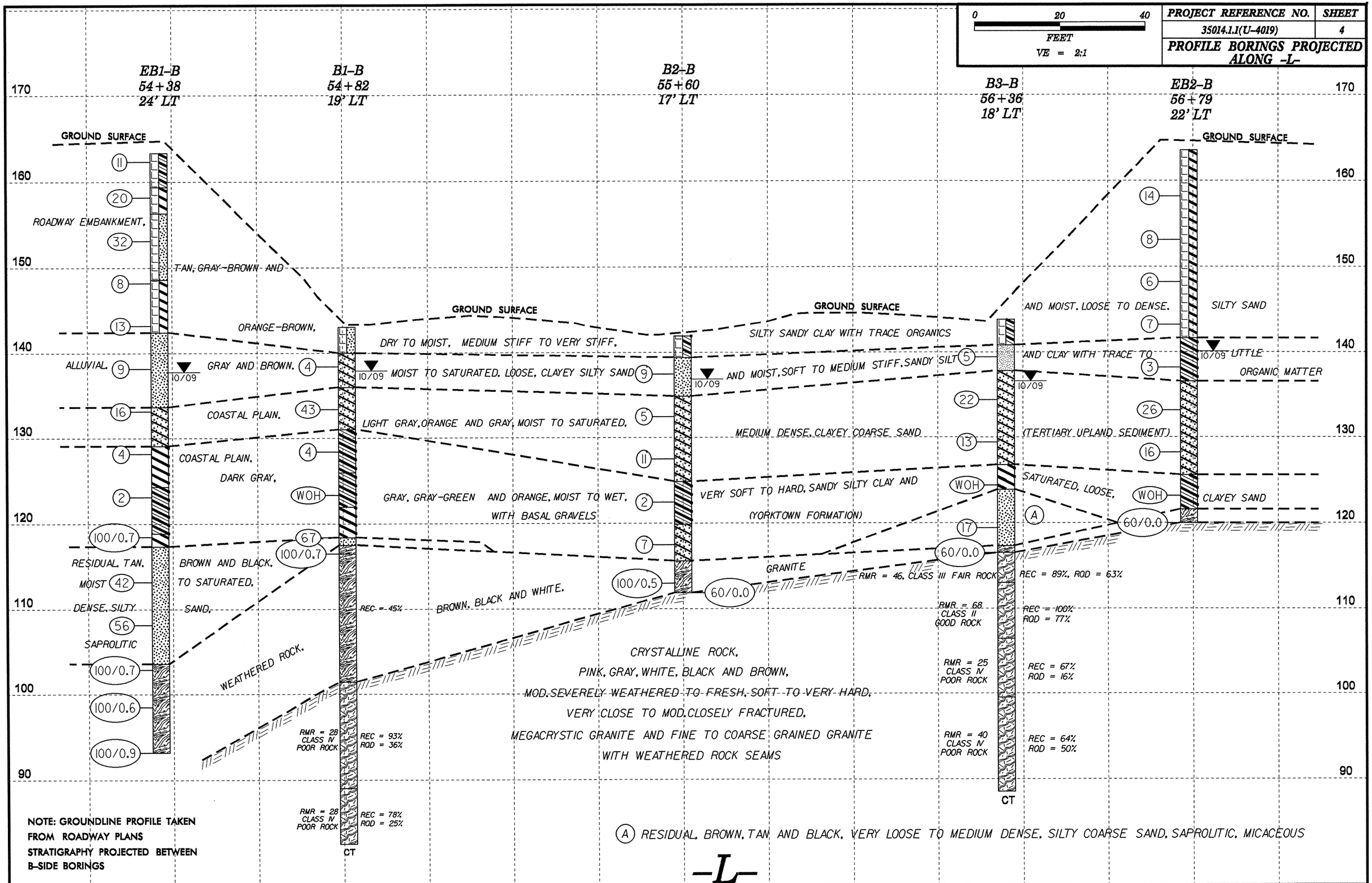
SITE PLAN

0 50 100
FEET

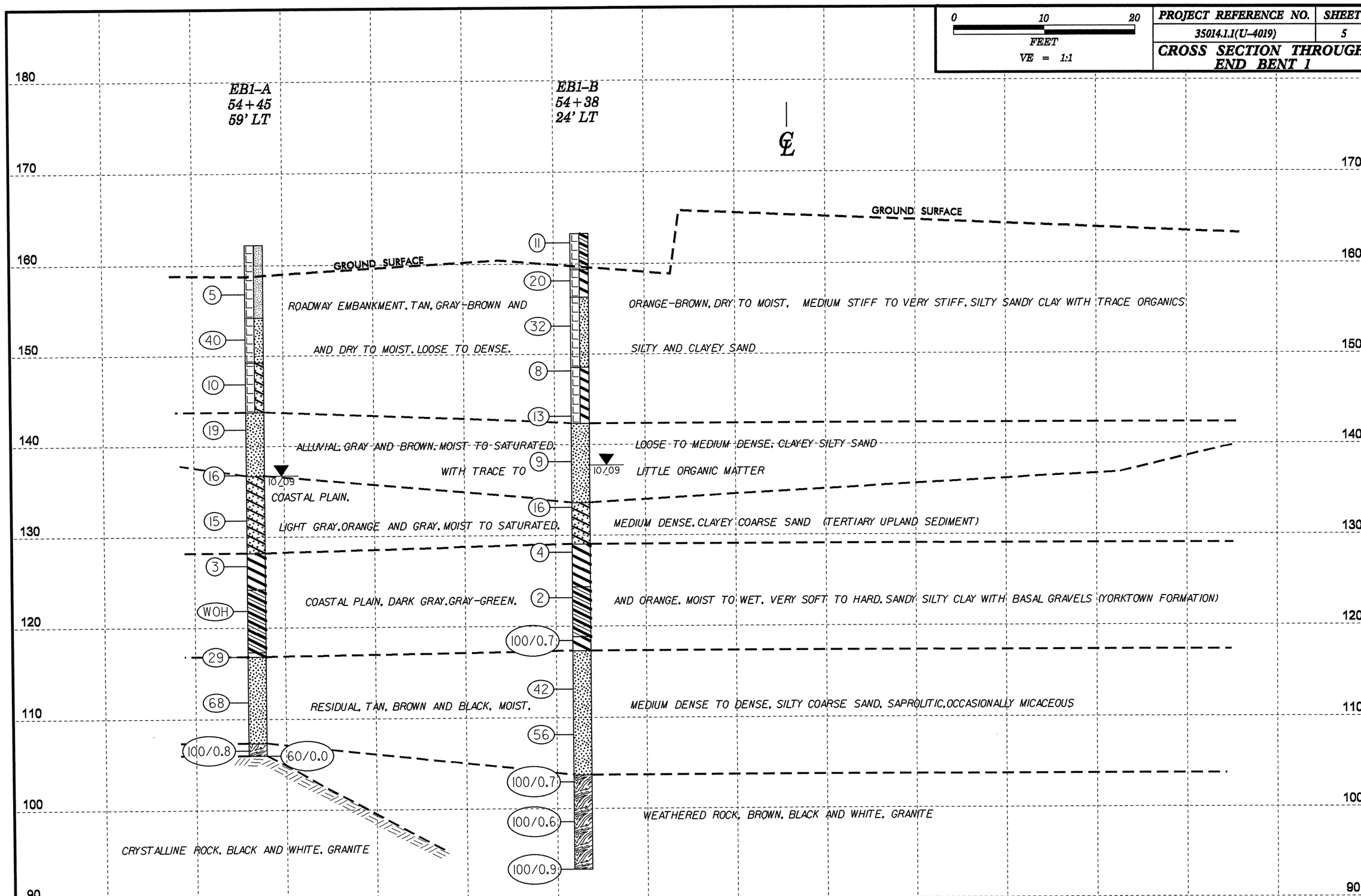


NOTE:
BRIDGE SKEW BETWEEN 97 TO 103 DEGREES
SURVEY BASED ON GPS U4019-7
ELEV.: 163.05' MSL

PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	4
PROFILE BORINGS PROJECTED ALONG -L-	

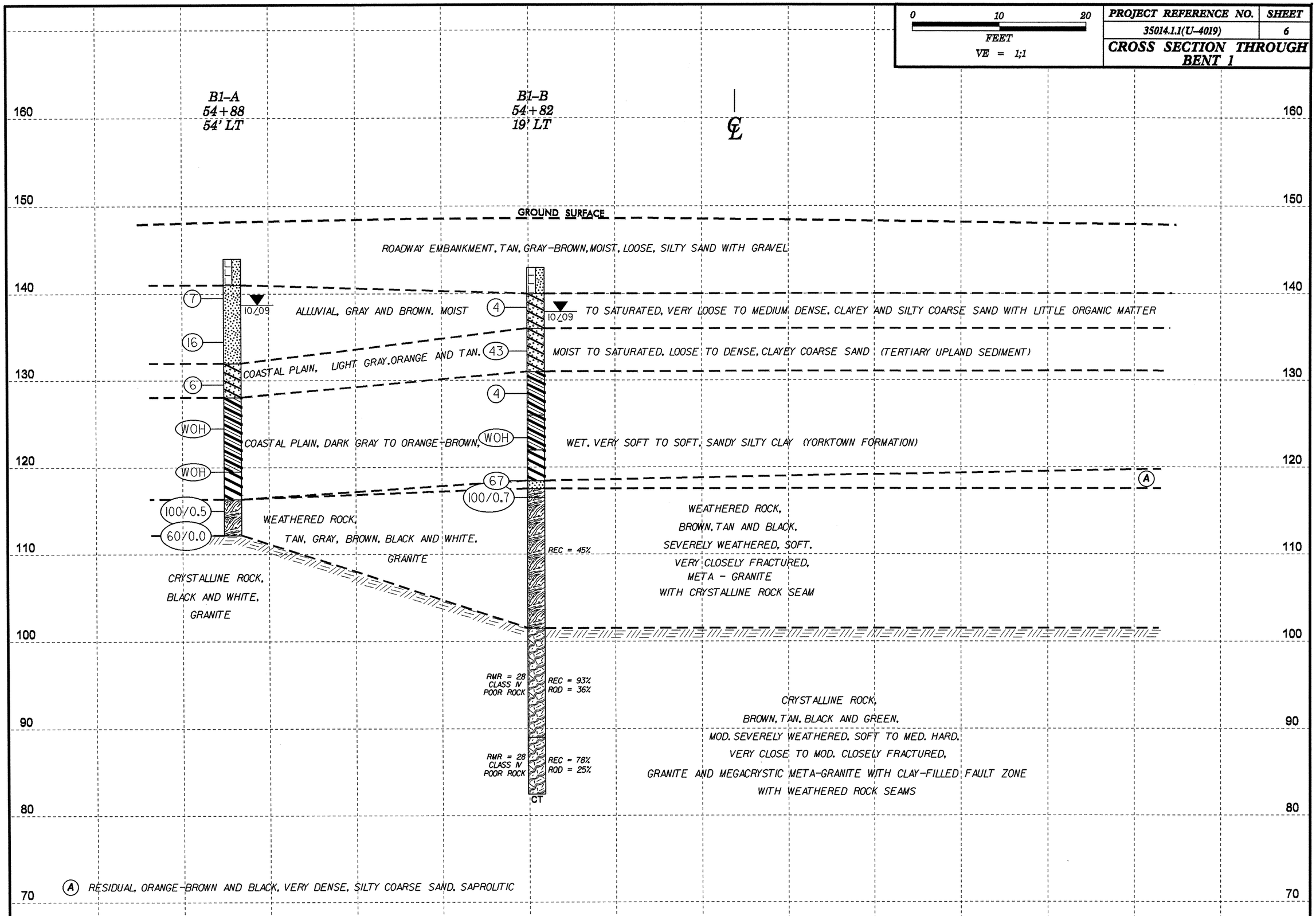


PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	5
CROSS SECTION THROUGH END BENT 1	

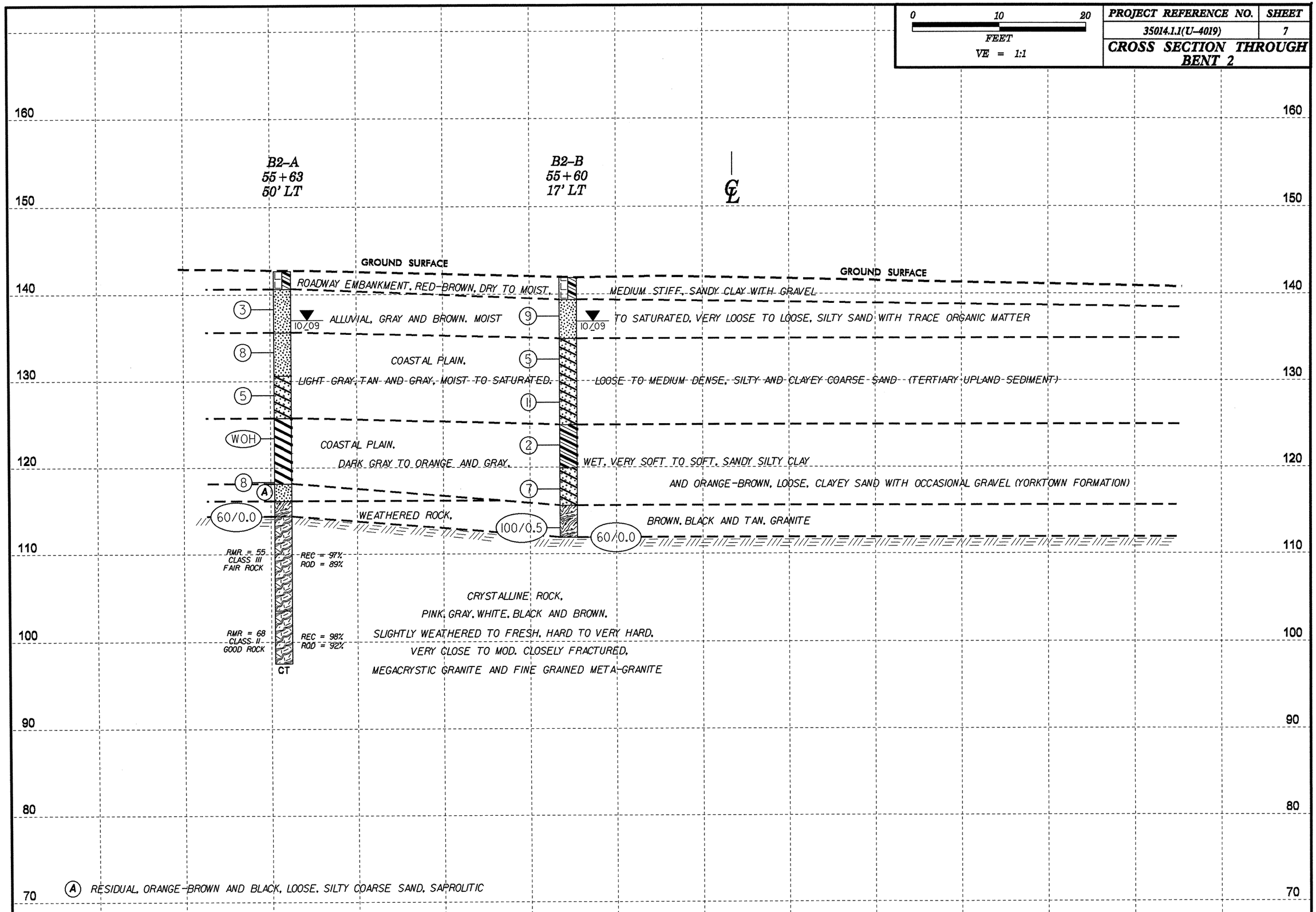


PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	6

CROSS SECTION THROUGH BENT 1



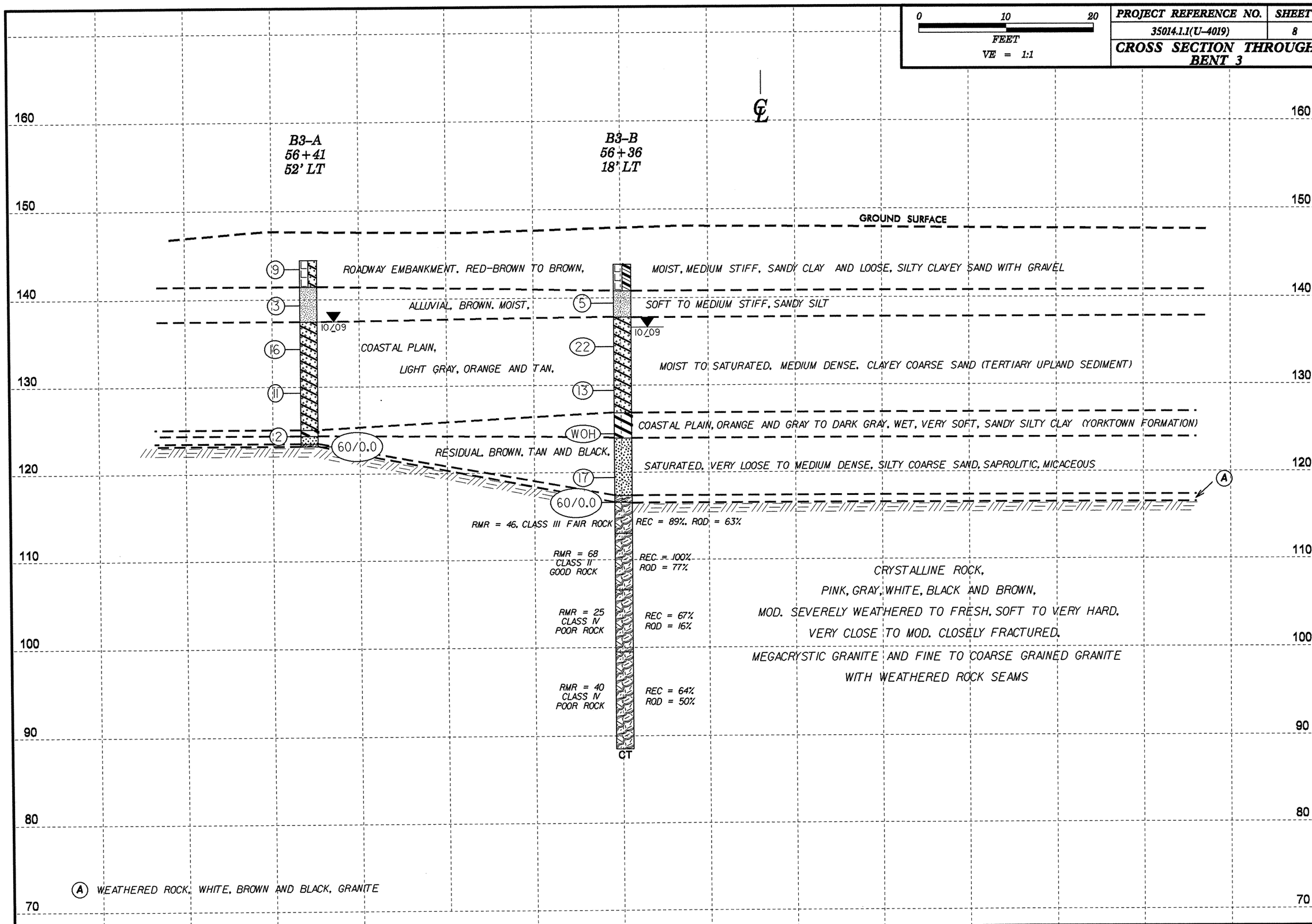
PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	7
CROSS SECTION THROUGH BENT 2	



PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	8

CROSS SECTION THROUGH BENT 3

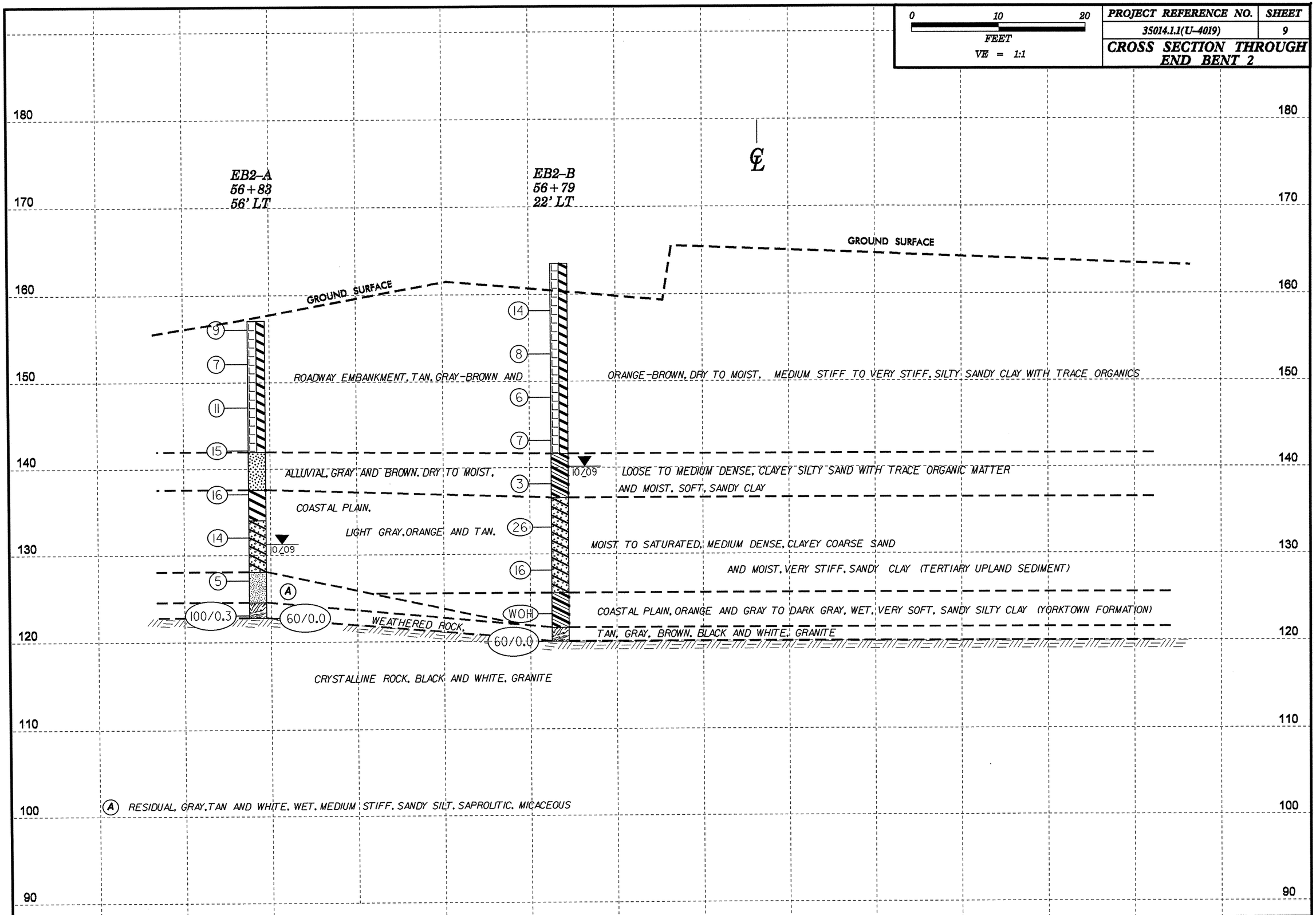
0 10 20
FEET
VE = 1:1



PROJECT REFERENCE NO.	SHEET
35014.1.1(U-4019)	9

CROSS SECTION THROUGH END BENT 2

0 10 20
FEET
VE = 1:1



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 54+45	**OFFSET** 59ft LT	**ALIGNMENT** -L-	**0 HR.** 25.4
COLLAR ELEV. 162.3 ft	**TOTAL DEPTH** 56.3 ft	**NORTHING** 812,000	**EASTING** 2,340,977	**24 HR.** 25.5
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 10/13/09	**COMP. DATE** 10/14/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 56.3 ft	

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
										162.3	GROUND SURFACE	0.0
	157.9	4.4	3	2	3	5	SS-1	D		154.3	**ROADWAY EMBANKMENT** GRAY-BROWN, SANDY, SILTY CLAY WITH TRACE ORGANICS	8.0
	152.9	9.4	10	18	22	40	SS-2	D		149.3	TAN, SILTY SAND	13.0
	147.9	14.4	3	4	6	10	SS-3	M		143.8	ORANGE AND GRAY, CLAYEY SAND	18.5
	142.9	19.4	9	9	10	19	SS-4	M		136.8	**ALLUVIAL** GRAY-BROWN, CLAYEY SILTY SAND WITH TRACE ORGANICS	25.5
	137.9	24.4	5	9	7	16		Sat.		128.3	**COASTAL PLAIN** LIGHT GRAY, CLAYEY COARSE SAND (TERTIARY UPLAND SEDIMENT)	34.0
	132.9	29.4	2	7	8	15	SS-5	Sat.		124.3	**COASTAL PLAIN** ORANGE AND GRAY, SILTY CLAY (YORKTOWN FORMATION)	38.0
	127.9	34.4	WOH	2	1	3	SS-6	33%		117.4	DARK GRAY, SILTY CLAY WITH FINE TO MEDIUM GRAINED SAND LENSES	44.9
	122.9	39.4	WOH	WOH	WOH	0	SS-7	44%		116.9	ORANGE, SANDY SILTY CLAY WITH OCCASIONAL 1" DIAMETER GRAVEL	45.4
	117.9	44.4	WOH	5	24	29	SS-8	W		107.4	**RESIDUAL** TAN, BROWN AND BLACK, SILTY COARSE SAND, SAPROLITIC	54.9
	112.9	49.4	20	28	40	68	SS-9	M		106.0	**WEATHERED ROCK** BLACK, GRAY AND BROWN, META-GRANITE	56.3
	107.9	54.4	24	40	60/0.3	100/0.8					Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 106.0 ft ON CR: GRANITE	
	106.0	56.3	60/0			60/0						

Other Samples:
ST-1 (36.2 - 38.2)
ST-2 (38.2 - 40.2)

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 54+38	**OFFSET** 24ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 163.4 ft	**TOTAL DEPTH** 70.1 ft	**NORTHING** 811,979	**EASTING** 2,341,005	**24 HR.** 25.6
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 10/15/09	**COMP. DATE** 10/15/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
										163.4	GROUND SURFACE	0.0
	163.4	0.0	3	4	7	11		D		159.4	**ROADWAY EMBANKMENT** TAN TO GRAY-BROWN, SILTY SANDY CLAY WITH TRACE ORGANICS	4.0
	159.2	4.2	5	8	12	20	SS-10	D		156.4	ORANGE-BROWN AND TAN, SILTY SANDY CLAY	7.0
	154.2	9.2	13	14	18	32		D		148.6	TAN, SILTY SAND	14.8
	149.2	14.2	3	3	5	8	SS-11	M		142.4	ORANGE, GRAY AND TAN, SILTY SANDY CLAY, SLIGHTLY MICACEOUS	21.0
	144.2	19.2	3	5	8	13		M		133.7	**ALLUVIAL** BROWN, SILTY SAND WITH LITTLE ORGANIC MATTER	29.7
	139.2	24.2	8	5	4	9	SS-12			129.1	**COASTAL PLAIN** LIGHT GRAY, CLAYEY COARSE SAND (UPLAND TERTIARY SEDIMENT)	34.3
	134.2	29.2	4	7	9	16		M		124.4	**COASTAL PLAIN** ORANGE AND GRAY, SANDY SILTY CLAY (YORKTOWN FORMATION)	39.0
	129.2	34.2	3	2	2	4		M		118.9	DARK GREEN-GRAY, SANDY SILTY CLAY	44.5
	124.2	39.2	2	1	1	2		W		117.4	ORANGE AND GRAY, SANDY SILTY CLAY WITH GRAVEL	46.0
	119.2	44.2	60	40/0.2		100/0.7		W		103.7	**RESIDUAL** BROWN, TAN AND BLACK, SILTY SAND, MICACEOUS, SAPROLITIC	59.7
	114.2	49.2	10	12	30	42		M		93.3	**WEATHERED ROCK** BROWN, WHITE AND BLACK, GRANITE	70.1
	109.2	54.2	22	30	26	56	SS-13	M			Boring Terminated at Elevation 93.3 ft IN WR: GRANITE	
	104.2	59.2	25	55	45/0.2	100/0.7						
	99.2	64.2	88	12/0.1		100/0.6						
	94.2	69.2	43	57/0.4		100/0.9						

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 54+88	**OFFSET** 54ft LT	**ALIGNMENT** -L- / **0 HR.** 4.9
COLLAR ELEV. 144.0 ft	**TOTAL DEPTH** 31.8 ft	**NORTHING** 812,038	**EASTING** 2,341,001 / **24 HR.** 5.3
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/20/09	**COMP. DATE** 10/20/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 31.8 ft

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	
145										144.0 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT TAN, SILTY SAND	
140	140.5	3.5								141.0	3.0
			2	5	2	7		M		**ALLUVIAL** GRAY, SILTY COARSE SAND	
135	135.5	8.5									
			6	6	10	16		Sat.		132.0	12.0
130	130.5	13.5								**COASTAL PLAIN** TAN AND LIGHT GRAY, CLAYEY COARSE SAND (TERTIARY UPLAND SEDIMENT)	
			7	3	3	6		Sat.		128.0	16.0
125	125.5	18.5								**COASTAL PLAIN** GRAY, SANDY SILTY CLAY WITH SAND LENSES (YORKTOWN FORMATION)	
			WOH	WOH	WOH	0	SS-14	W			
120	120.5	23.5								119.5	24.5
			WOH	WOH	WOH	0		W		ORANGE-BROWN, SANDY SILTY CLAY WITH OCCASIONAL GRAVEL	
115	115.5	28.5								116.3	27.7
			100/0.5			100/0.5				**WEATHERED ROCK** TAN, BROWN AND BLACK, GRANITE	
	112.2	31.8	60/0			60/0				112.2	31.8
110										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 112.2 ft ON CR: GRANITE	
105											
100											
95											
90											
85											
80											
75											
70											
65											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 54+82	**OFFSET** 19ft LT	**ALIGNMENT** -L- / **0 HR.** 5.8
COLLAR ELEV. 143.0 ft	**TOTAL DEPTH** 60.5 ft	**NORTHING** 812,016	**EASTING** 2,341,029 / **24 HR.** 5.1
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/21/09	**COMP. DATE** 10/22/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 41.5 ft

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)
										143.0 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT GRAY-BROWN, SILTY SAND WITH GRAVEL	
	139.4	3.6								140.0	3.0
			1	1	3	4	SS-15	M		**ALLUVIAL** GRAY-BROWN, SILTY CLAYEY SAND WITH LITTLE ORGANIC MATTER	
	134.4	8.6								136.0	7.0
			18	19	24	43	SS-16	Sat.		**COASTAL PLAIN** LIGHT GRAY, SLIGHTLY SILTY CLAYEY SAND (TERTIARY UPLAND SEDIMENT)	
	129.4	13.6								131.0	12.0
			3	2	2	4	SS-17	W		**COASTAL PLAIN** LIGHT GRAY AND TAN, SANDY CLAY (YORKTOWN FORMATION)	
	124.4	18.6								126.0	17.0
			WOH	WOH	WOH	0		W		DARK GRAY, SILTY CLAY WITH SAND LENSES	
	119.4	23.6								122.0	21.0
			WOH	1	66	67		W		ORANGE-BROWN, SANDY SILTY CLAY WITH OCCASIONAL GRAVEL	
	117.2	25.8								118.4	24.6
			90	10/0.2		100/0.7				117.5 **RESIDUAL** ORANGE-BROWN AND BLACK, SILTY COARSE SAND, SAPROLITIC	25.5
										116.5 **WEATHERED ROCK** ORANGE-BROWN, TAN AND BLACK GRANITE	26.5
										WEATHERED ROCK BROWN, TAN AND BLACK, META-GRANITE WITH CRYSTALLINE ROCK SEAM CR SEAM FROM 36.6 - 37.0' STRATA REC = 45%, STRATA RQD = N/A	
										101.5	41.5
							RS-1			**CRYSTALLINE ROCK** BROWN, TAN AND BLACK, META-GRANITE WITH WEATHERED ROCK SEAMS WR SEAMS FROM: 45.5 - 46.4' 48.4 - 49.2' STRATA REC = 93%, STRATA RQD = 36% RMR = 28 (CLASS IV - POOR ROCK)	
										89.0	54.0
										CRYSTALLINE ROCK GREEN, BROWN AND TAN, , META-GRANITE WITH CLAY-FILLED FAULT ZONE	
										82.5 WR SEAM FROM 56.5 - 59.9' STRATA REC = 78%, STRATA RQD = 25% RMR = 28 (CLASS IV - POOR ROCK)	60.5
										Boring Terminated at Elevation 82.5 ft IN CR: GRANITE	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 54+82	**OFFSET** 19ft LT	**ALIGNMENT** -L- / **0 HR.** 5.8
COLLAR ELEV. 143.0 ft	**TOTAL DEPTH** 60.5 ft	**NORTHING** 812,016	**EASTING** 2,341,029 / **24 HR.** 5.1
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/21/09	**COMP. DATE** 10/22/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 41.5 ft
CORE SIZE NX	**TOTAL RUN** 34.0 ft	**DRILLER** Conley, H. R.	

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)
116.5											Begin Coring @ 26.5 ft	
115	116.5	26.5	4.0	0:30 0:50 0:45 0:50	(0.5) 13%	(0.0) 0% N/A		(6.7) 45%	(0.0) 0% N/A		116.5 **WEATHERED ROCK** BROWN, TAN AND BLACK, SEVERELY WEATHERED, SOFT TO VERY SOFT, VERY CLOSELY FRACTURED, META-GRANITE WITH CRYSTALLINE ROCK SEAM CR SEAM FROM 36.6 - 37.0'	26.5
	112.5	30.5										
110			5.0	0:45 0:50 0:35 0:55 0:50	(3.4) 68%	(0.0) 0% N/A						
	107.5	35.5										
105			5.0	0:50 1:45 2:20 1:10 1:35	(2.8) 56%	(0.0) 0% N/A						
	102.5	40.5									101.5	41.5
100			5.0	2:30 4:30 2:00 1:30 1:00	(4.0) 80%	(0.7) 14%		(11.6) 93%	(4.5) 36%		**CRYSTALLINE ROCK** BROWN, TAN AND BLACK, MOD. SEVERELY WEATHERED, SOFT TO MEDIUM HARD, VERY CLOSELY TO CLOSELY FRACTURED, META-GRANITE WITH WEATHERED ROCK SEAMS WR SEAMS FROM: 45.5 - 46.4' 48.4 - 49.2' RMR = 28 (CLASS IV - POOR ROCK)	
	97.5	45.5					RS-1					
95			5.0	1:40 1:05 0:40 2:00 1:15	(4.1) 82%	(1.4) 28%						
	92.5	50.5										
90			5.0	1:10 0:30 1:05 1:15 1:30	(5.0) 100%	(3.0) 60%						
	87.5	55.5									89.0	54.0
85			5.0	3:00 2:00 6:00 6:00 1:15	(3.6) 72%	(1.0) 20%		(5.1) 78%	(1.6) 25%		**CRYSTALLINE ROCK** GREEN, BROWN AND TAN, MOD. SEVERELY WEATHERED, VERY SOFT TO MED. HARD, VERY CLOSELY TO MOD. CLOSELY FRACTURED, META-GRANITE WITH CLAY-FILLED FAULT ZONE WR SEAM FROM 56.5 - 59.9' RMR = 28 (CLASS IV - POOR ROCK)	
	82.5	60.5									82.5	60.5
80											Boring Terminated at Elevation 82.5 ft IN CR: GRANITE	
75												
70												
65												
60												
55												
50												
45												
40												

NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 55+63	**OFFSET** 50ft LT	**ALIGNMENT** -L- / **0 HR.** 7.2
COLLAR ELEV. 142.6 ft	**TOTAL DEPTH** 45.1 ft	**NORTHING** 812,105	**EASTING** 2,341,041 / **24 HR.** 5.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/26/09	**COMP. DATE** 10/26/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 28.3 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. ft / DEPTH ft)
									142.6 / 0.0 GROUND SURFACE
	139.3	3.3	2	2	1		D		140.6 / 2.0 **ROADWAY EMBANKMENT** RED-BROWN, SANDY CLAY
	134.3	8.3	3	4	4	SS-18	Sat.		135.6 / 7.0 **ALLUVIAL** BROWN, SILTY SAND WITH TRACE ORGANIC MATTER
	129.3	13.3	4	3	2		Sat.		130.6 / 12.0 **COASTAL PLAIN** LIGHT GRAY, SILTY SAND (TERTIARY UPLAND SEDIMENT)
	124.3	18.3	WOH	WOH	WOH	SS-19	W		125.6 / 17.0 TAN AND GRAY, SLIGHTLY SILTY CLAYEY COARSE SAND
	119.3	23.3	WOH	3	5		Sat.		118.1 / 24.5 **COASTAL PLAIN** ORANGE AND GRAY, SANDY SILTY CLAY WITH SAND LENSES (YORKTOWN FORMATION)
	114.3	28.3	60/0			RS-2			116.1 / 26.5 **RESIDUAL** TAN, BROWN AND BLACK, SILTY SAND, SAPROLITIC; 114.3 / 28.3 **WEATHERED ROCK** TAN, BROWN AND BLACK, GRANITE; **CRYSTALLINE ROCK** PINK, GRAY, WHITE, BLACK AND BROWN, MEGACRYSTIC GRANITE. STRATA REC = 97%, STRATA RQD = 89%. RMR = 55 (CLASS III - FAIR ROCK)
									103.5 / 39.1 **CRYSTALLINE ROCK** GRAY, WHITE AND BLACK, META-GRANITE. STRATA REC = 98%, STRATA RQD = 92%. RMR = 68 (CLASS III - FAIR ROCK)
									97.5 / 45.1 Boring Terminated at Elevation 97.5 ft IN CR: GRANITE

NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 55+63	**OFFSET** 50ft LT	**ALIGNMENT** -L- / **0 HR.** 7.2
COLLAR ELEV. 142.6 ft	**TOTAL DEPTH** 45.1 ft	**NORTHING** 812,105	**EASTING** 2,341,041 / **24 HR.** 5.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/26/09	**COMP. DATE** 10/26/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 28.3 ft
CORE SIZE NX	**TOTAL RUN** 16.8 ft	**DRILLER** Conley, H. R.	

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)
114.3											Begin Coring @ 28.3 ft
	114.3 / 112.5	28.3 / 30.1	1.8	1:15 / 1:10/0.8	(1.6) 89%	(1.3) 72%		(10.5) 97%	(9.6) 89%		114.3 / 28.3 **CRYSTALLINE ROCK** PINK, GRAY, WHITE, BLACK AND BROWN, SLI. WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSELY TO MOD. CLOSELY FRACTURED, MEGACRYSTIC GRANITE. RMR = 55 (CLASS III - FAIR ROCK)
	107.5	35.1	5.0	1:45 2:20 2:30 3:00 4:30	(4.9) 98%	(4.3) 86%					
	102.5	40.1	5.0	5:20 6:45 4:45 1:45 2:30	(5.0) 100%	(4.5) 90%	RS-2				
	97.5	45.1	5.0	2:45 2:20 3:30 2:20 2:15	(4.9) 98%	(4.7) 94%		(5.9) 98%	(5.5) 92%		103.5 / 39.1 **CRYSTALLINE ROCK** GRAY, WHITE AND BLACK, VERY SLI. WEATHERED TO FRESH, HARD TO VERY HARD, VERY CLOSELY TO CLOSELY FRACTURED, FINE GRAINED META-GRANITE. RMR = 68 (CLASS III - FAIR ROCK)
											97.5 / 45.1 Boring Terminated at Elevation 97.5 ft IN CR: GRANITE

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 55+60	**OFFSET** 17ft LT	**ALIGNMENT** -L-	**0 HR.** 5.2
COLLAR ELEV. 141.9 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 812,086	**EASTING** 2,341,068	**24 HR.** 5.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 10/23/09	**COMP. DATE** 10/23/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 30.0 ft	

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)
										141.9 GROUND SURFACE	0.0
										139.4 **ROADWAY EMBANKMENT** RED-BROWN, SANDY CLAY	2.5
	138.5	3.4	4	5	4	9		D		134.9 **ALLUVIAL** BROWN, SILTY SAND	7.0
	133.5	8.4	2	2	3	5		M		124.9 **COASTAL PLAIN** GRAY TO LIGHT GRAY, CLAYEY FINE TO COARSE SAND (TERTIARY UPLAND SEDIMENT)	17.0
	128.5	13.4	5	5	6	11		Sat.		119.9 **COASTAL PLAIN** DARK GRAY, SILTY CLAY WITH SAND LAYERS (YORKTOWN FORMATION)	22.0
	123.5	18.4	WOH	WOH	2	2		W		115.6 ORANGE-BROWN, SILTY CLAYEY SAND WITH OCCASIONAL GRAVEL	26.3
	118.5	23.4	WOH	3	4	7	SS-28	Sat.		111.9 **WEATHERED ROCK** BROWN, TAN AND BLACK, GRANITE	30.0
	113.5	28.4	100/0.5			100/0.5					
	111.9	30.0	60/0			60/0					

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 111.9 ft ON CR: GRANITE

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 56+41	**OFFSET** 52ft LT	**ALIGNMENT** -L-	**0 HR.** 13.5
COLLAR ELEV. 144.4 ft	**TOTAL DEPTH** 21.3 ft	**NORTHING** 812,174	**EASTING** 2,341,079	**24 HR.** 7.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 10/28/09	**COMP. DATE** 10/28/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 21.3 ft	

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
	144.4	0.0	2	5	4	9	SS-26	M		144.4 GROUND SURFACE 0.0
	140.3	4.1	2	1	2	3	SS-27	M		141.4 **ROADWAY EMBANKMENT** BROWN TO RED-BROWN, SILTY CLAYEY SAND WITH GRAVEL 3.0
	135.3	9.1	6	6	10	16		M		137.4 **ALLUVIAL** BROWN, SANDY SILT 7.0
	130.3	14.1	4	5	6	11		Sat.		125.0 **COASTAL PLAIN** LIGHT GRAY AND TAN TO ORANGE, CLAYEY COARSE SAND (TERTIARY UPLAND SEDIMENTS) 19.4
	125.3	19.1	4	1	1	2		W		124.3 **COASTAL PLAIN** ORANGE, SANDY SILTY CLAY (YORKTOWN FORMATION) 20.1
	123.1	21.3	60/0			60/0				123.4 **RESIDUAL** WHITE, GRAY AND BLACK, SILTY COARSE SAND, SAPROLITIC 21.0
										123.1 **WEATHERED ROCK** TAN, WHITE AND BLACK, GRANITE 21.3

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 123.1 ft ON CR: GRANITE

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 56+36	**OFFSET** 18ft LT	**ALIGNMENT** -L- / **0 HR.** 7.0
COLLAR ELEV. 143.8 ft	**TOTAL DEPTH** 55.3 ft	**NORTHING** 812,152	**EASTING** 2,341,107 / **24 HR.** 7.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 10/28/09	**COMP. DATE** 10/28/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 27.3 ft

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)
145										143.8 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT RED-BROWN, MEDIUM STIFF, SANDY CLAY (A-6)	
140	140.4	3.4	2	2	3	5		M		140.8 **ALLUVIAL** BROWN, SANDY SILT	3.0
135	135.4	8.4	8	10	12	22	SS-29	M		137.8 **COASTAL PLAIN** LIGHT GRAY, RED-BROWN TO ORANGE-BROWN, CLAYEY COARSE SAND (TERTIARY UPLAND SEDIMENT)	6.0
130	130.4	13.4	5	7	6	13		Sat.			
125	125.4	18.4	WOH	WOH	WOH	0		W		126.8 **COASTAL PLAIN** ORANGE BROWN AND LIGHT GRAY TO DARK GRAY, SANDY SILTY CLAY	17.0
120	120.4	23.4	6	7	10	17		Sat.		123.9 **RESIDUAL** BROWN, TAN AND BLACK, SILTY COARSE SAND, SAPROLITIC, MICACEOUS	19.9
115	116.5	27.3	60/0			60/0	RS-3			117.3 / 116.5 **WEATHERED ROCK** WHITE, BROWN AND BLACK, GRANITE	26.5 / 27.3
110										113.0 **CRYSTALLINE ROCK** GRAY, WHITE AND BLACK, FINE TO MEDIUM GRAINED GRANITE WITH WR SEAMS STRATA REC = 89%, STRATA RQD = 63% RMR = 46 (CLASS III - FAIR ROCK)	30.8
105							RS-4			106.5 PINK, TAN AND GRAY, COARSE-GRAINED GRANITE STRATA REC = 100%, STRATA RQD = 77% RMR = 68 (CLASS II - GOOD ROCK)	37.3
100										99.5 GRAY, WHITE, BLACK AND BROWN, FINE TO MEDIUM GRAINED GRANITE WR SEAM FROM 43.0 - 44.3' STRATA REC = 67%, STRATA RQD = 16% RMR = 25 (CLASS IV - POOR ROCK)	44.3
95										GRAY, PINK, TAN AND BLACK, MEGACRYSTIC GRANITE STRATA REC = 64%, STRATA RQD = 50% RMR = 40 (CLASS IV - POOR ROCK)	
90										88.5 *WIRELINE MALFUNCTION, CORE FROM 51.3-55.3' LOST, EXTENSIVE MECHANICAL FRACTURING EVIDENT.	55.3
85										Boring Terminated at Elevation 88.5 ft IN CR: GRANITE	
80											
75											
70											
65											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.	
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64				**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 56+36	**OFFSET** 18ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 143.8 ft	**TOTAL DEPTH** 55.3 ft	**NORTHING** 812,152	**EASTING** 2,341,107	**24 HR.** 7.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 10/28/09	**COMP. DATE** 10/28/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 27.3 ft	
CORE SIZE NX	**TOTAL RUN** 28.0 ft	**DRILLER** Conley, H. R.		

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)
116.5											Begin Coring @ 27.3 ft	
115	116.5	27.3	3.0	3:30 2:15 3:15	(2.6) 87%	(1.7) 57%		(3.1) 89%	(2.2) 63%		116.5 **CRYSTALLINE ROCK** GRAY, WHITE AND BLACK, SLI. TO VERY SLI. WEAKLY WEATHERED, HARD, CLOSELY FRACTURED, FINE TO MEDIUM GRAINED GRANITE	27.3
	113.5	30.3					RS-3					
110	108.5	35.3	5.0	2:05 1:45 2:15 2:00 2:15	(5.0) 100%	(3.4) 68%		(6.5) 100%	(5.0) 77%		113.0 WR SEAM FROM 28.6 - 29.0' RMR = 46 (CLASS III - FAIR ROCK) PINK, TAN AND GRAY, SLI. WEATHERED TO FRESH, MOD. HARD TO VERY HARD, VERY CLOSELY TO MOD. CLOSELY FRACTURED, COARSE GRAINED GRANITE	30.8
105	103.5	40.3	5.0	3:15 3:15 1:45 1:45 1:40	(4.0) 80%	(2.1) 42%	RS-4	(4.7) 67%	(1.1) 16%		106.5 RMR = 68 (CLASS II - GOOD ROCK) GRAY, WHITE, BLACK AND BROWN, MOD. SEVERELY TO SLIGHTLY WEATHERED, SOFT TO HARD, VERY CLOSELY TO CLOSELY FRACTURED, FINE TO MEDIUM GRAINED GRANITE	37.3
100	98.5	45.3	5.0	1:20 0:45 0:45 1:15 2:00	(3.7) 74%	(2.1) 42%		(7.0) 64%	(5.5) 50%		99.5 WR SEAM FROM 43.0 - 44.3' RMR = 25 (CLASS IV - POOR ROCK) GRAY, PINK, TAN AND BLACK, SLIGHTLY WEATHERED, MODERATELY HARD, VERY CLOSELY TO CLOSELY FRACTURED, MEGACRYSTIC GRANITE	44.3
95	93.5	50.3	5.0	1:50 2:30 3:00 3:45 2:45	(5.0) 100%	(4.5) 90%						
90	88.5	55.3	5.0	2:15 3:15 3:00 4:15 4:15	(1.0) 20%	(0.0) 0% *					88.5 *WIRELINE MALFUNCTION, CORE FROM 51.3-55.3' LOST, EXTENSIVE MECHANICAL FRACTURING EVIDENT. RMR = 40 (CLASS IV - POOR ROCK)	55.3
85											Boring Terminated at Elevation 88.5 ft IN CR: GRANITE	
80												
75												
70												
65												
60												
55												
50												
45												
40												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 56+83	**OFFSET** 56ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 157.1 ft	**TOTAL DEPTH** 34.3 ft	**NORTHING** 812,212	**EASTING** 2,341,098	**24 HR.** 25.8
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 10/27/09	**COMP. DATE** 10/27/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 34.3 ft

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)
	157.1	0.0								GROUND SURFACE	0.0
			2	4	5	9	SS-20	M		**ROADWAY EMBANKMENT** RED-BROWN AND TAN, SILTY SANDY CLAY WITH OCCASIONAL GRAVEL AND TRACE ROOT MATTER	
	153.1	4.0	3	4	3	7		M			
	148.1	9.0	4	4	7	11		M			
	143.1	14.0	4	4	11	15		D			141.9 / 15.2
										ALLUVIAL GRAY-BROWN, SILTY SAND WITH TRACE ORGANIC MATTER	137.6 / 19.5
	138.1	19.0	5	6	10	16	SS-21	M		**COASTAL PLAIN** ORANGE-BROWN AND GRAY, COARSE SANDY CLAY (TERTIARY UPLAND SEDIMENT)	134.1 / 23.0
	133.1	24.0	4	6	8	14	SS-22			ORANGE AND TAN, CLAYEY COARSE SAND	
	128.1	29.0	2	2	3	5	SS-23	W		**RESIDUAL** GRAY, TAN AND WHITE, SANDY SILT , SAPROLITIC, MICACEOUS	128.1 / 29.0
										WEATHERED ROCK GRAY, TAN AND BLACK, GRANITE	124.6 / 32.5
	123.1	34.0									122.8 / 34.3
	122.8	34.3	100/0.3			100/0.3				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 122.8 ft ON CR: GRANITE	
			60/0			60/0					

PROJECT NO. 35014.1.1	**ID.** U-4019	**COUNTY** NASH	**GEOLOGIST** Bruinsma, C. M.
SITE DESCRIPTION WIDEN BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 56+79	**OFFSET** 22ft LT	**ALIGNMENT** -L-	**0 HR.** 26.5
COLLAR ELEV. 163.6 ft	**TOTAL DEPTH** 43.6 ft	**NORTHING** 812,191	**EASTING** 2,341,125	**24 HR.** 23.5
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 10/27/09	**COMP. DATE** 10/27/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 43.6 ft

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
										163.6 GROUND SURFACE 0.0
	159.2	4.4	4	6	8	14		M		**ROADWAY EMBANKMENT** RED-BROWN TO BROWN, SANDY SILTY CLAY WITH TRACE ORGANICS AND OCCASIONAL GRAVEL
	154.2	9.4	2	4	4	8		M		
	149.2	14.4	2	2	4	6		M		
	144.2	19.4	2	3	4	7		M		141.6 / 22.0
										ALLUVIAL BROWN, SANDY CLAY
	139.2	24.4	1	1	2	3	SS-24	M		136.6 / 27.0
	134.2	29.4	9	11	15	26		M		**COASTAL PLAIN** ORANGE AND LIGHT GRAY, CLAYEY COARSE SAND (TERTIARY UPLAND SEDIMENT)
	129.2	34.4	6	8	8	16	SS-25	Sat.		125.6 / 38.0
	124.2	39.4	WOH	WOH	WOH	0		W		**COASTAL PLAIN** ORANGE AND GRAY TO DARK GRAY, SANDY SILTY CLAY (YORKTOWN FORMATION) 121.6 / 42.0
	120.0	43.6	60/0			60/0				**WEATHERED ROCK** BROWN, WHITE AND GRAY, GRANITE 120.0 / 43.6
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 120.0 ft ON CR: GRANITE

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	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	54+45	59 LT	4.4-5.9	A-6(8)	35	15	21.0	14.2	22.3	42.5	99	86	66	-	-
SS-2	54+45	59 LT	9.4-10.9	A-2-4(0)	16	2	55.2	22.6	10.0	12.1	95	60	23	-	-
SS-3	54+45	59 LT	14.4-15.9	A-2-7(2)	44	22	51.0	18.8	6.0	24.3	96	61	31	-	-
SS-4	54+45	59 LT	19.4-20.9	A-2-4(0)	18	6	55.0	19.0	9.8	16.2	100	63	28	-	-
SS-5	54+45	59 LT	29.4-30.9	A-2-7(3)	56	35	63.1	9.3	1.3	26.3	96	51	27	-	-
SS-6	54+45	59 LT	34.4-35.9	A-7-6(50)	75	53	2.6	16.2	20.5	60.7	100	99	86	32.6	-
SS-7	54+45	59 LT	39.4-40.9	A-6(6)	33	16	10.9	36.8	30.0	22.2	100	98	58	43.9	-
SS-8	54+45	59 LT	44.9-45.4	A-7-6(4)	43	19	14.2	42.9	20.7	22.2	76	68	43	-	-
SS-9	54+45	59 LT	45.4-45.9	A-2-4(0)	31	5	42.7	34.0	15.3	8.1	88	65	25	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	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	54+38	24 LT	4.2-5.7	A-7-6(4)	45	26	48.7	16.6	8.4	26.3	99	66	36	-	-
SS-11	54+38	24 LT	14.8-15.7	A-7-6(4)	48	23	42.3	18.4	11.0	28.3	95	67	40	-	-
SS-12	54+38	24 LT	24.2-25.7	A-2-4(0)	24	6	56.4	19.0	8.4	16.2	99	61	26	-	-
SS-13	54+38	24 LT	54.2-55.7	A-2-4(0)	31	7	47.9	21.2	22.8	8.1	91	60	31	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-14	54+88	54 LT	18.5-20.0	A-6(11)	39	19	5.5	32.0	34.3	28.3	100	99	68	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-15	54+82	19 LT	3.6-5.1	A-2-6(0)	30	11	54.0	18.0	7.8	20.2	100	63	29	-	-
SS-16	54+82	19 LT	8.6-10.1	A-2-7(5)	61	41	53.4	13.1	5.2	28.3	89	52	31	-	-
SS-17	54+82	19 LT	13.6-15.1	A-6(4)	35	22	38.0	24.3	9.4	28.3	98	76	40	-	-

B2-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-18	55+63	50 LT	8.3-9.8	A-2-4(0)	15	NP	56.0	30.1	9.8	4.0	98	61	18	-	-
SS-19	55+63	50 LT	18.3-19.8	A-7-6(17)	49	34	7.5	34.6	15.5	42.5	100	99	61	-	-

B2-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-28	55+60	17 LT	23.4-24.9	A-2-7(7)	63	44	44.1	18.6	11.0	26.3	79	47	35	-	-

B3-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-26	56+41	52 LT	0.0-1.5	A-2-6(1)	31	14	44.5	23.3	12.0	20.2	91	64	32	-	-
SS-27	56+41	52 LT	4.1-9.6	A-4(0)	31	10	40.6	24.5	10.6	24.3	99	74	37	-	-

B3-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-29	56+36	18 LT	8.4-9.9	A-2-7(5)	71	42	60.7	8.1	2.9	28.3	93	48	30	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-20	56+83	56 LT	0.0-1.5	A-7-6(7)	57	30	41.7	17.0	9.0	32.4	93	65	41	-	-
SS-21	56+83	56 LT	19.5-20.5	A-7-6(19)	63	34	24.3	16.4	10.8	48.5	100	85	61	-	-
SS-22	56+83	56 LT	24.0-25.5	A-2-7(2)	54	36	69.8	9.1	2.9	18.2	94	41	21	-	-
SS-23	56+83	56 LT	29.0-30.5	A-4(0)	36	7	36.4	32.2	19.3	12.1	100	82	37	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-24	56+79	22 LT	24.4-25.9	A-6(2)	33	13	35.8	23.3	12.6	28.3	99	76	43	-	-
SS-25	56+79	22 LT	34.4-35.9	A-2-7(0)	45	26	76.8	8.1	2.9	12.1	92	31	15	-	-

B1-B

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-1	54+81	19 LT	44.8-45.5	2.7759	163.9	2.22	23,900	8.73	2.8

B2-A

ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-2	55+63	50 LT	35.1-35.9	2.7759	160.9	2.22	32,900	12.01	0.404

B3-B

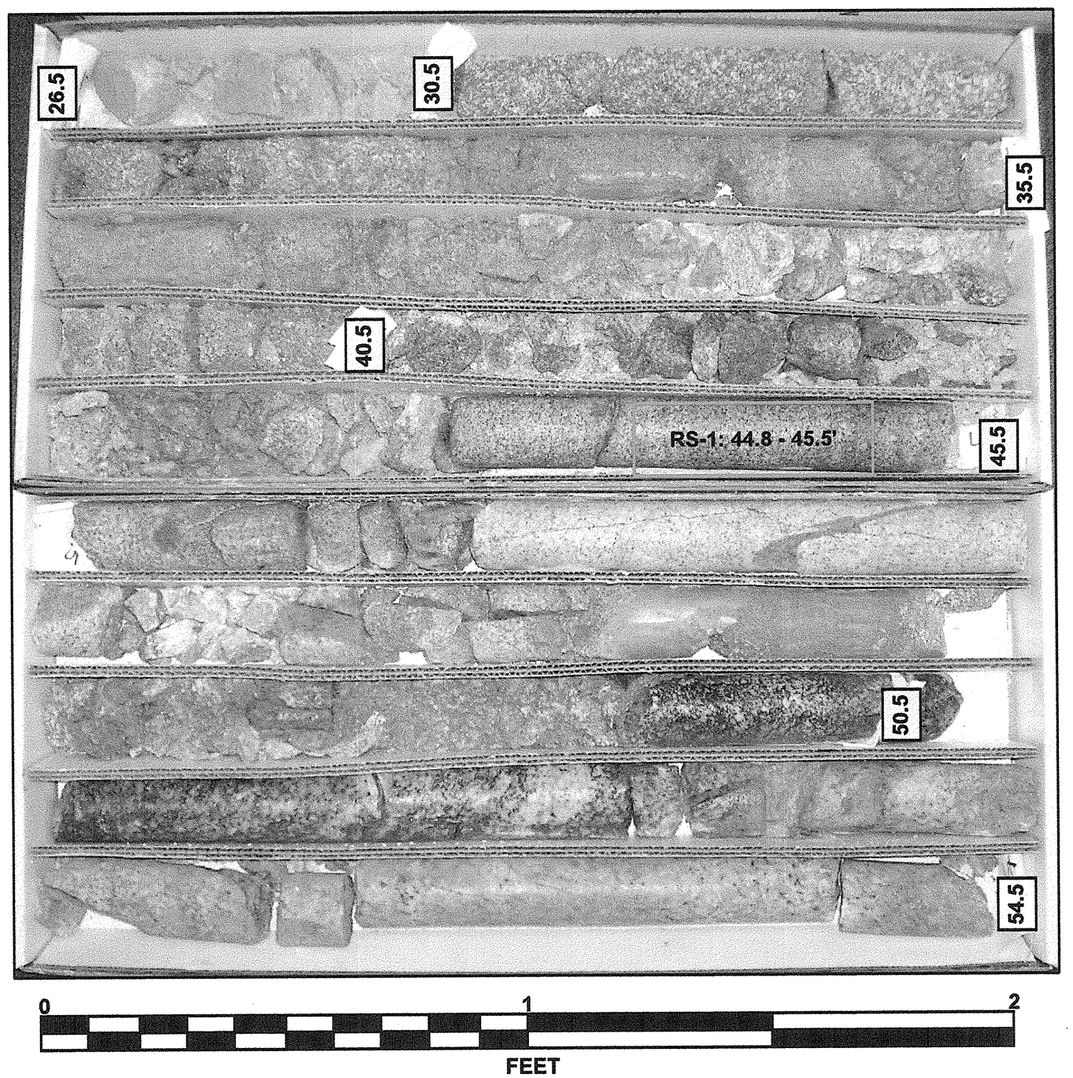
ROCK TEST RESULTS

SAMPLE NO.	STATION	OFFSET (FT)	DEPTH INTERVAL (FT)	AREA (in^2)	UNIT WEIGHT (lbs/ft^3)	H/D RATIO	ULTIMATE LOAD (lbf)	ULTIMATE CORRECTED (ksi)	SEC MOD @ 40% (Mpsi)
RS-3	56+36	18 LT	29.7-30.3	3.2813	169.2	2.04	40,300	12.3	6.99
RS-4	56+36	18 LT	36.6-37.3	1.6513	254	2.87	28,200	17.73	6.2
RS-4b	56+36	18 LT	36.6-37.3	1.6513	254	2.87	24,800	15.57	6.82

CORE PHOTOGRAPHS

B1-B

BOXES 1 & 2: 26.5 - 54.5 FEET



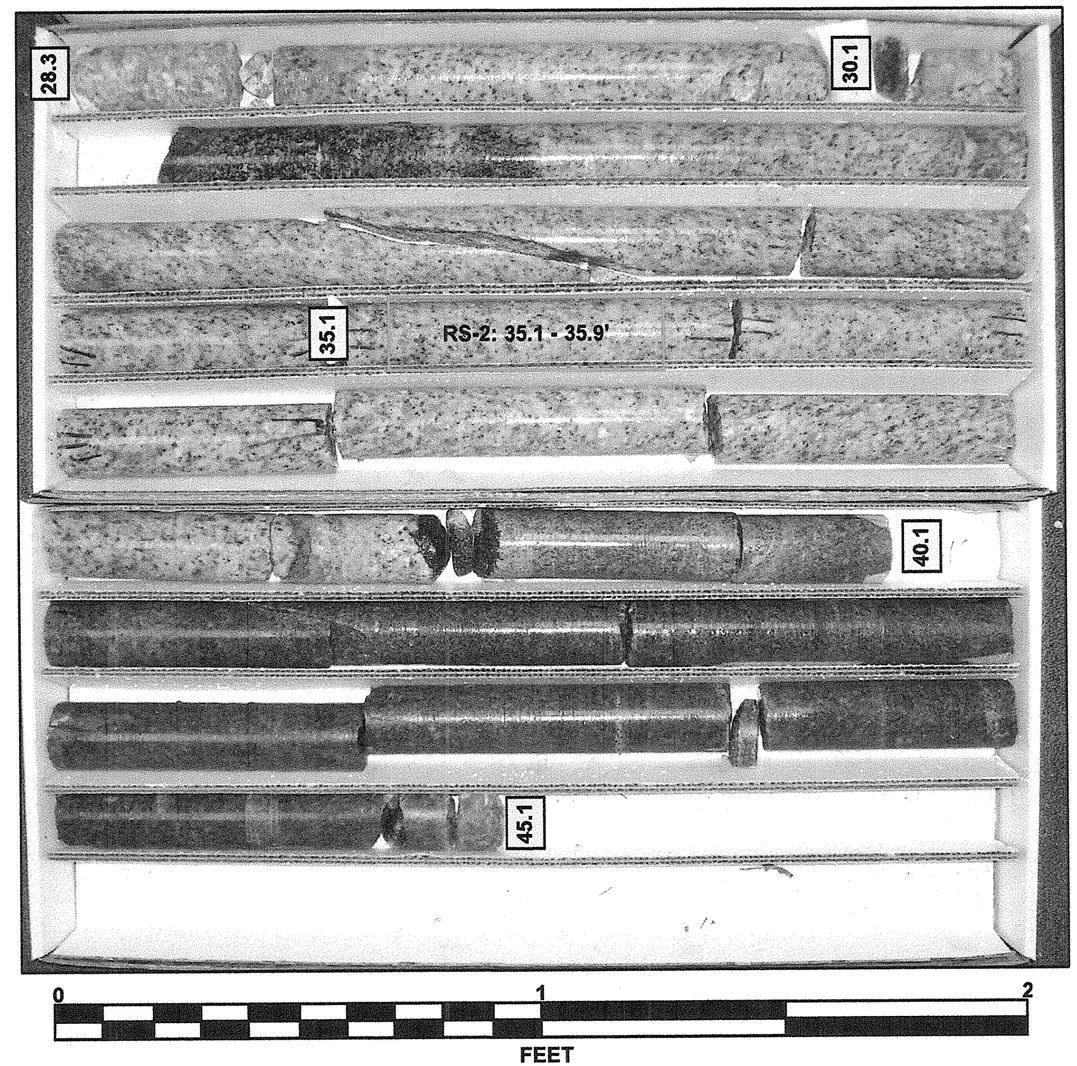
B1-B

BOX 3: 54.5 - 60.5 FEET

CORE PHOTOGRAPHS

B2-A

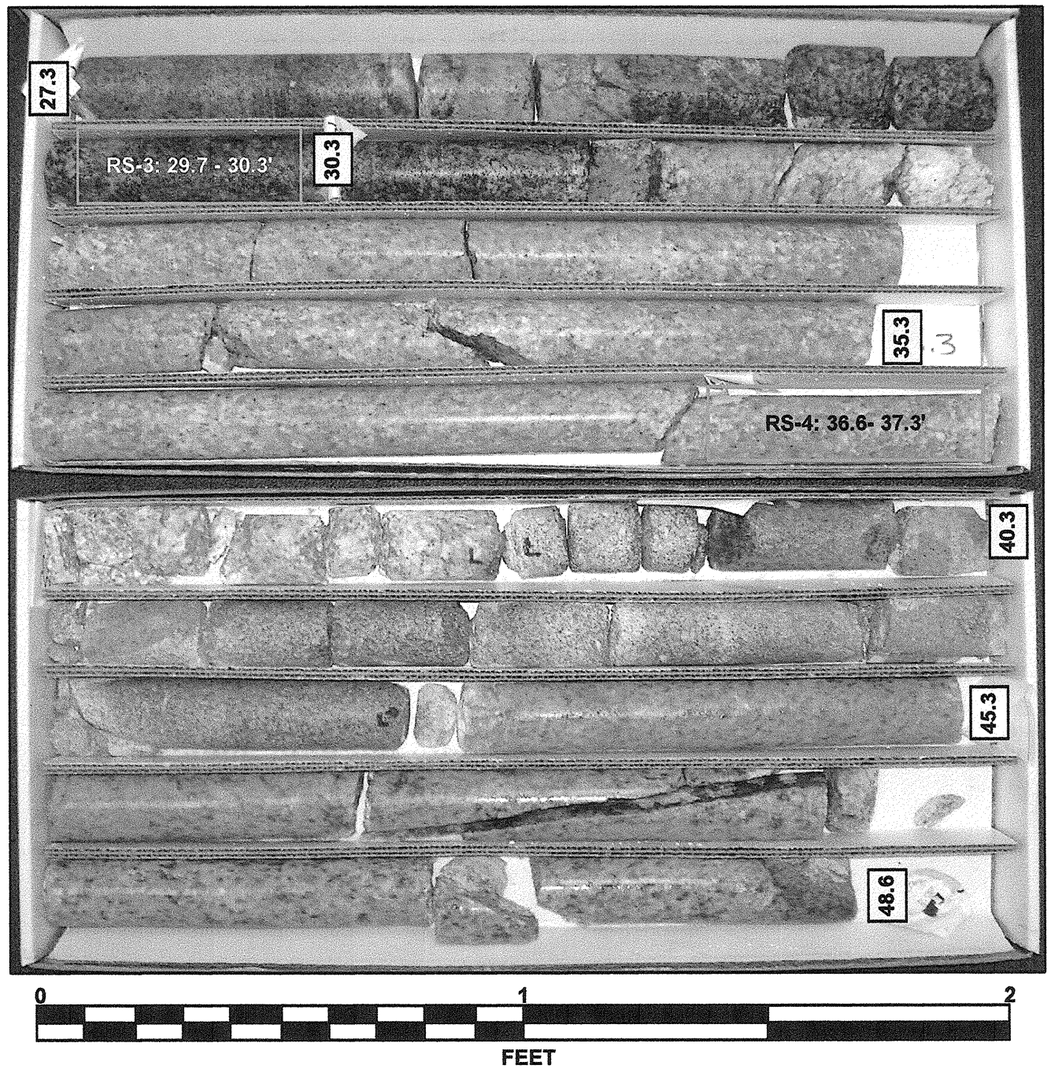
BOX 1 & 2: 28.3 - 45.1 FEET



CORE PHOTOGRAPHS

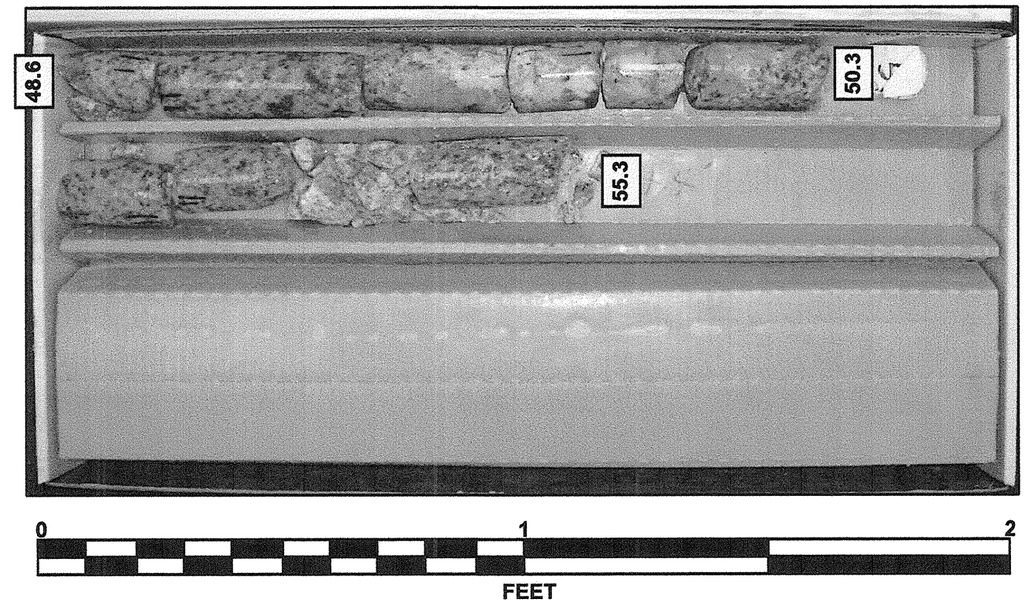
B3-B

BOXES 1 & 2: 27.3 - 48.6 FEET



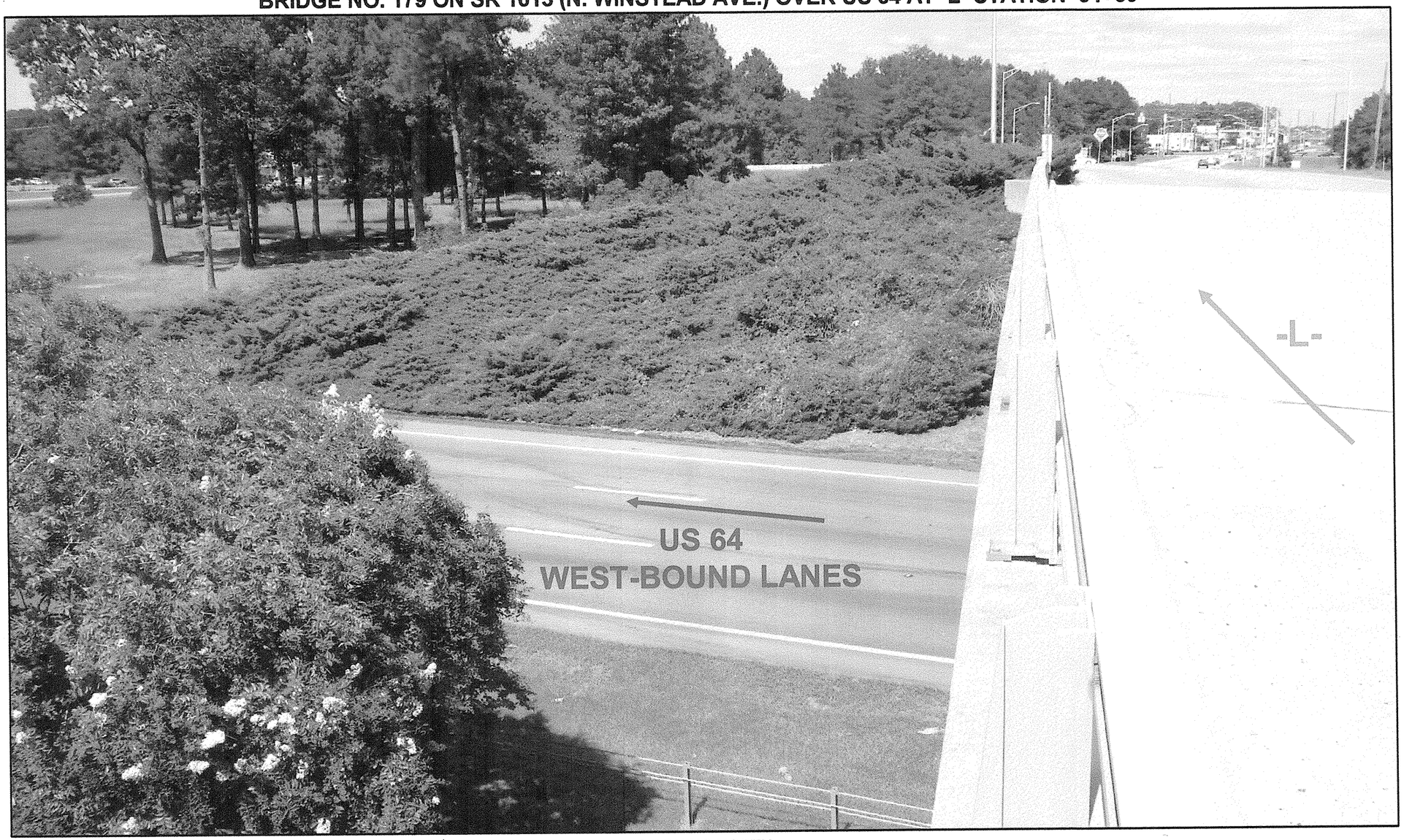
B3-B

BOX 3: 48.6 - 55.3 FEET



SITE PHOTO

BRIDGE NO. 179 ON SR 1613 (N. WINSTEAD AVE.) OVER US 64 AT -L- STATION 54+50



LOOKING NORTH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4019 (35014.1.1)	1	5

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 35014.1.1 (U-4019) F.A. PROJ. STP-1613(3)

COUNTY NASH

PROJECT DESCRIPTION SR 1613 (N. WINSTEAD AVE.)
FROM SR 1770 (SUNSET AVE.) TO SR 1604 (HUNTER HILL RD.)

SITE DESCRIPTION RETAINING WALL 1: -Y- STA. 16+00
RETAINING WALL 2: -L- STA. 25+50
RETAINING WALL 3: -L- STA. 70+50

WALL INVENTORY

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN AND PROFILE RET. WALL 1
4	SITE PLAN AND PROFILE RET. WALL 2
5	SITE PLAN AND PROFILE RET. WALL 3

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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PERSONNEL
C.M. BRUINSMA
R.E. SMITH
J. EDMONSON

INVESTIGATED BY C.M. BRUINSMA
CHECKED BY N.T. ROBERSON
SUBMITTED BY C.M. BRUINSMA
DATE JULY 2010

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA M. BRUINSMA
7-16-10

CONTRACT: 35014.1.1

ID: U-4019

DRAWN BY: W. D. FIELDS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT REFERENCE NO.	SHEET NO.
U-4019 (35014.1.1)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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 A 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 0.50 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
GRAIN SIZE 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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [x] CME-45B
- [ ] _____

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

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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:

ELEVATION: FT.

NOTES:

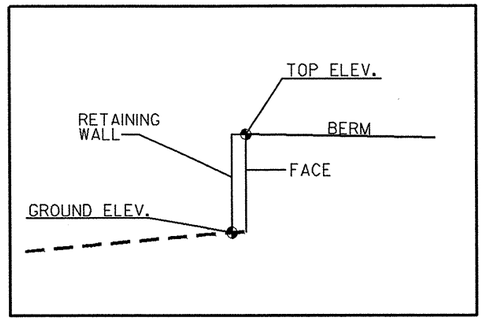
PROJECT REFERENCE NO.	SHEET NO.
U-4019 (35014.1.1)	3

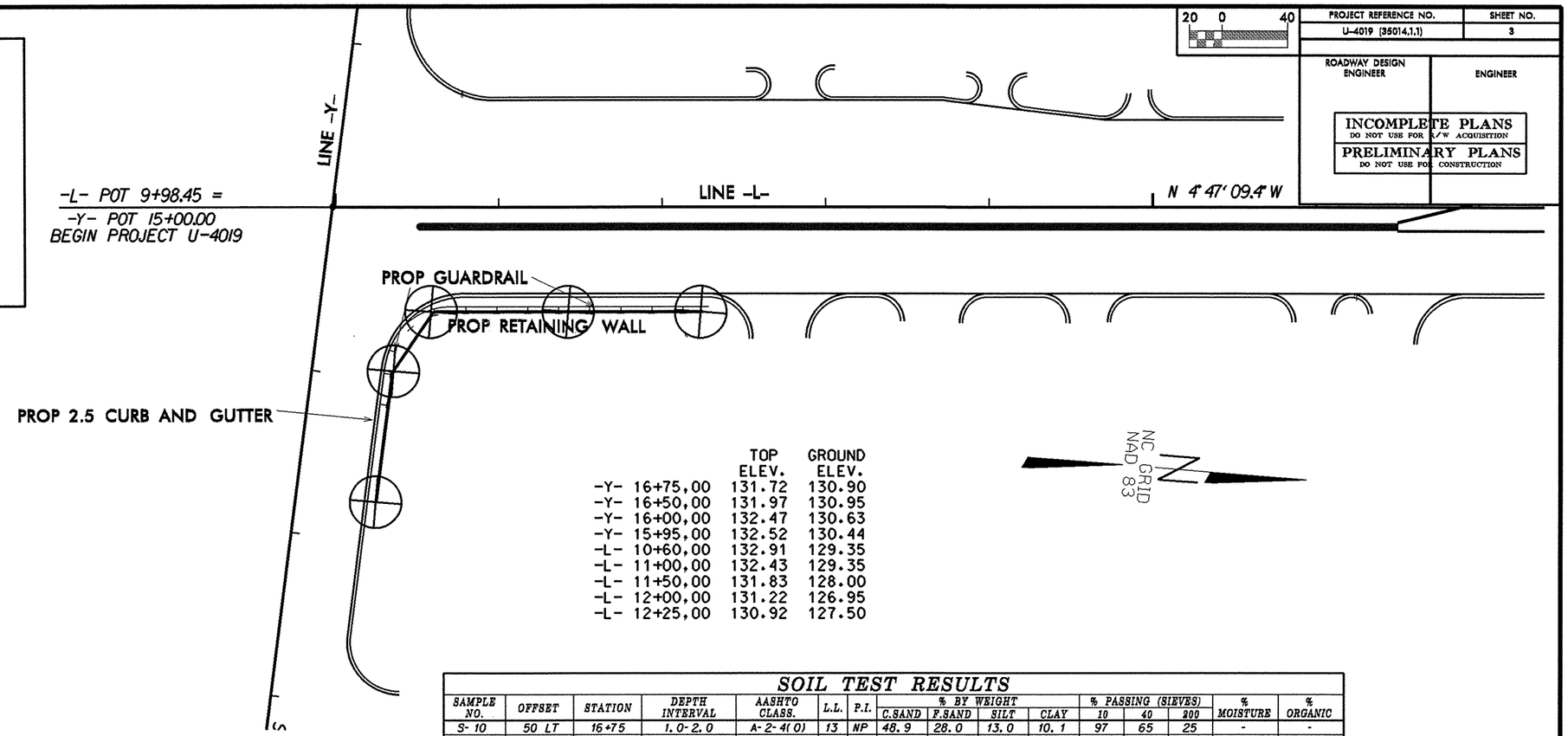
ROADWAY DESIGN ENGINEER

ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

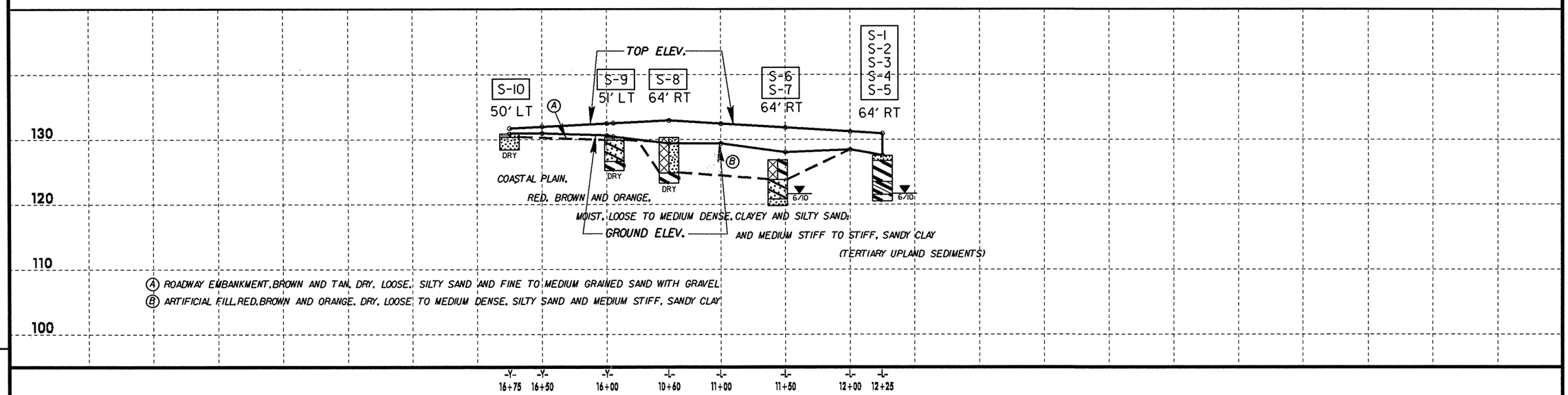




	TOP ELEV.	GROUND ELEV.
-Y- 16+75,00	131.72	130.90
-Y- 16+50,00	131.97	130.95
-Y- 16+00,00	132.47	130.63
-Y- 15+95,00	132.52	130.44
-L- 10+60,00	132.91	129.35
-L- 11+00,00	132.43	129.35
-L- 11+50,00	131.83	128.00
-L- 12+00,00	131.22	126.95
-L- 12+25,00	130.92	127.50

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-10	50 LT	16+75	1.0-2.0	A-2-4(0)	13	NP	48.9	28.0	13.0	10.1	97	65	25	-	-
S-9	50 LT	15+95	2.5-3.5	A-2-7(4)	57	32	52.2	12.1	7.6	28.2	91	53	33	-	-
S-8	64 RT	10+60	6.5-7.0	A-7-6(40)	72	46	5.8	16.5	21.2	56.4	100	96	81	-	-
S-6	64 RT	11+44	1.0-2.0	A-7-6(7)	47	30	37.7	20.7	13.4	28.2	98	73	43	-	-
S-7	64 RT	11+44	5.0-6.0	A-2-7(4)	54	31	52.4	13.9	7.6	26.2	97	62	34	-	-
S-1	64 RT	12+25	0.0-0.8	A-2-4(0)	13	NP	45.9	26.0	16.0	12.1	91	63	29	-	-
S-2	64 RT	12+25	0.8-2.0	A-7-6(8)	43	27	35.9	19.7	12.2	32.2	99	75	46	17.6	-
S-3	64 RT	12+25	3.0-4.0	A-7-6(8)	52	34	39.9	20.7	11.2	28.2	99	72	41	-	-
S-4	64 RT	12+25	4.0-6.0	A-6(4)	40	25	42.9	20.9	14.0	22.2	98	70	38	-	-
S-5	64 RT	12+25	6.0-7.0	A-7-6(5)	41	23	35.4	24.0	14.4	26.2	100	81	43	-	-



(A) ROADWAY EMBANKMENT, BROWN AND TAN, DRY, LOOSE, SILTY SAND AND FINE TO MEDIUM GRAINED SAND WITH GRAVEL.

(B) ARTIFICIAL FILL, RED, BROWN AND ORANGE, DRY, LOOSE TO MEDIUM DENSE, SILTY SAND AND MEDIUM STIFF, SANDY CLAY.

REVISIONS

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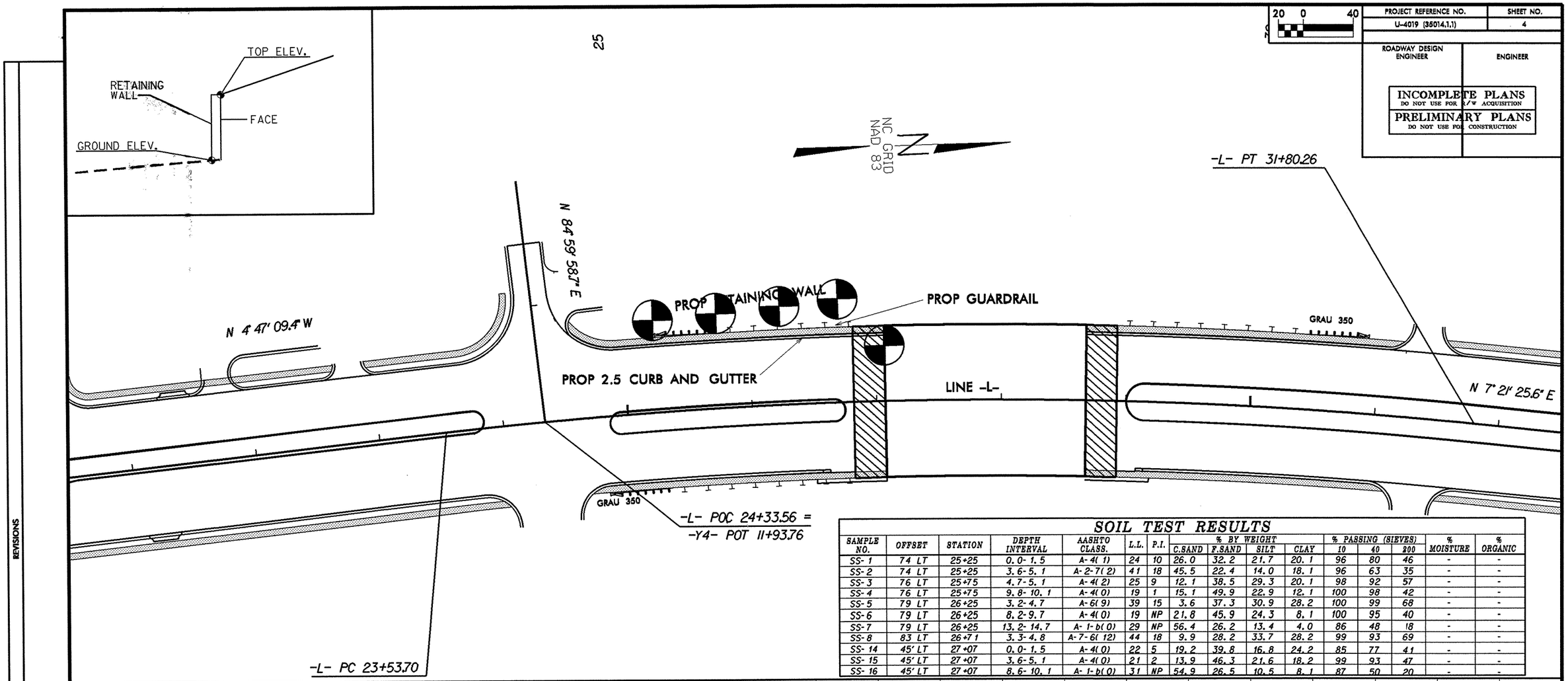
PROJECT REFERENCE NO.	SHEET NO.
U-4019 (35014.1.1)	4

ROADWAY DESIGN ENGINEER

ENGINEER

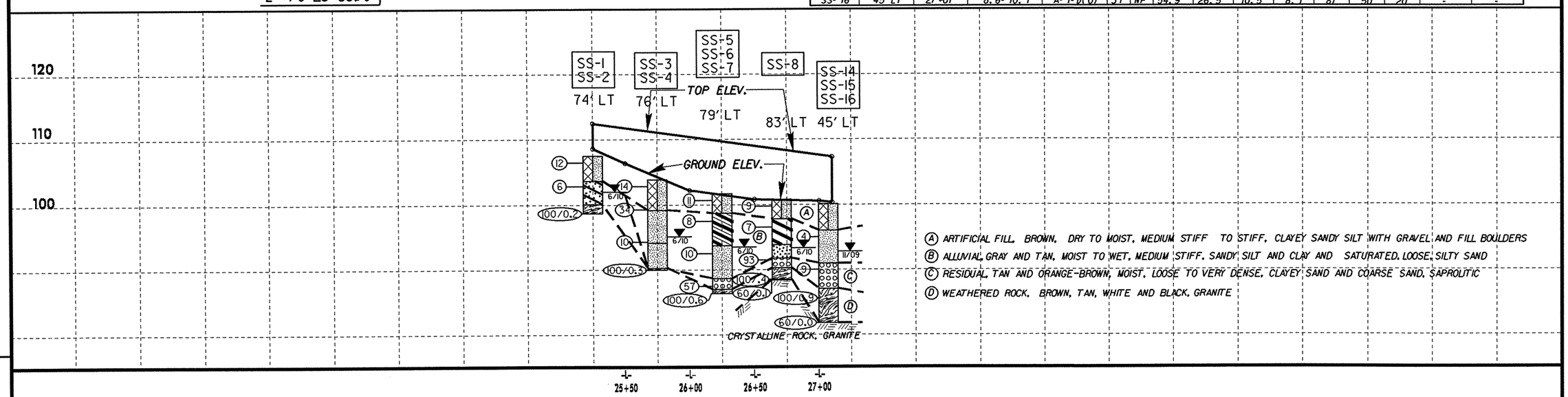
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-1	74 LT	25+25	0.0-1.5	A-4(1)	24	10	26.0	32.2	21.7	20.1	96	80	46	-	-
SS-2	74 LT	25+25	3.6-5.1	A-2-7(2)	41	18	45.5	22.4	14.0	18.1	96	63	35	-	-
SS-3	76 LT	25+75	4.7-5.1	A-4(2)	25	9	12.1	38.5	29.3	20.1	98	92	57	-	-
SS-4	76 LT	25+75	9.8-10.1	A-4(0)	19	1	15.1	49.9	22.9	12.1	100	98	42	-	-
SS-5	79 LT	26+25	3.2-4.7	A-6(9)	39	15	3.6	37.3	30.9	28.2	100	99	68	-	-
SS-6	79 LT	26+25	8.2-9.7	A-4(0)	19	NP	21.8	45.9	24.3	8.1	100	95	40	-	-
SS-7	79 LT	26+25	13.2-14.7	A-1-b(0)	29	NP	56.4	26.2	13.4	4.0	86	48	18	-	-
SS-8	83 LT	26+71	3.3-4.8	A-7-6(12)	44	18	9.9	28.2	33.7	28.2	99	93	69	-	-
SS-14	45' LT	27+07	0.0-1.5	A-4(0)	22	5	19.2	39.8	16.8	24.2	85	77	41	-	-
SS-15	45' LT	27+07	3.6-5.1	A-4(0)	21	2	13.9	46.3	21.6	18.2	99	93	47	-	-
SS-16	45' LT	27+07	8.6-10.1	A-1-b(0)	31	NP	54.9	26.5	10.5	8.1	87	50	20	-	-



(A) ARTIFICIAL FILL, BROWN, DRY TO MOIST, MEDIUM STIFF TO STIFF, CLAYEY SANDY SILT WITH GRAVEL AND FILL BOULDERS

(B) ALLUVIAL, GRAY AND TAN, MOIST TO WET, MEDIUM STIFF, SANDY SILT AND CLAY AND SATURATED, LOOSE, SILTY SAND

(C) RESIDUAL, TAN AND ORANGE-BROWN, MOIST, LOOSE TO VERY DENSE, CLAYEY SAND AND COARSE SAND, SAPROLITIC

(D) WEATHERED ROCK, BROWN, TAN, WHITE AND BLACK, GRANITE

REVISIONS

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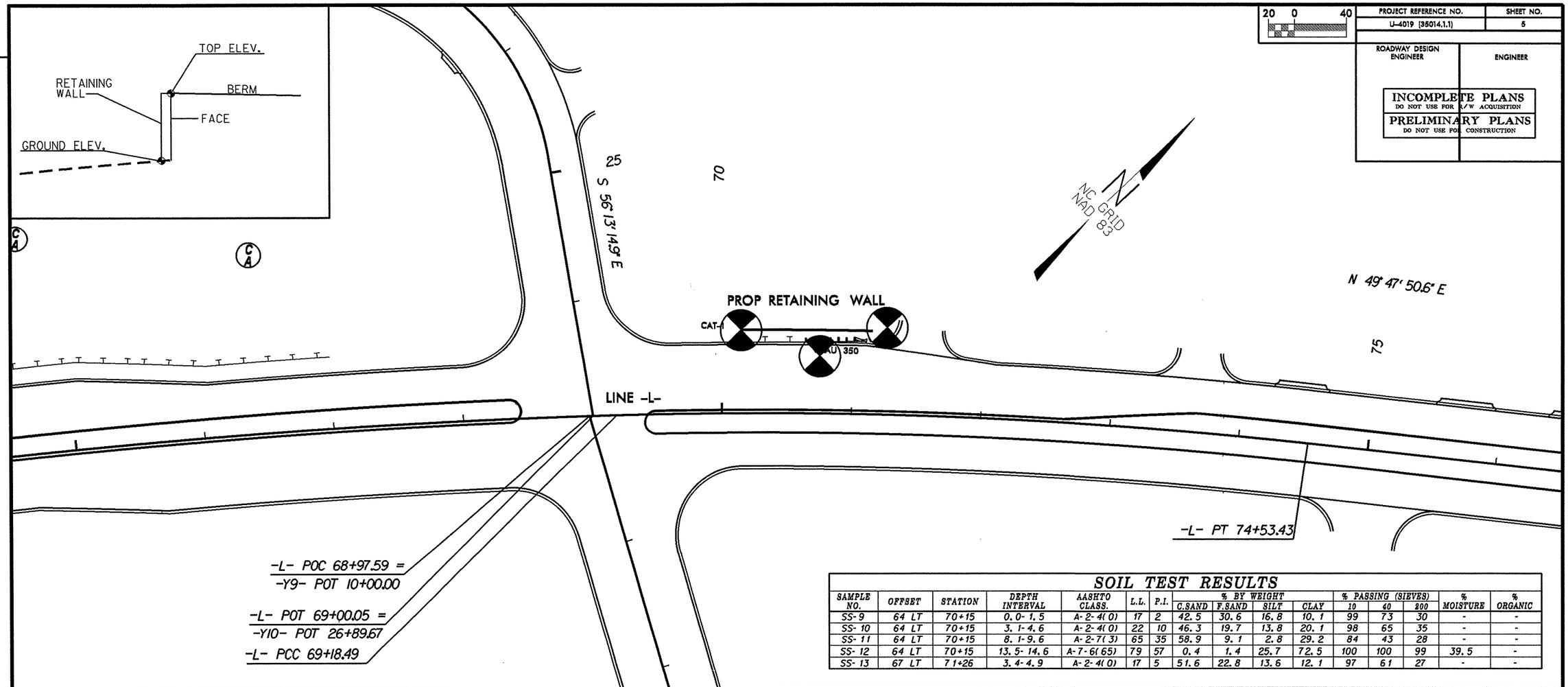
PROJECT REFERENCE NO.	SHEET NO.
U-4019 (35014.1.1)	5

ROADWAY DESIGN ENGINEER

ENGINEER

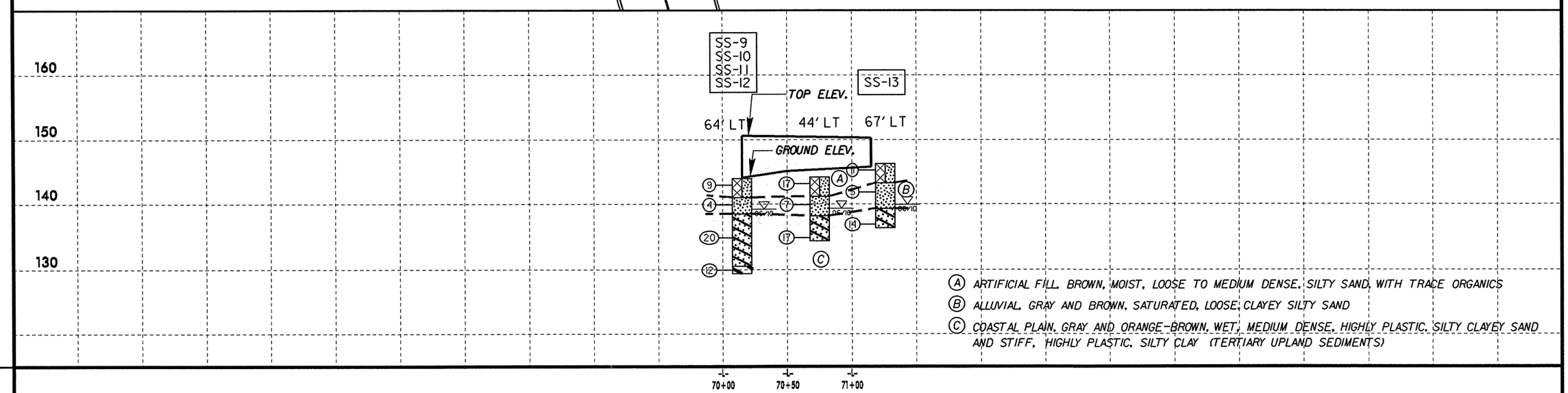
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-9	64 LT	70+15	0.0-1.5	A-2-4(0)	17	2	42.5	30.6	16.8	10.1	99	73	30	-	-
SS-10	64 LT	70+15	3.1-4.6	A-2-4(0)	22	10	46.3	19.7	13.8	20.1	98	65	35	-	-
SS-11	64 LT	70+15	8.1-9.6	A-2-7(3)	65	35	58.9	9.1	2.8	29.2	84	43	28	-	-
SS-12	64 LT	70+15	13.5-14.6	A-7-6(65)	79	57	0.4	1.4	25.7	72.5	100	100	99	39.5	-
SS-13	67 LT	71+26	3.4-4.9	A-2-4(0)	17	5	51.6	22.8	13.6	12.1	97	61	27	-	-



(A) ARTIFICIAL FILL, BROWN, MOIST, LOOSE TO MEDIUM DENSE, SILTY SAND, WITH TRACE ORGANICS

(B) ALLUVIAL, GRAY AND BROWN, SATURATED, LOOSE, CLAYEY SILTY SAND

(C) COASTAL PLAIN, GRAY AND ORANGE-BROWN, WET, MEDIUM DENSE, HIGHLY PLASTIC, SILTY CLAYEY SAND AND STIFF, HIGHLY PLASTIC, SILTY CLAY (TERTIARY UPLAND SEDIMENTS)

REVISIONS

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