PROJECT: C201487

ID: U-4012

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LINE	STATION	PLAN	XSECTS
-RPC-	11+00-21+08	4	9
-L-	34+00-85+20	5-8	10-16

NOTE: REFER TO SHEET 2A FOR PLAN SHEET LAYOUT AT THE TIME OF INVESTIGATION

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

ROADWAY SUBSURFACE INVESTIGATION

STATE PROJECT *35012.3.1* I.D. NO. *U-4012*

F.A. PROJECT *MA-NHF-15(8)*

COUNTY *DURHAM*

PROJECT DESCRIPTION *US 15-501 FROM NORTH OF MT. MORIAH ROAD TO SOUTH OF GARRETT ROAD*

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4012	1	16

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
35012.1.1	MA-NHF-15(8)	PE
35012.2.2	NHF-15(8)	R/W, UTIL
35012.3.1	NHF-15(17)	CONST

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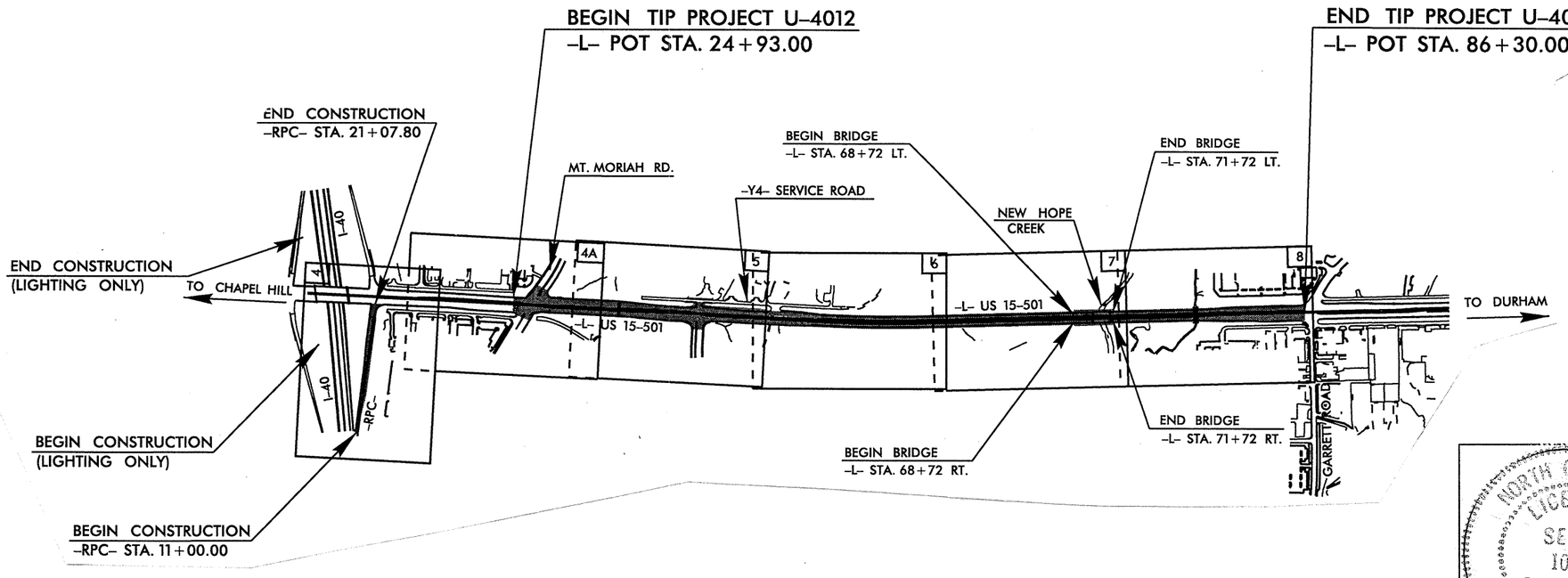
NAD 83

INVENTORY



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DATE *MARCH, 2003* *T. N. BENNEKIN*

DRAWN BY: *N.T.R.*

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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.

NORTH CAROLINA LICENSED SEAL 1050 GEOLOGIST D. N. ARGENBRIGHT

SEAL

SIGNATURE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4012	8.1352301	2	16

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		N.P.	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 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	2.0	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT PLASTIC RANGE (PI) 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, YEL-BRN, 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 ARE 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 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 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 SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT DPT DHT 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 - CBR 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
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
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 ROCKS 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 WHICH 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 IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

ELEVATION:

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

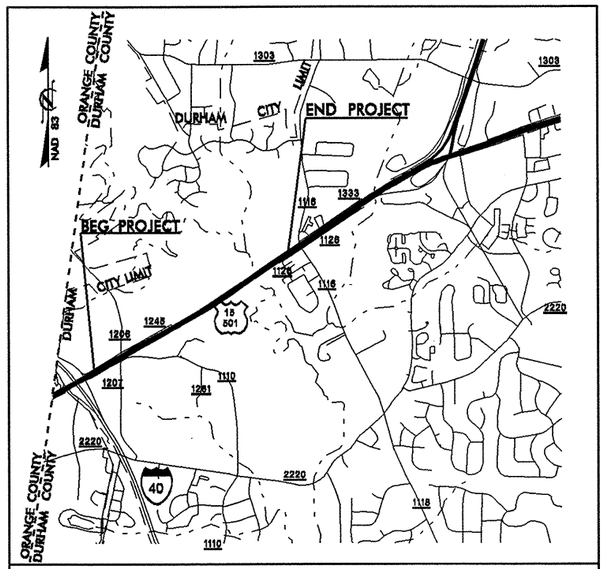
DURHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4012	2A	16

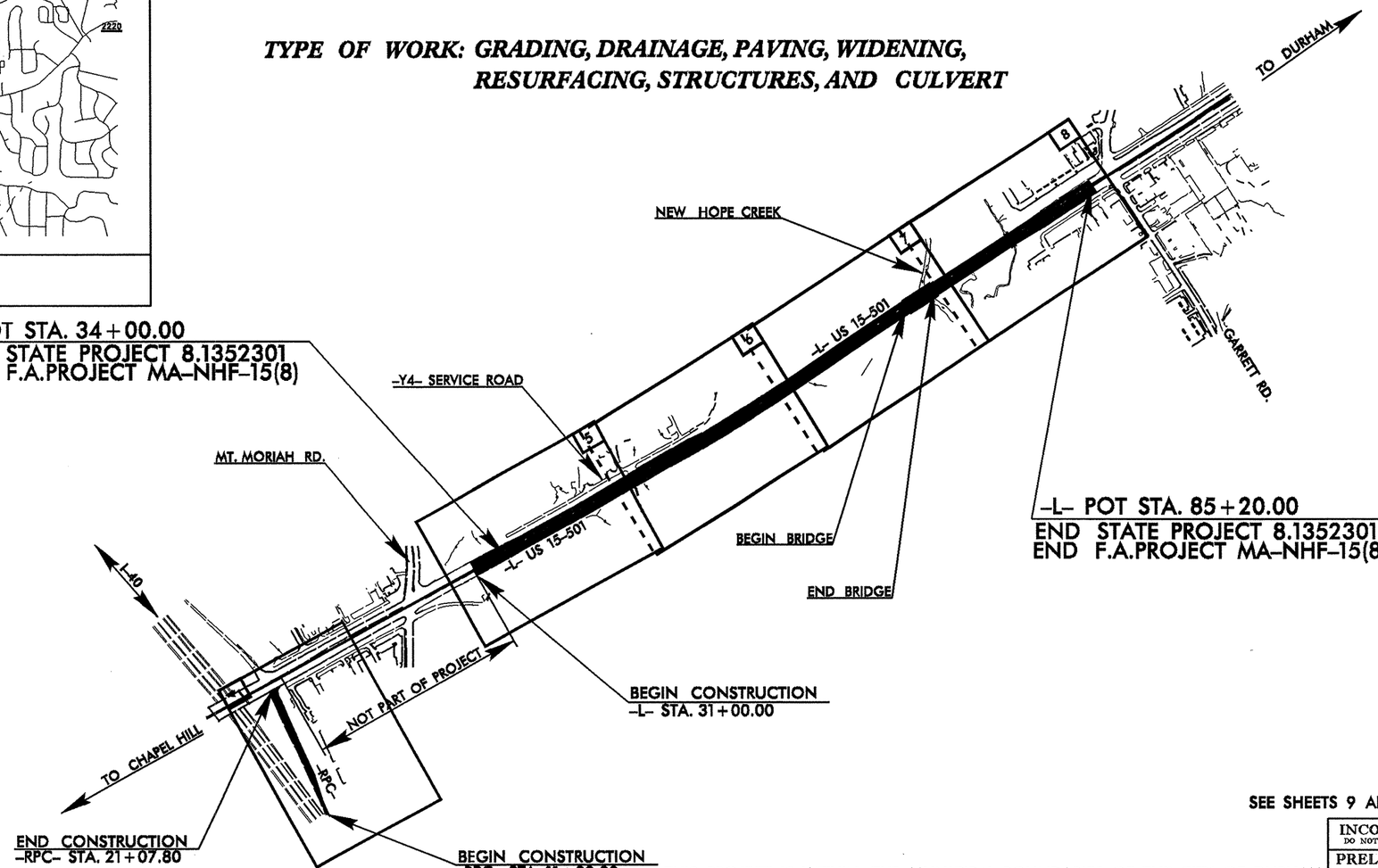
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
8.1352301	MA-NHF-15(8)	PE

LOCATION: US 15-501 FROM NORTH OF MT MORIAH ROAD TO SOUTH OF GARRETT ROAD.

TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING, RESURFACING, STRUCTURES, AND CULVERT



VICINITY MAP



-L- POT STA. 34+00.00
BEGIN STATE PROJECT 8.1352301
BEGIN F.A.PROJECT MA-NHF-15(8)

-L- POT STA. 85+20.00
END STATE PROJECT 8.1352301
END F.A.PROJECT MA-NHF-15(8)

BEGIN CONSTRUCTION
-L- STA. 31+00.00

END CONSTRUCTION
-RPC- STA. 21+07.80

BEGIN CONSTRUCTION
-RPC- STA. 11+00.00

SEE SHEETS 9 AND 10 FOR DETOUR

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF DURHAM

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2002 = 50,524
ADT 2025 = 99,100
DHV = 9 %
D = 60 %
T = 7 % *
V = 60 MPH

* TTST 4 % DUAL 3 %

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT MA-NHF-15(8) =

LENGTH STRUCTURE F.A. PROJECT MA-NHF-15(8) =

TOTAL LENGTH ROADWAY STATE PROJECT 8.1352301 = 0.970 MI

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., NC, 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 18, 2003

LETTING DATE: SEPTEMBER 21, 2004

RONALD D. ALLEN, P.E.
PROJECT ENGINEER

JEANIE TYSON
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

PROJECT: 8.1352301

U-4012

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett
SECRETARY

March 24, 2003

STATE PROJECT:	8.1352301 (U-4012)
FEDERAL PROJECT:	MA-NHF-15(8)
COUNTY:	Durham
DESCRIPTION:	US 15-501 from North of Mt. Moriah Road to South of Garrett Road
SUBJECT:	Geotechnical Report - Inventory

Project Description

This project consists of the widening of US 15-501 (-L-) beginning just north of I-40 and extending northward to Garrett Road. To facilitate construction of two new bridges on -L- over New Hope Creek, a temporary detour and detour bridge will be constructed left of -L- from approximately Sta. 60+00 to Sta. 79+94. The off-ramp from the west bound lane of I-40 (-RPC-) will also be widened as part of this project.

A geotechnical investigation was conducted during January and February 2003. A CME-550 ATV-mounted drill machine with automatic hammer was used during the investigation. Standard Penetration Tests were performed at selected locations and additional borings were advanced using continuous flight augers. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by the Materials and Tests Unit.

The following alignments, totaling 1.16 miles, were investigated. Subsurface soil cross sections of these lines are included in this report.

Line	Station	Location
-L-	34+00 to 85+20	Main line
-RPC-	11+00 to 21+07.8	Ramp C

Areas of Special Geotechnical Interest

1) Groundwater: Groundwater was encountered within 6.0 feet of proposed grade at the following location:

Line	Stations	Offset
-RPC-	12+00 to 16+50	RT

2) Unconsolidated Alluvial Soils: Unconsolidated, fine-grained, alluvial sediments occur on the project at the following locations:

Line	Stations	Offset
-L-	66+50 to 80+00	LT
-L-	60+50 to 70+35	RT

3) Degradable Rock: Non-crystalline rock material with a high potential for slaking occurs within the unclassified excavation limits at the following location:

Line	Stations	Offset
-RPC-	13+00 to 16+00	RT

Physiography and Geology

The project is located in the Piedmont area of North Carolina. Land use along the project corridor consists of a combination of wooded land and businesses. Geologically, the project is located within the Durham Triassic Basin. Soils are derived from the weathering of the underlying sedimentary rock which is composed of Triassic sandstone and siltstone. These units are generally massively bedded and are near horizontal.

Soil Properties

Residual Soils: These soils, consisting of clays, silts, and sands are derived from the in-place weathering of the underlying Triassic Basin sandstone and siltstone. They consist of tan-brown, medium stiff to hard, moist to wet, sandy and silty clay (AASHTO classification of A-6, A-7), tan-brown, medium dense, moist to wet, silty and clayey sand (A-2-4, A-2-6) and tan-brown, very stiff to hard, moist, sandy silt (A-4). Residual soils grade into weathered rock.

Alluvial Soils: These soils, consisting of sands, silts and clays, were deposited on residual soils. They consist of tan-brown, soft to stiff, moist to wet, sandy and silty clay (A-6, A-7), tan-brown and tan-gray, very loose to medium dense, wet, silty sand (A-2-4) and tan-gray, soft to medium stiff, wet, sandy silt (A-4).

Roadway Embankment Soils: These soils were encountered primarily in the existing roadway embankment area in the alluvial plain adjacent to New Hope Creek. They consist primarily of brown, medium stiff, moist to wet, sandy clay (A-6).

Rock Properties

Triassic sedimentary rocks underlie the project area. These sedimentary rocks consist of sandstone and siltstone. Non-crystalline rock requiring blasting was not found within 6 feet of proposed grade on this project. Weathered rock was encountered within the proposed unclassified excavation in the cut section right of Ramp C from -RPC- Sta. 12+00 to 16+50.

Groundwater

Groundwater was encountered within 6.0 feet below proposed grade in the one area noted above in "Areas of Special Geotechnical Interest".

Culvert at -L- Sta. 77+88

This culvert is to be extended to accommodate the two new lanes (see Plan Sheet No. 8). The culvert has a 90° skew and has up to seven feet of fill that will overlie the top of the culvert (see culvert profile on sheet no. 16). The upstream portion of the culvert will lie on alluvial, silty sand (A-2-4); while the downstream end of the culvert will lie on alluvial sandy and silty clay (A-6, A-7). The alluvial soils may need to be undercut and replaced with suitable foundation material in order to prevent differential settling of the structure.

Respectfully submitted,

N. T. Roberson
Project Geologist

EARTHWORK BALANCE CARD

Volumes in Cubic Yards

CLUSTERED PROJECT: B-3450/U-4009/U-4012 COUNTY Durham DATE 7/3/2007 SHEET 1 of 2 SHEETS

RD223247

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +20%	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
U-4012 SUMMARY NO. 1																
-DET1-																
-L-	57+50.00	70+00.96	1002				1002	13275		13275	15930	14928				
-L-	71+18.96	79+50.00	49				49	12583		12583	15100	15051				
-DET2-																
-L-	56+00.00	62+50.00	280				280	90		90	108			172		172
-L-	75+50.00	80+50.00	276				276	17		17	20			256		256
		SUBTOTAL NO. 1	1607				1607	25965		25965	31158	29979		428		428
U-4012 SUMMARY NO. 2																
-DET3-																
-L-	56+00.00	69+00.00	26				26	2407		2407	2888	2862				
-L-	71+50.00	81+50.00	29				29	1168		1168	1402	1373				
		SUBTOTAL NO. 2	55				55	3575		3575	4290	4235				
U-4012 SUMMARY NO. 3																
DETOUR REMOVAL																
-L-	57+50.00	70+00.00	7577				7577	776		776	931			6646		6646
-L-	71+00.00	78+00.00	6638				6638							6638		6638
-L- (LEFT)																
-L-	33+50.00	62+00.00	1695				1695	1954		1954	2345	650				
-L-	62+00.00	69+00.54	23				23	2668		2668	3202	3179				
-L-	71+52.54	76+50.00						2176		2176	2611	2611				
-L-	76+50.00	86+50.00	407				407	1006		1006	1207	800				
		SUBTOTAL NO. 3	16340				16340	8580		8580	10296	7240		13284		13284
U-4012 SUMMARY NO. 4																
-L- (MEDIAN)																
-L-	33+50.00	62+00.00	477				477	701		701	841	364				
-L-	62+00.00	69+00.54	15				15	5463		5463	6556	6541				
-L-	71+52.54	76+50.00						2311		2311	2773	2773				
-L-	76+50.00	86+50.00	172				172	344		344	413	241				
		SUBTOTAL NO. 4	664				664	8819		8819	10583	9919				

EARTHWORK BALANCE CARD

Volumes in Cubic Yards

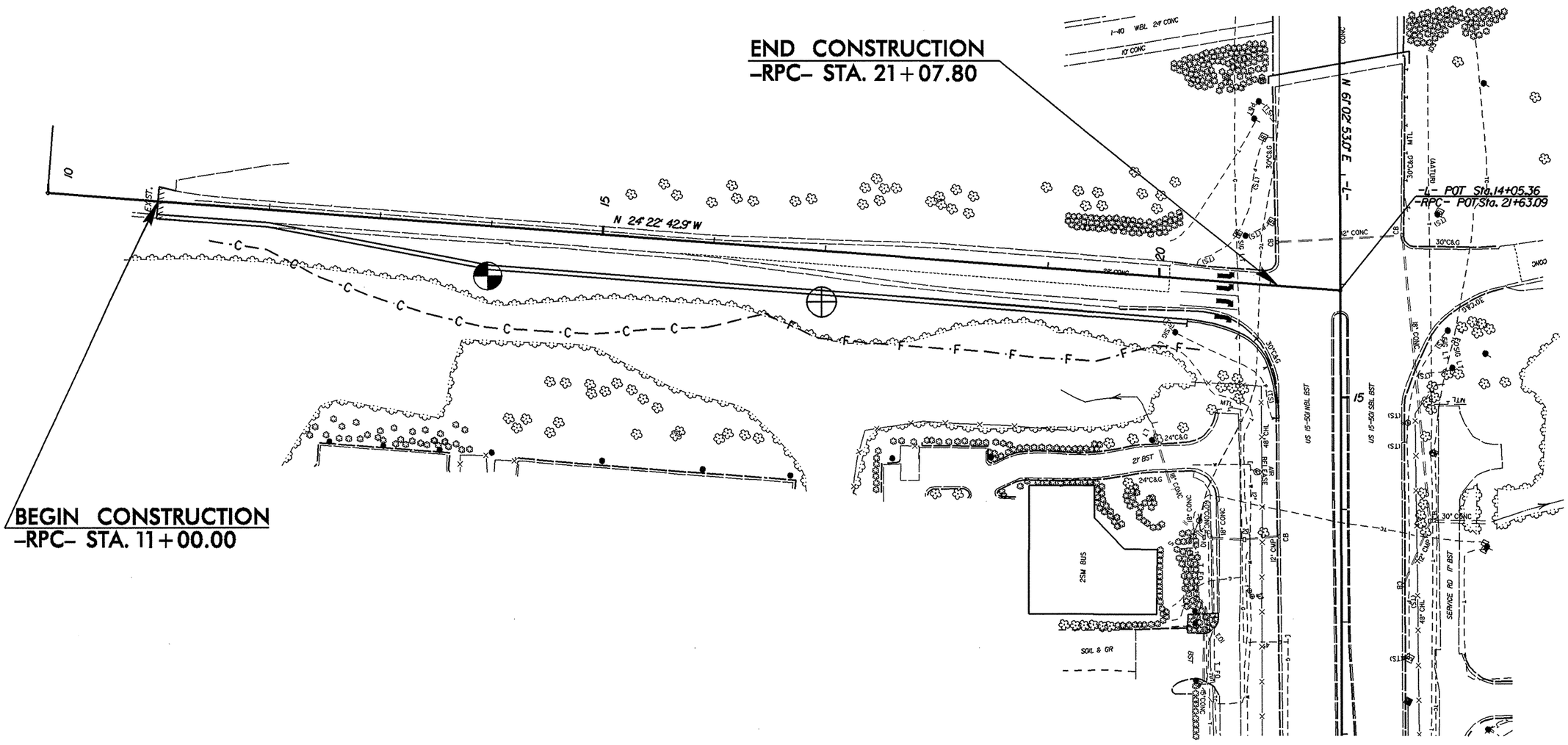
CLUSTERED PROJECT: B-3450/U-4009/U-4012 COUNTY Durham DATE 7/3/2007 SHEET 2 OF 25 SHEETS

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +20%	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
U-4012 SUMMARY NO. 5																
-L- (RIGHT)																
-L-	27+00.00	33+50.00	849				849	183		183	220			629		629
-L-	33+50.00	60+00.00	6386				6386	1546		1546	1855			4531		4531
-L-	60+00.00	69+00.54	2				2	26151		26151	31381	31379				
-L-	71+52.54	79+00.00	12				12	8613		8613	10336	10324				
-L-	79+00.00	86+50.00	1069				1069	360		360	432			637		637
		SUBTOTAL NO. 5	8318				8318	36853		36853	44224	41703		5797		5797
U-4012 Summary No. 6																
-RPC-	11+00.00	21+50.00	4071	735			3336	704	704		704		31	3336		3367
		SUBTOTAL NO. 6	4071	735			3336	704	704		704		31	3336		3367
SUMMARY TOTAL			31055	735			30320	84496	704	83792	101255	93076	31	22845		22876
ROCK WASTE IN LIEU OF BORROW									31	-31		-31	-31			-31
ADJUSTMENT FOR ROCK WASTE											-6	-6				
LOSS DUE TO CLEARING AND GRUBBING			-900				-900					900				
ESTIMATE FOR SHOULDER MATERIAL								5860		5860	7032	7032				
WASTE IN LIEU OF BORROW												-22845		-22845		-22845
PROJECT TOTAL			30155	735			29420	90356	735	89621	108281	78126		0		0
5% TO REPL TOPSOIL ON BORROW PIT												3907				
GRAND TOTAL			**30155**	**735**						**89621**	**108281**	**82033**				
ESTIMATED ADDITIONAL UNDERCUT =			3000													
DDE =			876													
PAVEMENT STRUCTURE VOL =			4210													
TEMP PAVEMENT STRUCTURE VOL =			201													
PROJ. B-3450/U-4009/U-4012 TOTALS			**38835**	**735**	**1236**	**108**	**37992**	**109,363**	**735**	**108,628**	**130,861**	**104,704**	**31**	**7583**	**1344**	**8909**
SAY			**39200**		**1300**							**105,800**				
TOTAL EST ADDL UNDERCUT =			3600													
TOTAL DDE = 1386, SAY =			1400													
TOTAL PAV'T STRUCTURE VOL =			4484													
TOTAL TEMP PAV'T STRUCTURE VOL =			251													

Clust Bal Card 2.xls : U-4012

7/17/2007 1:05 PM

PROJECT REFERENCE NO.	SHEET NO.
U-4012	4



PROJECT REFERENCE NO.	SHEET NO.
U-4012	5

BEGIN CONSTRUCTION
-L- STA. 33+00.00

-Y4- POT Sta. 10+00.00

NAD 83

SERVICE RD 20' BST

US 15-501 SBL BST

US 15-501 NBL BST

-L- N 61° 02' 53.0" E

US 15-501 SBL 24' BST

US 15-501 NBL 24' BST

PROPOSED MONOLITHIC ISLAND

EXIST. 18" CONC

24" CONC

18" CONC

15" CONC

30" CMP

RIP RAP

CONC

BLDG

ISFD

W/O

ISBKO

S ABAND

15' CONC

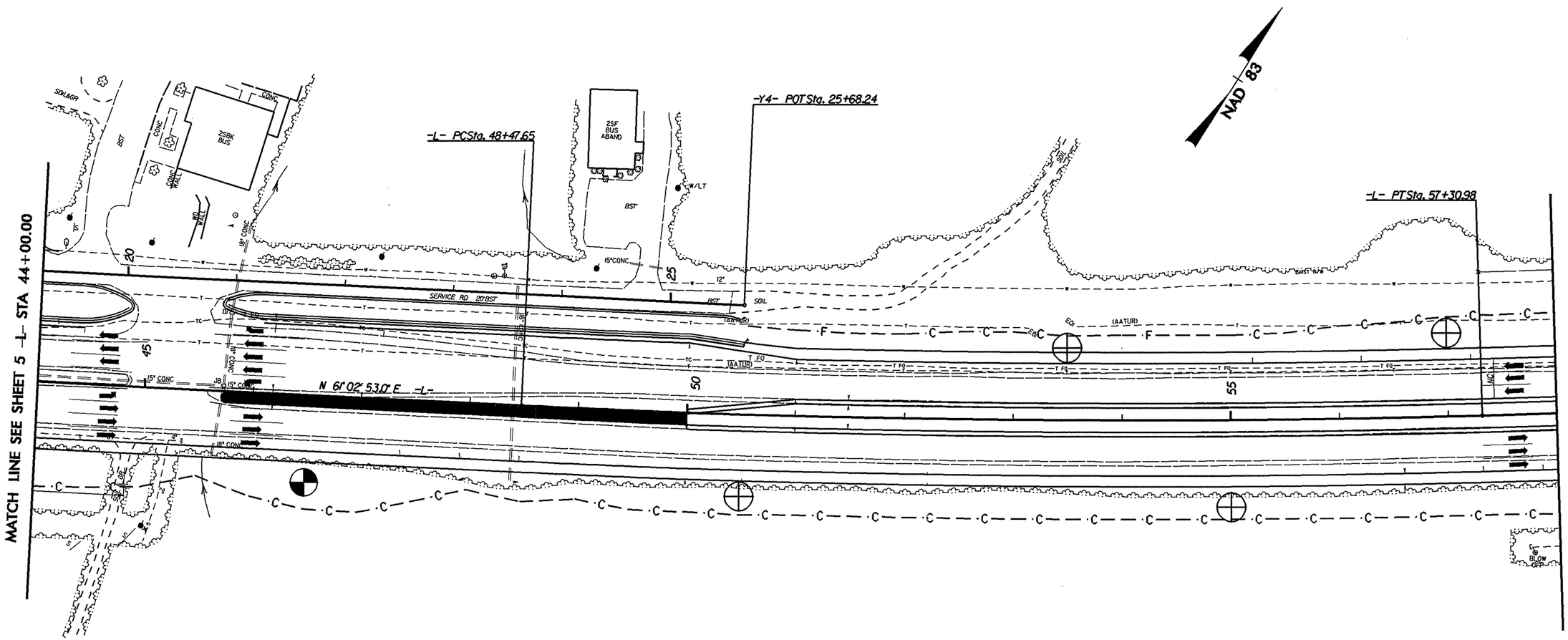
MATCH LINE SEE SHEET 6 -L- STA 44+00.00

BEGIN STATE PROJECT U-4012
-L- STA. 34+00.00

SEE SHEET 11 FOR -L- PROFILE

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-4012	6



SEE SHEET 11 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-4012	7

NAD 83

RESIDUAL

ALLUVIAL

MATCH LINE SEE SHEET 6 -L- STA. 58+00.00

MATCH LINE SEE SHEET 8 -L- STA. 72+00.00

-L-

US 15-501 SBL 24"BST

US 15-501 NBL 24"BST

PROPOSED GUARDRAIL

NEW HOPE CREEK

CONC HW

WLB

MTL

RESIDUAL

ALLUVIAL

PROJECT REFERENCE NO.	SHEET NO.
U-4012	8

MATCH LINE SEE SHEET 7 -L- STA. 72+00.00

ALLUVIAL

RESIDUAL

NAD 83

ALLUVIAL RESIDUAL

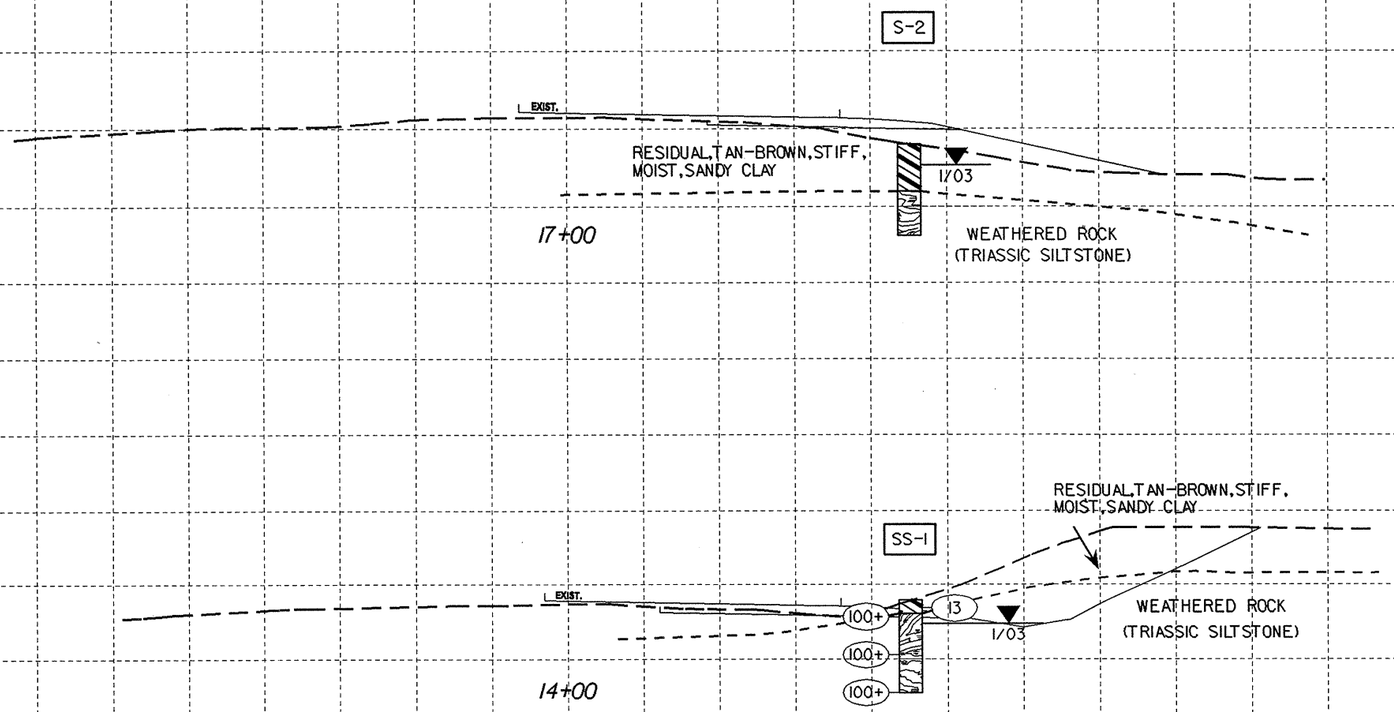
END STATE PROJECT U-4012
-L- STA. 85+20.00

END CONSTRUCTION
-L- STA. 86+30.00

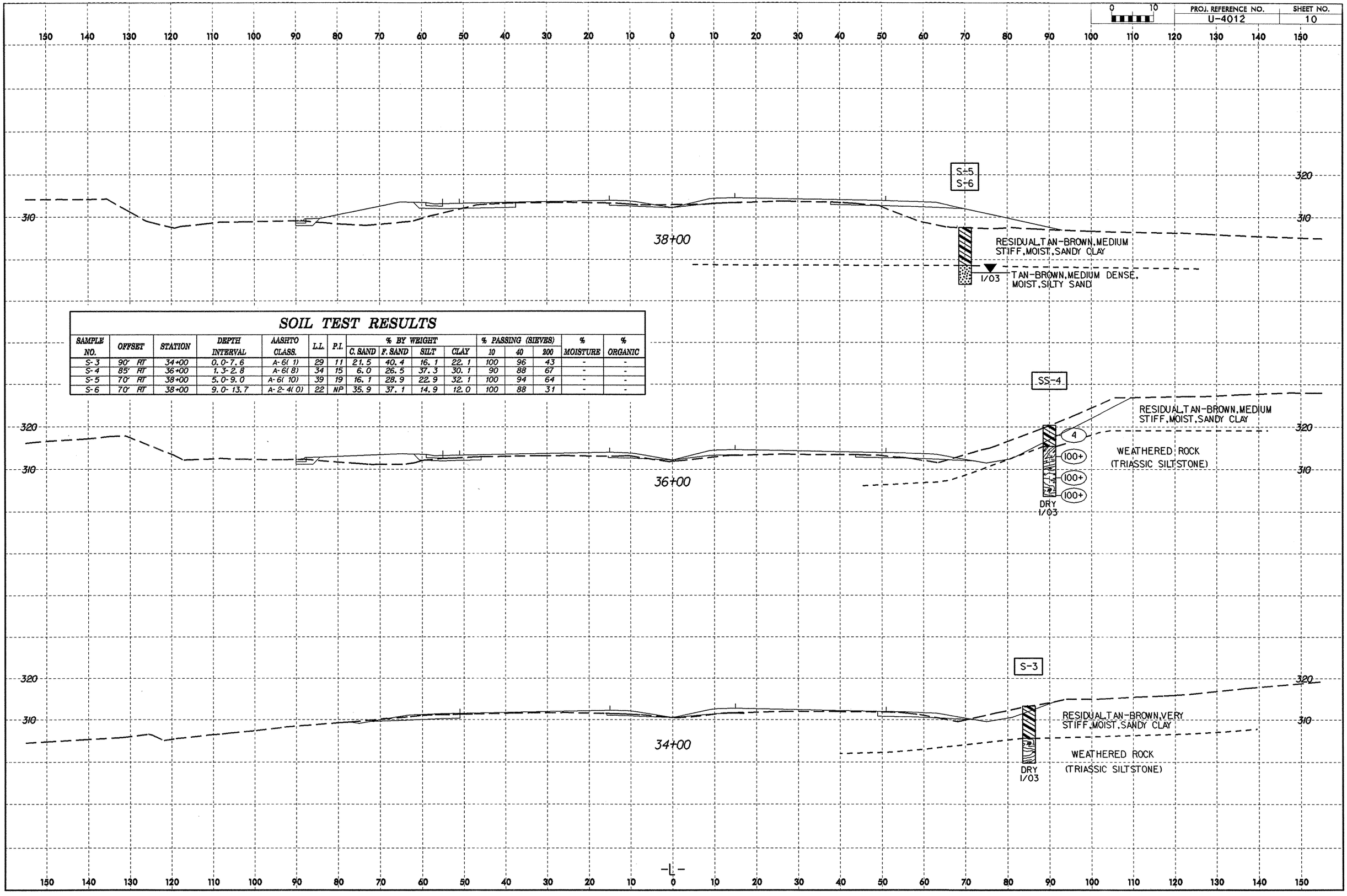
PROJ. REFERENCE NO.	SHEET NO.
U-4012	9

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	45' RT	14+00	0.0-1.5	A-6(14)	38	16	1.8	10.2	49.8	38.2	94	93	87	-	-
S-2	45' RT	17+00	0.0-6.0	A-6(12)	35	14	1.0	11.2	53.6	34.1	91	91	85	-	-



-RPC-



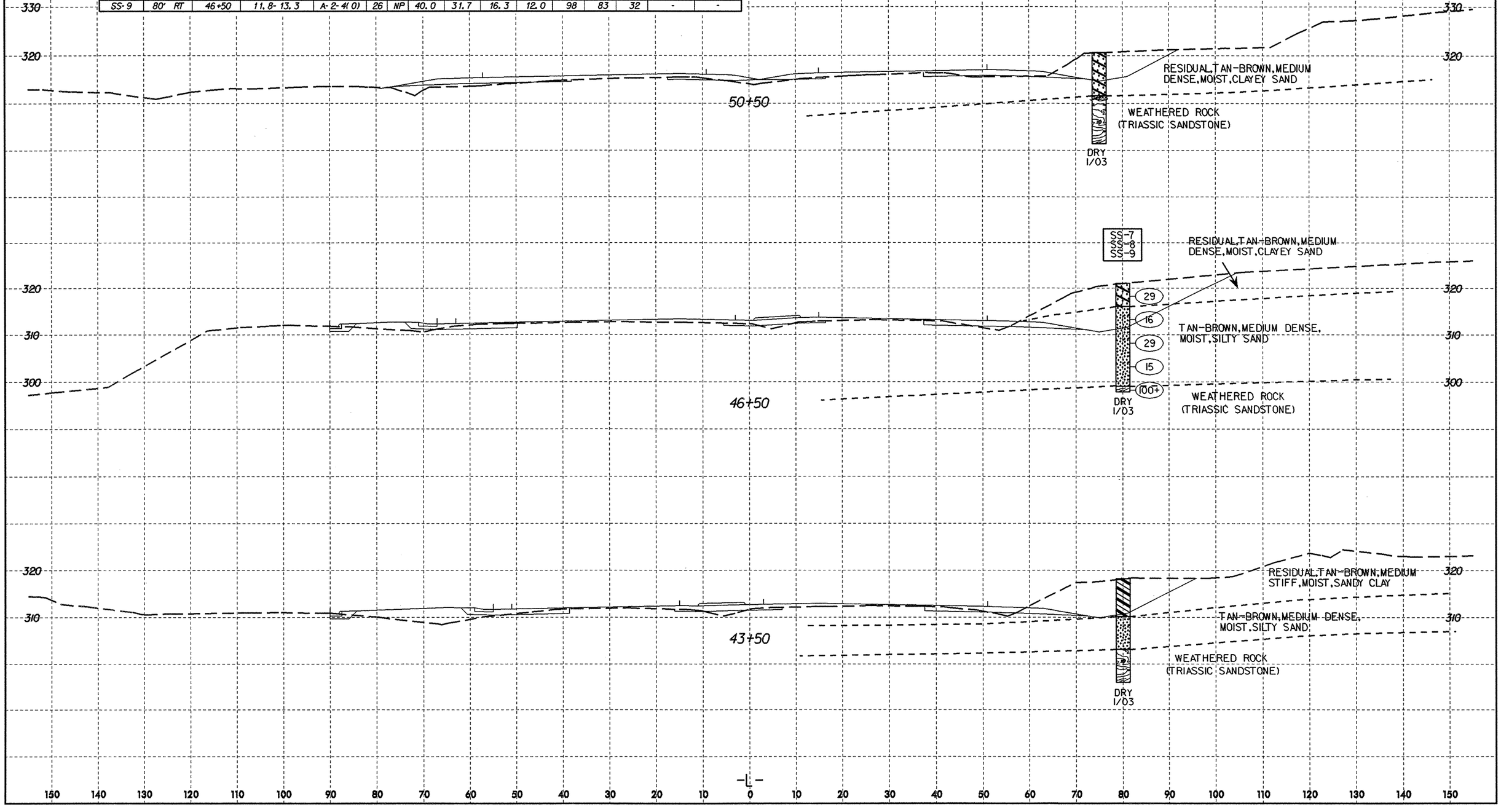
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-3	90' RT	34+00	0.0-7.6	A-6(1)	29	11	21.5	40.4	16.1	22.1	100	96	43	-	-
S-4	85' RT	36+00	1.3-2.8	A-6(8)	34	15	6.0	26.5	37.3	30.1	90	88	67	-	-
S-5	70' RT	38+00	5.0-9.0	A-6(10)	39	19	16.1	28.9	22.9	32.1	100	94	64	-	-
S-6	70' RT	38+00	9.0-13.7	A-2-4(0)	22	NP	35.9	37.1	14.9	12.0	100	88	31	-	-

PROJ. REFERENCE NO.	SHEET NO.
U-4012	11

SOIL TEST RESULTS

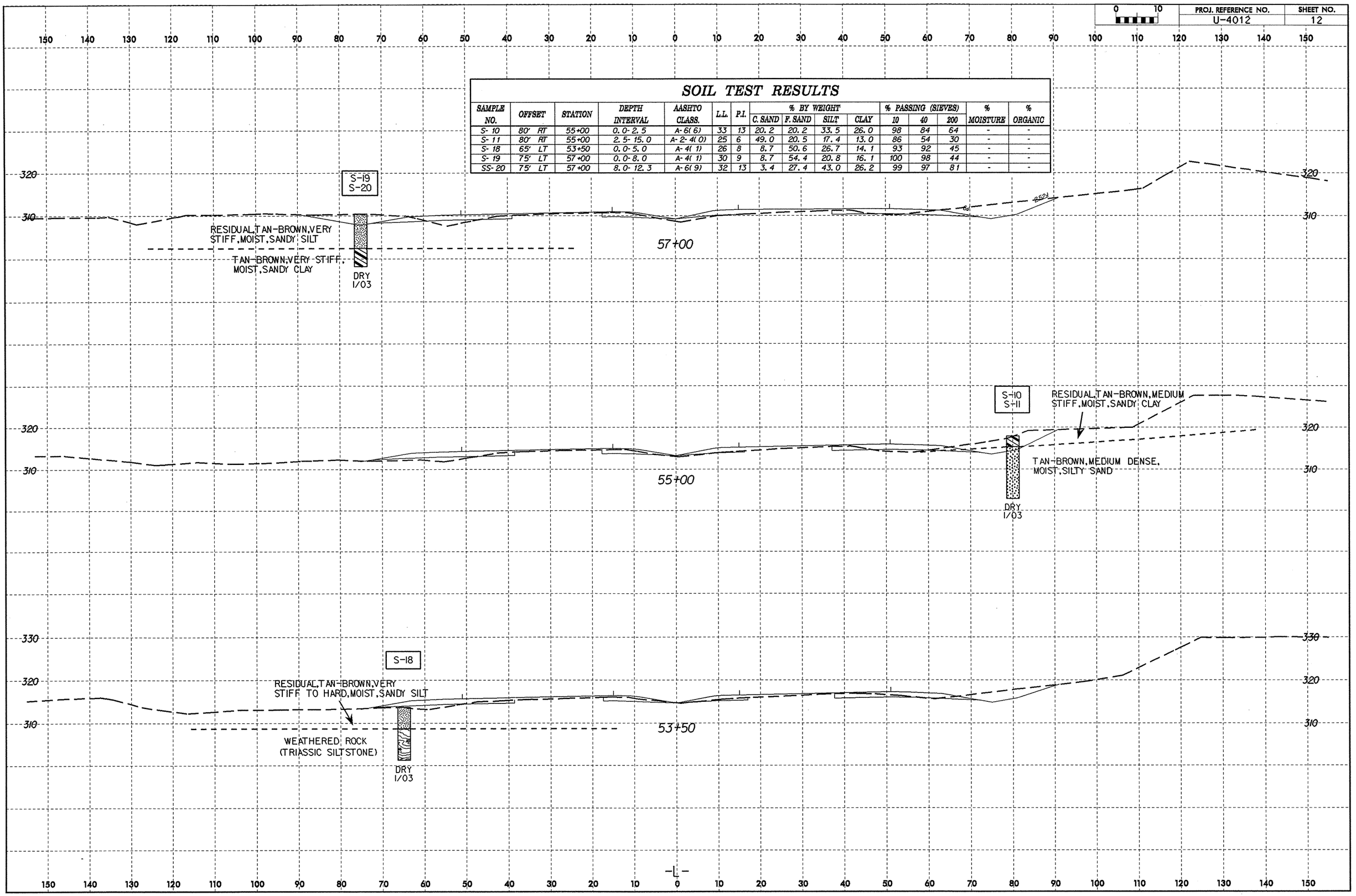
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-7	80' RT	46+50	1.8-3.3	A-2-6(1)	34	17	48.0	20.5	13.5	18.1	87	57	31	-	-
SS-8	80' RT	46+50	6.8-8.3	A-2-4(0)	31	9	45.4	22.7	15.9	16.1	87	59	32	-	-
SS-9	80' RT	46+50	11.8-13.3	A-2-4(0)	26	NP	40.0	31.7	16.3	12.0	98	83	32	-	-



PROJ. REFERENCE NO.	SHEET NO.
U-4012	12

SOIL TEST RESULTS

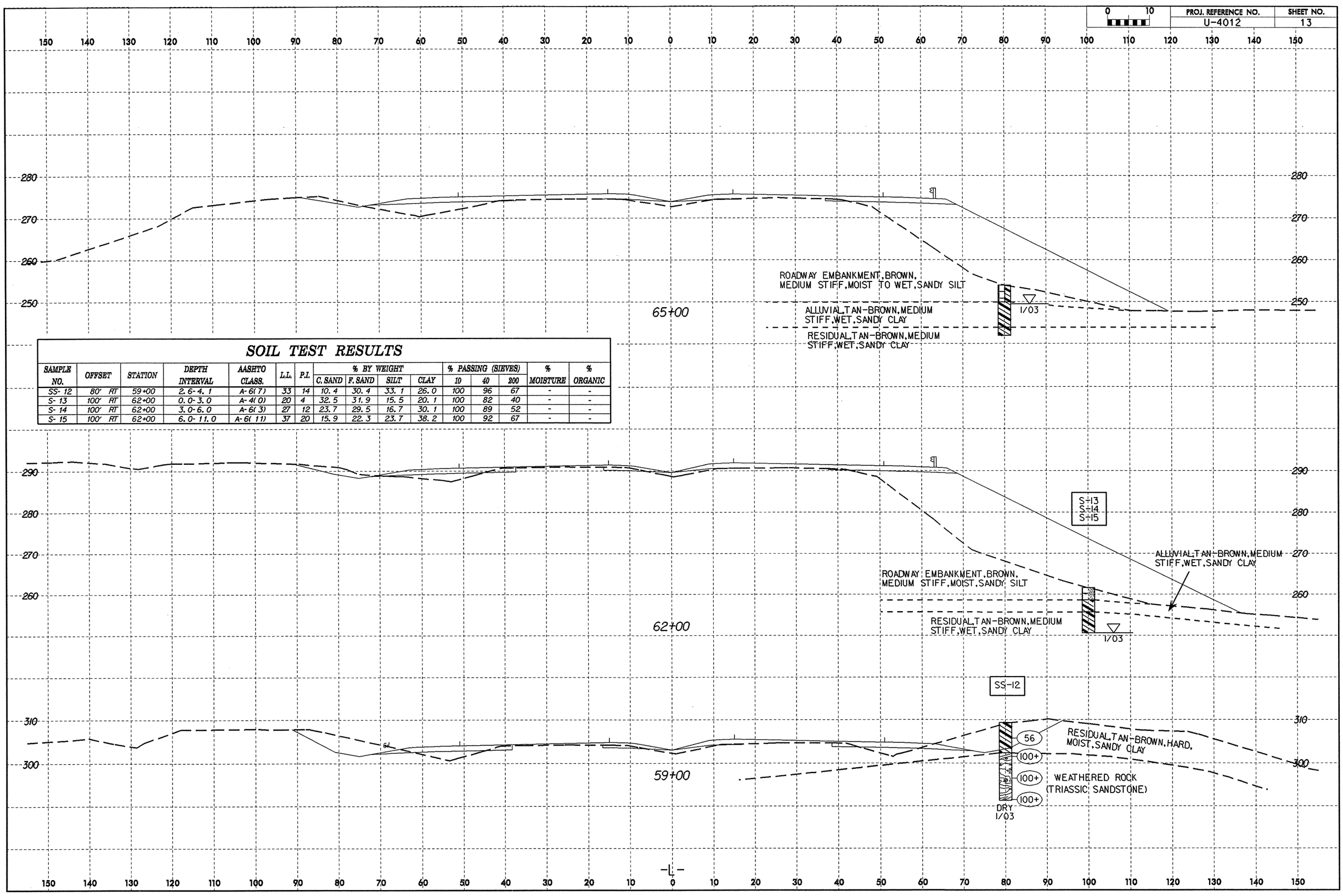
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-10	80' RT	55+00	0.0-2.5	A-6(6)	33	13	20.2	20.2	33.5	26.0	98	84	64	-	-
S-11	80' RT	55+00	2.5-15.0	A-2-4(0)	25	6	49.0	20.5	17.4	13.0	86	54	30	-	-
S-18	65' LT	53+50	0.0-5.0	A-4(1)	26	8	8.7	50.6	26.7	14.1	93	92	45	-	-
S-19	75' LT	57+00	0.0-8.0	A-4(1)	30	9	8.7	54.4	20.8	16.1	100	98	44	-	-
SS-20	75' LT	57+00	8.0-12.3	A-6(9)	32	13	3.4	27.4	43.0	26.2	99	97	81	-	-

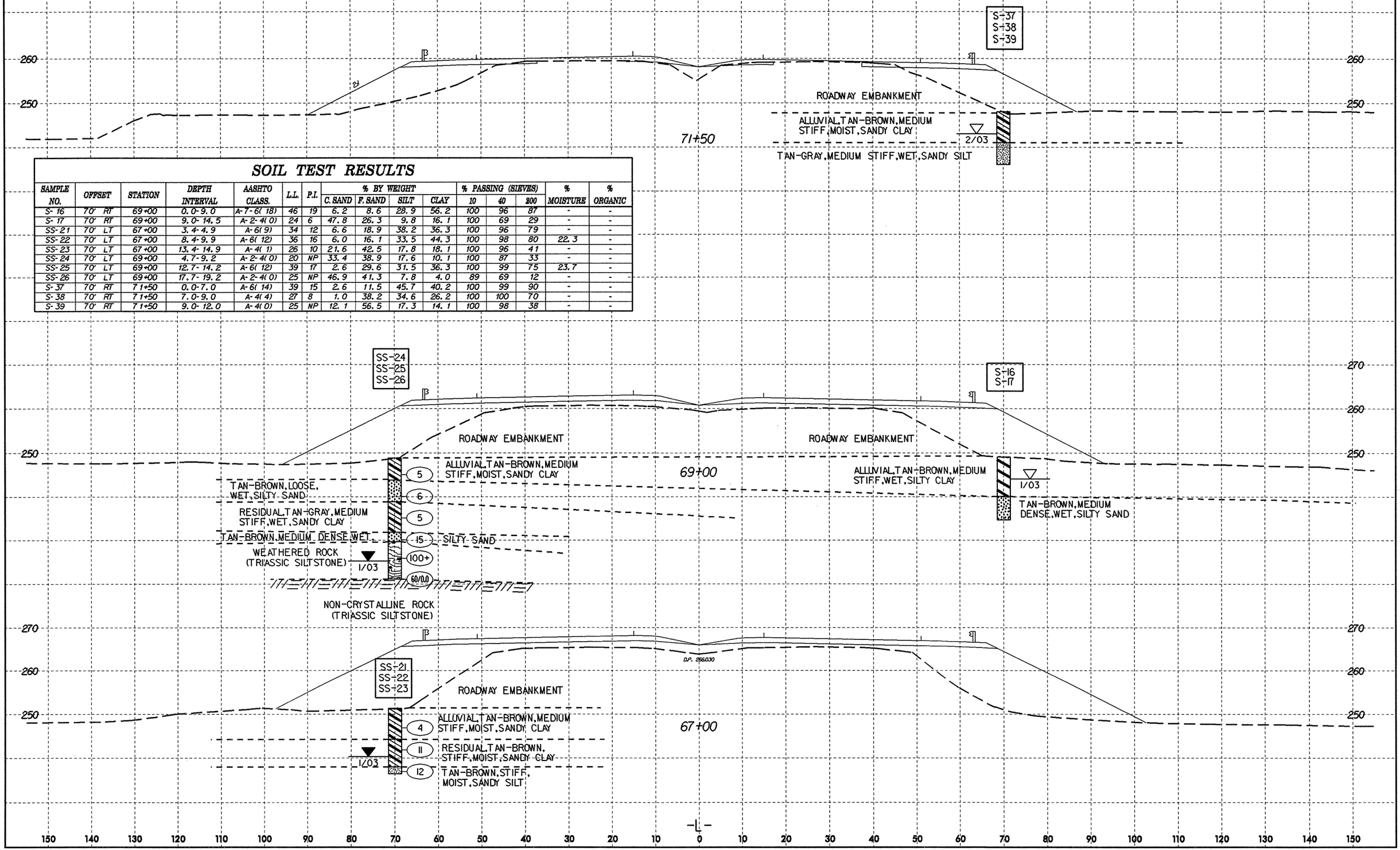


PROJ. REFERENCE NO.	SHEET NO.
U-4012	13

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-12	80' RT	59+00	2.6-4.1	A-6(7)	33	14	10.4	30.4	33.1	26.0	100	96	67	-	-
S-13	100' RT	62+00	0.0-3.0	A-4(0)	20	4	32.5	31.9	15.5	20.1	100	82	40	-	-
S-14	100' RT	62+00	3.0-6.0	A-6(3)	27	12	23.7	29.5	16.7	30.1	100	89	52	-	-
S-15	100' RT	62+00	6.0-11.0	A-6(11)	37	20	15.9	22.3	23.7	38.2	100	92	67	-	-

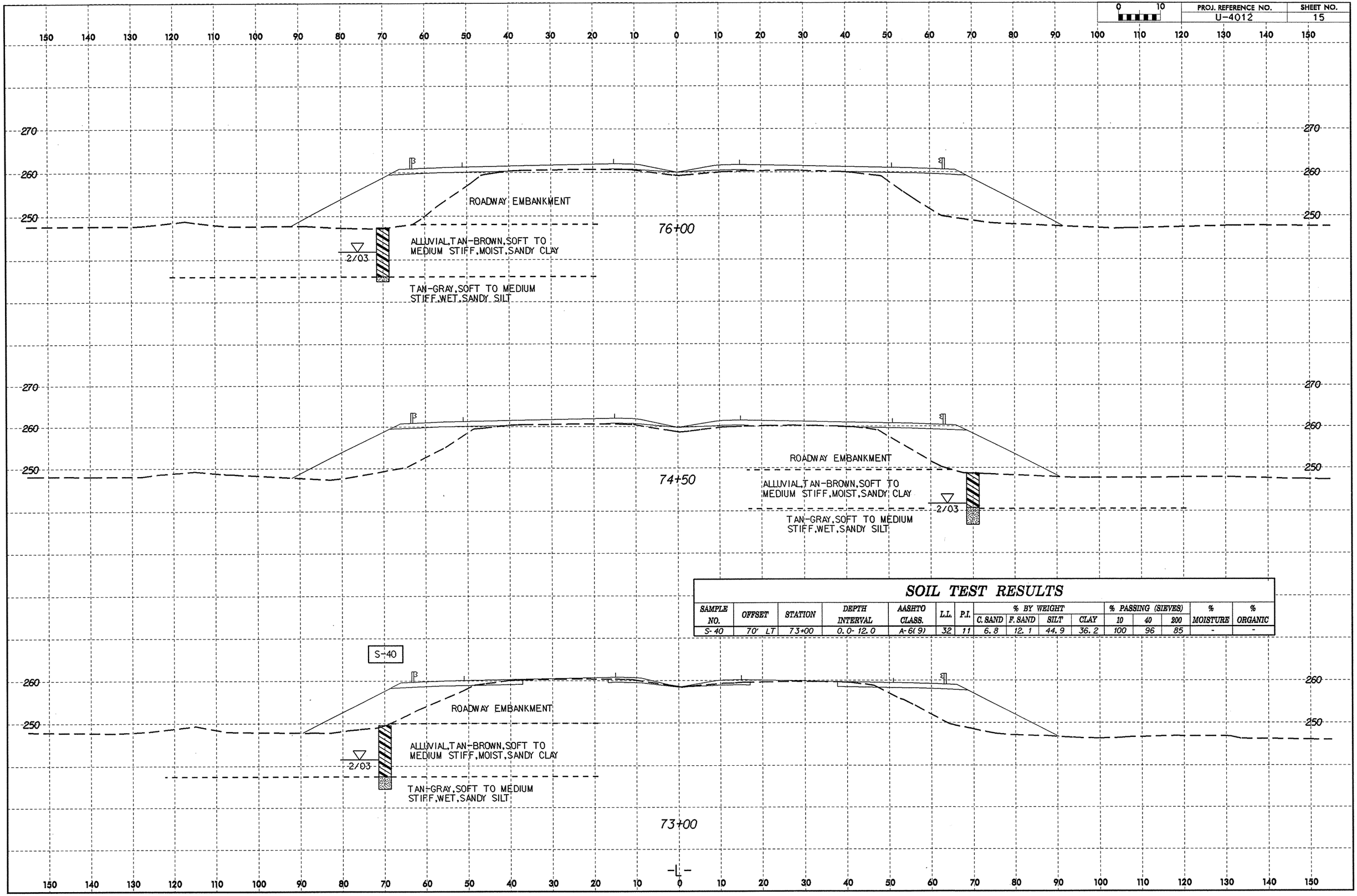




SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-16	70' RT	69+00	0.0-9.0	A-7-6(18)	46	19	6.2	8.6	28.9	56.2	100	96	87	-	-
S-17	70' RT	69+00	9.0-14.5	A-2-4(0)	24	6	47.8	26.3	9.8	16.1	100	69	29	-	-
SS-21	70' LT	67+00	3.4-4.9	A-6(9)	34	12	6.6	18.9	38.2	36.3	100	96	79	-	-
SS-22	70' LT	67+00	8.4-9.9	A-6(12)	36	16	6.0	16.1	33.5	44.3	100	98	80	22.3	-
SS-23	70' LT	67+00	13.4-14.9	A-4(1)	26	10	21.6	42.5	17.8	18.1	100	96	41	-	-
SS-24	70' LT	69+00	4.7-9.2	A-2-4(0)	20	NP	33.4	38.9	17.6	10.1	100	87	33	-	-
SS-25	70' LT	69+00	12.7-14.2	A-6(12)	39	17	2.6	29.6	31.5	36.3	100	99	75	23.7	-
SS-26	70' LT	69+00	17.7-19.2	A-2-4(0)	25	NP	46.9	41.3	7.8	4.0	89	69	12	-	-
S-37	70' RT	71+50	0.0-7.0	A-6(14)	39	15	2.6	11.5	45.7	40.2	100	99	90	-	-
S-38	70' RT	71+50	7.0-9.0	A-4(4)	27	8	1.0	38.2	34.6	26.2	100	100	70	-	-
S-39	70' RT	71+50	9.0-12.0	A-4(0)	25	NP	12.1	56.5	17.3	14.1	100	98	38	-	-

PROJ. REFERENCE NO.	SHEET NO.
U-4012	15



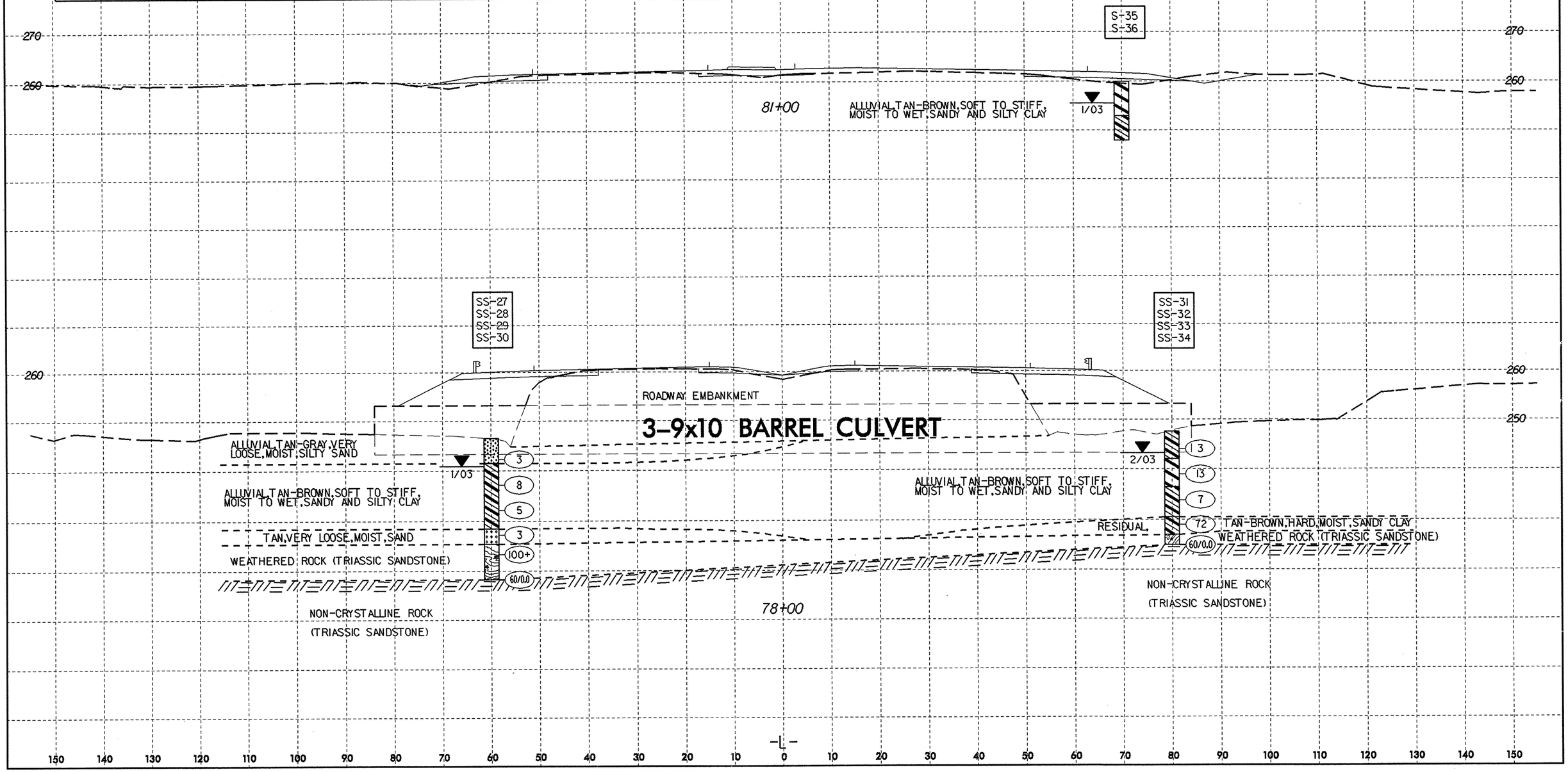
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-40	70' LT	73+00	0.0-12.0	A-6(9)	32	11	6.8	12.1	44.9	36.2	100	96	85	-	-

PROJ. REFERENCE NO.	SHEET NO.
U-4012	16

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-27	60' LT	78+00	3.2-4.7	A-2-4(0)	19	NP	51.0	33.6	9.3	6.1	97	72	19	-	-
SS-28	60' LT	78+00	8.2-9.7	A-6(18)	39	19	2.7	10.0	48.6	38.7	100	98	92	-	-
SS-29	60' LT	78+00	13.2-14.7	A-6(8)	31	13	5.7	28.1	37.6	28.5	100	98	76	-	-
SS-30	60' LT	78+00	18.2-19.7	A-3(0)	25	NP	71.9	23.4	2.7	2.0	99	61	6	-	-
SS-31	80' RT	78+00	2.5-4.0	A-6(15)	36	16	1.8	12.1	43.9	42.3	100	99	92	-	-
SS-32	80' RT	78+00	7.5-9.0	A-7-6(20)	41	20	2.4	6.4	40.8	50.3	100	99	93	25.0	-
SS-33	80' RT	78+00	12.5-14.6	A-6(9)	35	17	5.0	36.6	30.2	28.2	100	99	65	24.4	-
SS-34	80' RT	78+00	17.5-19.0	A-6(13)	36	15	4.6	8.9	64.4	22.1	96	93	88	-	-
S-35	70' RT	81+00	0.0-7.0	A-7-6(4)	44	24	34.6	20.3	12.9	32.2	81	63	39	-	-
S-36	70' RT	81+00	7.0-12.0	A-6(4)	33	13	16.1	31.8	30.0	22.1	100	95	54	-	-



CONTRACT: C201487 ID: B-3450

CONTENTS:

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

ROADWAY SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3450	1	7

STATE PROJ.NO.	F.A.PROJ.NO.	DESCRIPTION
33070.1.1	BRSTP-1116 (4)	PE
33070.2.2	BRSTP-1116 (4)	R/W, UTILITIES
33070.3.1	BRSTP-1116 (6)	CONST.

STATE PROJ. 33070.1.1 I.D. B-3450 F.A. PROJ. BRSTP-1116 (4)

COUNTY DURHAM

PROJECT DESCRIPTION Inventory of -DET1- at Bridge No. 217 over New Hope Creek and -DET2- at Bridge No. 122 over Sandy Creek

INVENTORY

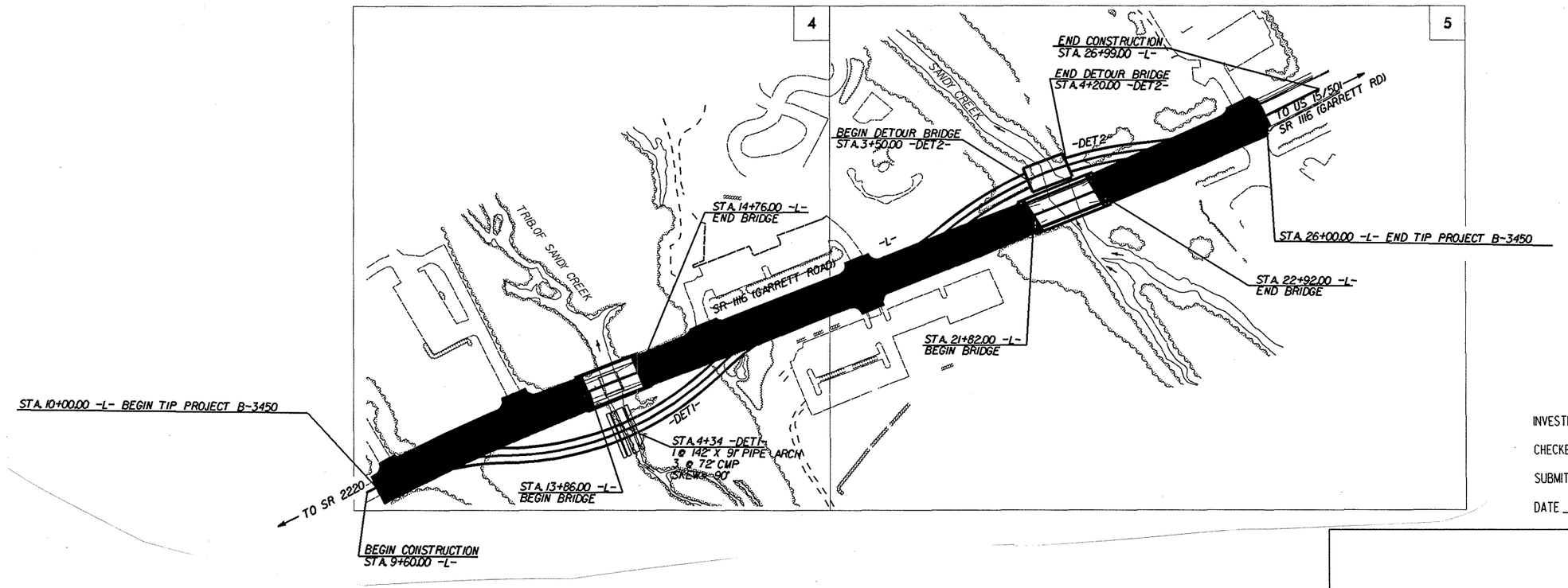
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

NC GRID
NAD 83



PERSONNEL

D. Goodnight, L.G.

P. Weaver, L.G.

R. Toothman

B. Shull

INVESTIGATED BY Trigon Engineering Consultants, Inc.

CHECKED BY Cheryl A. Youngblood, GIT

SUBMITTED BY Don Moore, L.G.

DATE

NORTH CAROLINA LICENSED SEAL C09 GEOLOGIST DONALD B. MOORE SEAL

Donald B Moore 1/15/10
SIGNATURE

DRAWN BY: Bradley D. Worley, L.G.

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.

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3450	33070.1.1	2	7

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		N.P.	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

P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- 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, YEL-BRN, 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 ARE 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 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 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 SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- 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 - CBR 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
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [X] MOBILE B- 57
- [ ] BK-51
- [ ] CME-55
- [ ] CME-850
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 6" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 3⅞" TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

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

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
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 ROCKS 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 WHICH 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 IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARKS:

Bridge No. 122: BM-3, RR spike in 15" beech tree 178' Lt of -BL- STA 15+67.9
N= 803140.0 E= 2007621.1 ELEVATION: 250.58

Bridge No. 217: BM-2, RR spike in 14" Twin Gum 140.82' Rt of -L- STA 8+18.5
N= 802557.9 E= 2008173.1 ELEVATION: 250.12

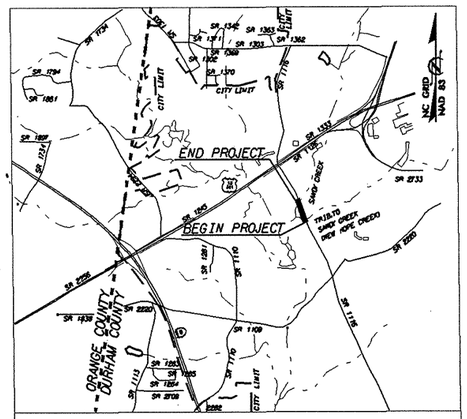
NOTES:

REVISED 09/15/00

09/08/99

PROJECT: 33070.1.1 B-3450

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

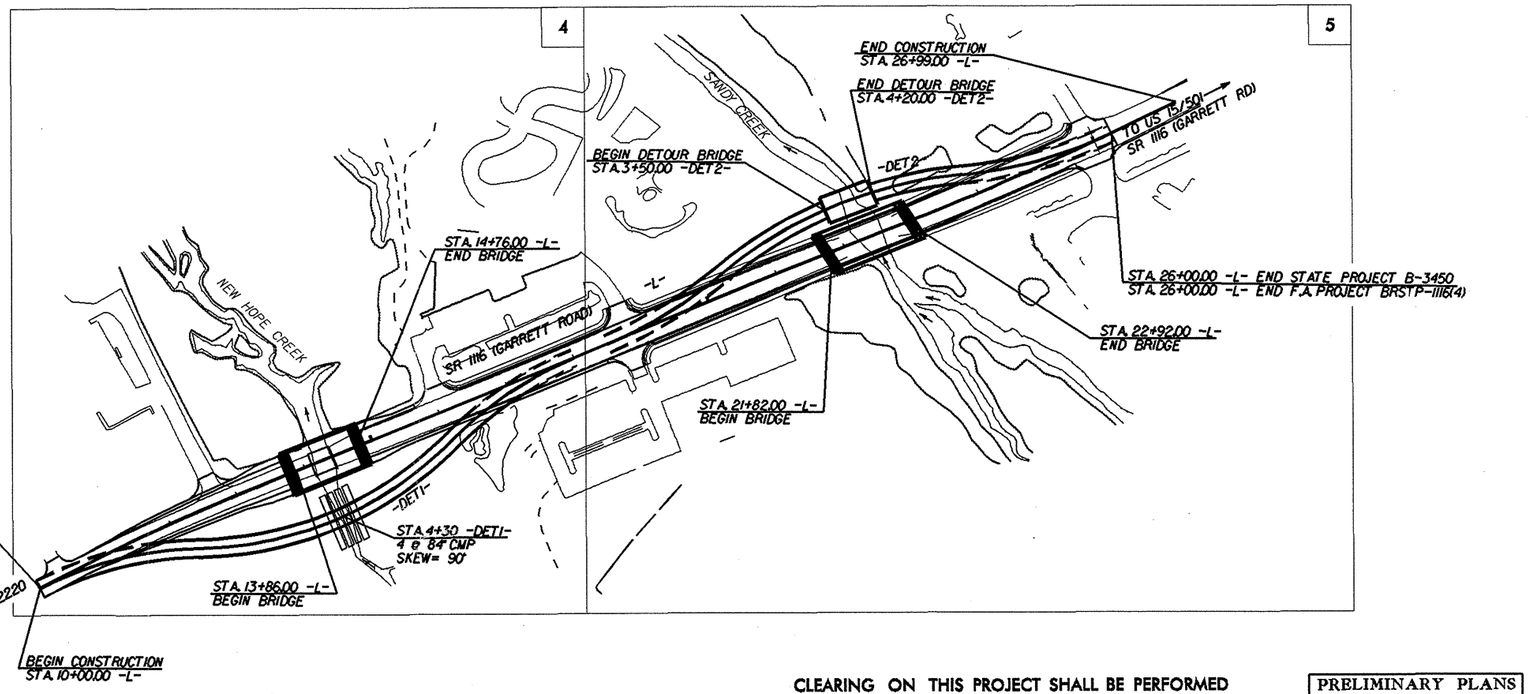
LOCATION: BRIDGE NO. 217 OVER NEW HOPE CREEK
AND BRIDGE NO. 122 OVER SANDY CREEK
AND APPROACHES ON SR 1116

TYPE OF WORK: GRADING, DRAINAGE, PAVING, GUARDRAIL, AND STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3450	2A	7

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
33070.1.1	BRSTP-1116 (4)	PE
33070.1.1	BRSTP-1116 (4)	R/W, UTILITIES

NOTE: THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF DURHAM.



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NCDOT CONTACT: MS. CATHY S. HOUSER, PE, PROJECT ENGINEER

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 11,800 VPD
ADT 2023 = 18,900 VPD
DHV = 10%
D = 55%
T = 7% *
V = 45 MPH
* TTST 3% + DUAL 4%

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT BRSTP-1116(4) = 0.265 MILE
LENGTH STRUCTURE F.A. PROJECT BRSTP-1116(4) = 0.038 MILE
TOTAL LENGTH STATE PROJECT 8.2353001 = 0.303 MILE

Prepared for NCDOT In the Office of:

KCI Associates
of North Carolina, P.A.
RALEIGH OFFICE
ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS

SUITE 200, LANDMARK CENTER 1
4601 SIX FORKS RD.
RALEIGH, N.C. 27609-5210
(919) 783-9214

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 21, 2003

LETTING DATE:
MARCH 16, 2004

MICHELLE R. BRAME, P.E
PROJECT ENGINEER

JENNIFER M. SPOHN
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT
SECRETARY

January 15, 2004

STATE PROJECT: 8.2353001 (B-3450)
WBS ELEMENT: 33070.1.1
FEDERAL PROJECT: BRSTP-1116(4)
COUNTY: Durham

DESCRIPTION: Bridge 217 over New Hope Creek and Bridge over Sandy Creek on SR 1116 Detours

SUBJECT: Geotechnical Report – Inventory

Project Description
This project is located in southwestern Durham County within the City of Durham. This project consists of widening a two-lane facility along 0.32 miles of existing alignment as well as 0.19 miles along two temporary detours. There are a total of four structures proposed with two permanent structures over New Hope Creek and Sandy Creek on -L- and two temporary structures that will be utilized along the detour alignment.

A geotechnical investigation was conducted between September and October 2002 utilizing ATV-mounted Mobile B-57 and Track mounted CME-850 drill machines. Borings were advanced with hollow stem augers. Standard Penetration Tests were conducted at all locations. Representative soil samples were obtained for visual classification in the field, and for laboratory analysis by the Material and Tests Unit and Trigon Engineering Consultants, Inc.

The following survey lines were investigated.

Line	Station
-L-	10+70 – 24+00
-Detour1-	1+12 – 6+84
-Detour2-	1+48 – 5+86

Areas of Special Geotechnical Interest

1) Groundwater: Groundwater was at the ground surface to 2 feet below the ground surface in various areas and was found to be above or within 6 feet of the proposed grade at the following locations.

Line	Station
-L-	11+11 – 12+43
-L-	20+01 – 20+63
-Detour 1-	1+12 – 2+49
-Detour 2-	1+53 – 2+18

2) Soft Foundation Soils: The following areas call for proposed embankments that will impact on soft alluvial soils with trace to little organics in some areas.

Line	Station
-L-	11+11 – 15+43
-L-	19+96 – 23+57
-Detour 1-	1+12 – 5+62
-Detour 2-	1+48 – 5+11

Physiography and Geology
The project is located within the City of Durham boundary in the Piedmont Physiographic Province. The project has topography typical of the Piedmont with gently rolling terrain and a wide well-defined stream valley. The project is drained by New Hope Creek and Sandy Creek. Geologically, Triassic mudstone and sandstone of the Durham Triassic basin underlie Triassic residual soils and/or alluvial soils throughout the project.

Soils Properties
Soils present on this project are separated into three major categories based on origin. These categories are roadway embankment, alluvial soils and residual soils.

Roadway embankment soils are present on the project near the existing road and were encountered in two borings. These soils were predominately brown, soft to hard, moist to wet, sandy clay (A-6) underlying brown and gray, medium dense, moist silty fine sand (A-2-4) with gravel.

Alluvial soils were found within the floodplain boundaries of New Hope Creek and Sandy Creek. These soils are predominantly brown to gray, very soft to stiff, fine sandy silty clay (A-6, A-7-5, A-7-6), brown and gray, very soft to soft, wet fine sandy silt (A-4) with little to trace organic matter and gray and brown, very loose to medium dense, silty, fine to coarse sand (A-2-4, A-1-b).

The alluvial clays are moderately to highly compressible while the alluvial silts and sands are slightly compressible.

Residual soils are present primarily outside the floodplains of New Hope Creek and Sandy Creek and are derived from the weathering of the Triassic rocks underlying the project. The surficial residual soils are generally brown to gray, stiff, moist silty clay (A-6). The surficial clays have low to high plasticity indices (12 to 27) that generally decrease with depth. The subsurface residual soils consist of brown and gray, medium stiff to hard, moist, silty clay (A-6, A-7-5, A-7-6) and sandy silt (A-4).

Weather Rock is present in all borings except for CMP-4, -DET1- 4+47, 12 ft. Lt. It consists of weathered Triassic mudstone and sandstone.

Rock Properties

Triassic Mudstone and Sandstone, Non-Crystalline Rock, was encountered in two borings on the -Detour 2- alignment as lenses within the Triassic Weathered Rock.

Groundwater

Groundwater was encountered throughout the project in all of the borings and is usually more than 6 feet below grade except for the areas noted above. The groundwater table is subject to seasonal fluctuations.

Respectfully submitted,

Cheryl A Youngblood

Cheryl A. Youngblood, GIT.
Project Geologist

DBM/CAY

Appendix A

Undisturbed Samples

Undisturbed "Shelby" tube samples were taken at the following locations to provide data relative to in situ soil strength.

Sample No.	Location	Depth	Test Performed
ST-5	5+82.5, 18.7'RT, -Detour 1-	0.50-1.50 Ft	Consolidation
ST-6	5+82.5, 16.7'RT, -Detour 1-	0.50-1.80 Ft.	Triaxial CU
ST-7	5+29.97, 24.7LT, -Detour 2-	7.5-9.5 Ft.	Consolidation
ST-8	5+29.97, 17.7 RT, -Detour 2	13.5-15.5 Ft.	Triaxial CU
ST-9	2+01.17, 12.5 RT, -Detour 1-	4.0-6.0 Ft.	Consolidation

EARTHWORK BALANCE CARD

Volumes in Cubic Yards

PROJECT: B-3450, BRIDGE NO. 217 OVER TRIB. OF SANDY CREEK AND BRIDGE NO. 122 OVER SANDY CREEK

COUNTY: DURHAM COUNTY

DATE: 3/23/07

COMPILED BY: M. BRAME

	STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
			TOTAL UNCLASSIFIED	ROCK	UNDERCUT	UNSUITABLE UNCLASSIFIED	SUITABLE UNCLASSIFIED	TOTAL	ROCK	EARTH	EMBANK. + 20%		ROCK	SUITABLE	UNSUITABLE	TOTAL
	SUMMARY 1															
-DET1-	Sta. 1+12.19	Sta. 6+84.08	78				78	5,487		5,487	6,584	6,506				
-DET2-	Sta. 1+48.07	Sta. 3+50 BR	49				49	457		457	548	499				
-DET2-	Sta. 4+20 BR	Sta. 5+86.05	65				65	2,145		2,145	2,574	2,509				
		SUBTOTAL	192				192	8,088		8,088	9,706	9,514				
	SUMMARY 2															
-L-	Sta. 10+00	Sta. 13+86 BR	87				87	1,092		1,092	1,310	1,223				
-L-	Sta. 14+76 BR	Sta. 21+82 BR	24				24	3,128		3,128	3,754	3,730				
-L-	Sta. 22+92 BR	Sta. 26+00	174				174	871		871	1,045	871				
		SUBTOTAL	285				285	5,091		5,091	6,109	5,824				
	SUMMARY 3															
-DET1-	Sta. 1+12.19	Sta. 6+84.08	5659				5659	378		378	454	0		5205		5205
-DET2-	Sta. 1+48.07	Sta. 3+50 BR	699				699	163		163	196	0		503		503
-DET2-	Sta. 4+20 BR	Sta. 5+86.05	1004				1004	127		127	152	0		852		852
		SUBTOTAL	7362				7362	668		668	802	0		6560		6560
TOTAL			7839				7839	13,847		13,847	16,617	15,338		6560		6560
ESTIMATE FOR SHOULDER MATERIAL								583		583	700	700				
LOSS DUE TO CLEARING & GRUBBING			-500				-500					500				
PROJECT TOTALS			7339				7339	14,430		14,430	17,317	16,538		6560		6560
EST.FOR REPL. TOPSOIL ON BORROW PITS												827				
GRAND TOTALS			7339									17,365				
SAY			7400									17,400				

ESTIMATED UNDERCUT EXCAVATION = 500 CY
-L- PAVEMENT STRUCTURE VOLUME = 274 CY
-DET1- PAVEMENT STRUCTURE VOLUME = 18 CY
-DET2- PAVEMENT STRUCTURE VOLUME = 32 CY

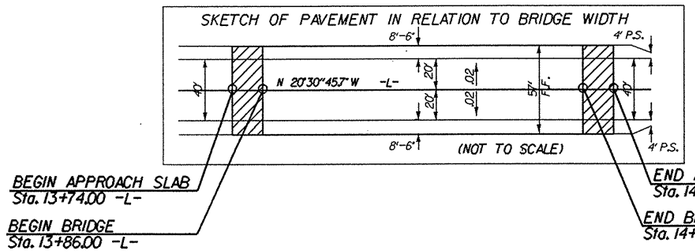
DDE = 170 CY

STATE PROJECT NO.: 33070.3.1
F.A. PROJECT NO.: BRSTP-1116(6)

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT.
THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA
PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PROJECT REFERENCE NO.		SHEET NO.
33070JJ	B-3450	4

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



BEGIN APPROACH SLAB
Sta. 13+74.00 -L-

BEGIN BRIDGE
Sta. 13+86.00 -L-

END APPROACH SLAB
Sta. 14+88.00 -L-

END BRIDGE
Sta. 14+76.00 -L-

NC GRID
NAD 83

REMOVE EXISTING STRUCTURE
(STRUCTURE ITEM)

END DETOUR CONSTRUCTION
PT Sta. 8+18.99 -DET1- =
POT Sta.18+00.00 -L-

MATCH LINE
Sta.18+18.00

BEGIN STATE PROJECT B-3450
POT Sta. 10+00.00 -L-

BEGIN CONSTRUCTION
POT Sta. 10+00.00 -L- =
PC Sta.0+00.00 -DET1-

-DET1- PCSta.0+00.00

-L- PCSta.10+77.43

-DET1- PRCSta. 2+27.36

-L- PTSta.12+90.51

-DET1- PRCSta.6+15.75

PTSta. 8+18.99

RB-1

RB-2

RB-3

CMP-3

CMP-4

BEGIN BRIDGE
Sta. 13+86.00 -L-

BEGIN APPROACH SLAB
Sta. 13+74.00 -L-

END APPROACH SLAB
Sta. 14+88.00 -L-

END BRIDGE
Sta. 14+76.00 -L-

BEGIN PROP. CBG AND SIDEWALK

N 20° 30' 45.7" W

2'-6" CBG -L-

KIDS' KASTLE, INC.
DB 2314 PG 485
PB 136 PG 28

DOUGLAS STEPHEN DAFFRON
DB 2103 PG 309
PB 136 PG 30

YATES BAPTIST ASSOCIATION
DB 350 PG 173

PRICE FAMILY LIMITED PARTNERSHIP, A NORTH CAROLINA LIMITED PARTNERSHIP
DB 1935 PG 916
PB 132 PG 129

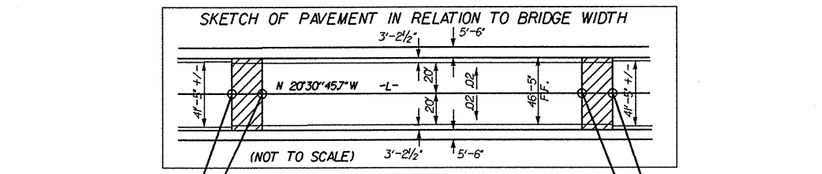
DR. NAWA ABDEL-CHANY, TRUSTEE
DB 2540 PG 785
PB 132 PG 29

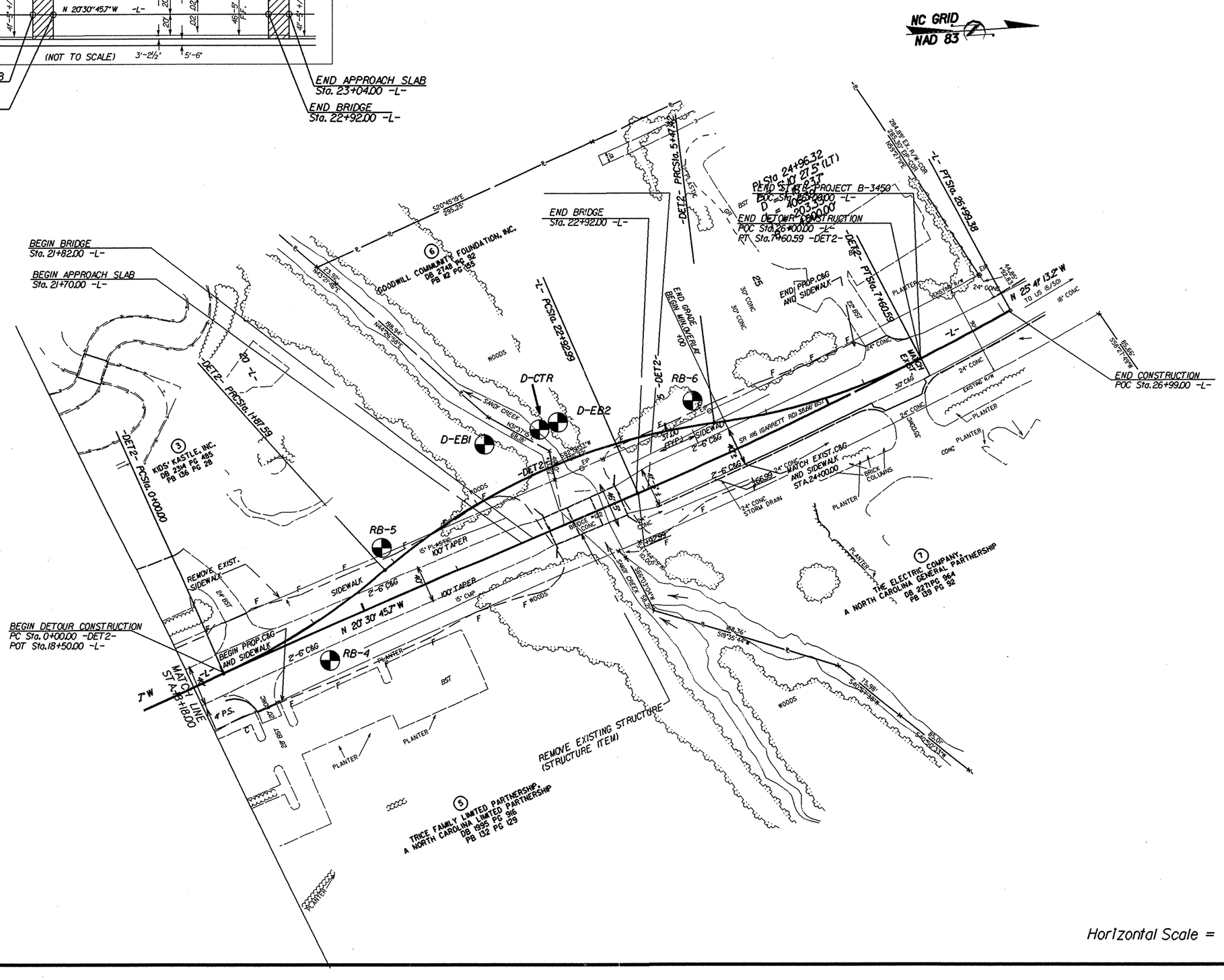
N 25° 23' 45.9" W
TO SR 2220
SR 1116 (GARNETT RD) 25.0' BST

Horizontal Scale = 1:100

PROJECT REFERENCE NO.		SHEET NO.
33070.11	B-3450	5

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





Horizontal Scale = 1:100

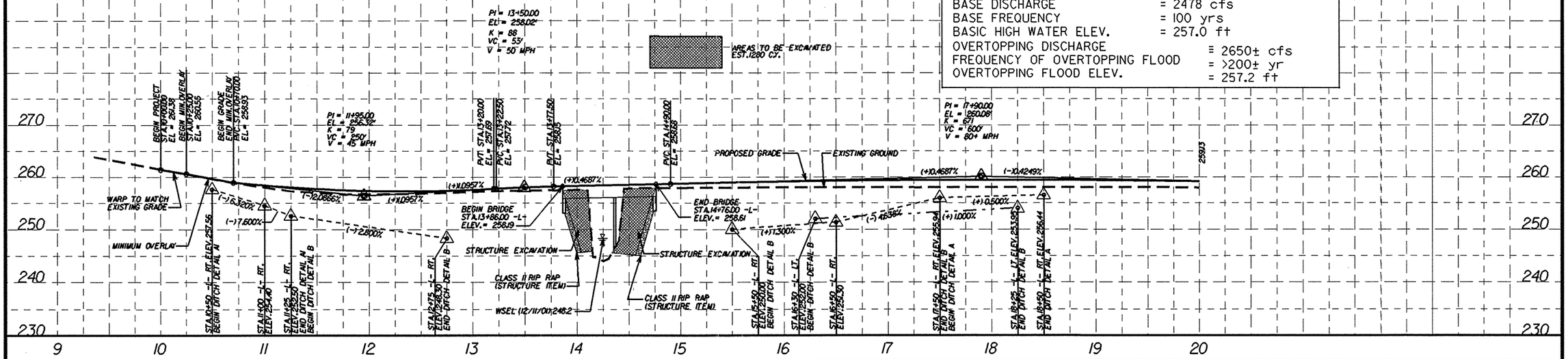
5/28/99

PROJECT REFERENCE NO.	SHEET NO.
33070.11 B-3450	6

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BM#2 = RR SPIKE SET IN 14" GUM 140.82' RT OF ℄ STA 8+18.5 ELEV.=250.12', N 803140.0 E 2008173.1

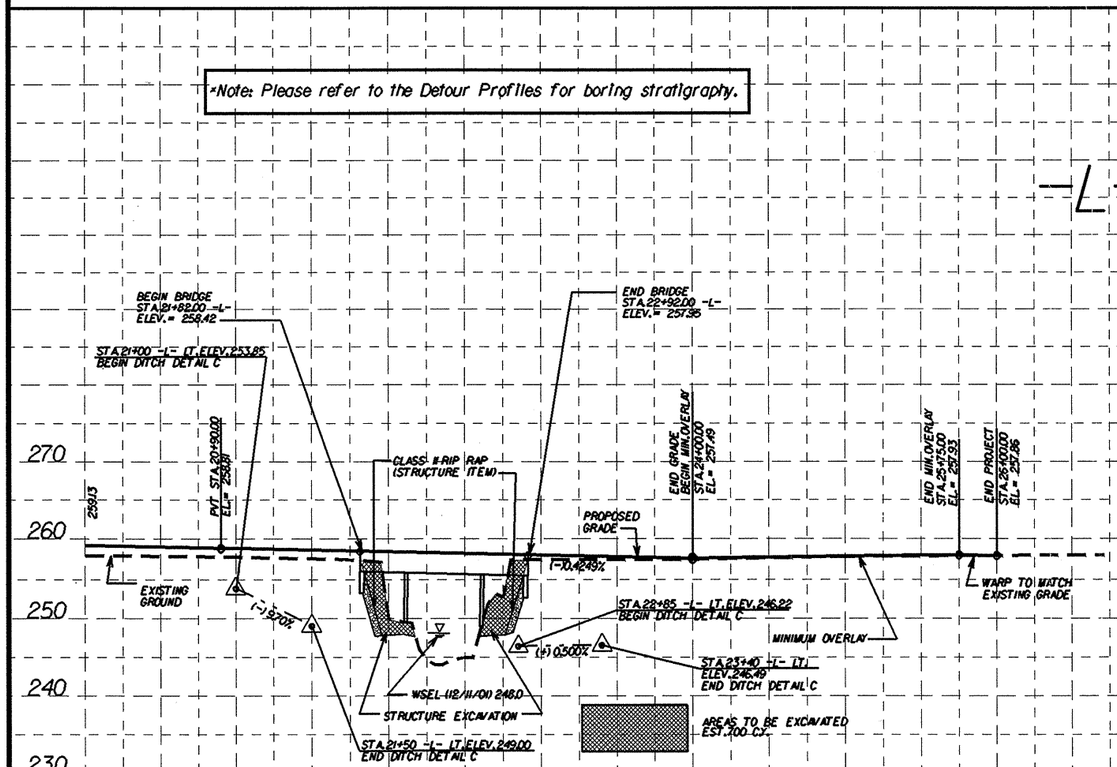
BM#3 = RR SPIKE SET IN 15" BEECH 178' LT OF ℄ STA 15+67.9 ELEV.=250.58', N 803140.0 E 2007621.1



HYDRAULIC & OVERTOPPING DATA FOR BRIDGE #217

DESIGN DISCHARGE	= 2167 cfs
DESIGN FREQUENCY	= 50 yrs.
DESIGN HIGH WATER ELEV.	= 255.9 ft
BASE DISCHARGE	= 2478 cfs
BASE FREQUENCY	= 100 yrs
BASIC HIGH WATER ELEV.	= 257.0 ft
OVERTOPPING DISCHARGE	≅ 2650± cfs
FREQUENCY OF OVERTOPPING FLOOD	= >200± yr
OVERTOPPING FLOOD ELEV.	= 257.2 ft

*Note: Please refer to the Detour Profiles for boring stratigraphy.



HYDRAULIC & OVERTOPPING DATA FOR BRIDGE #122

DESIGN DISCHARGE	= 5019 cfs
DESIGN FREQUENCY	= 50 yrs.
DESIGN HIGH WATER ELEV.	= 257.0 ft
BASE DISCHARGE	= 5778 cfs
BASE FREQUENCY	= 100 yrs
BASIC HIGH WATER ELEV.	= 257.4 ft
OVERTOPPING DISCHARGE	≅ 6500± cfs
FREQUENCY OF OVERTOPPING FLOOD	= >200± yr
OVERTOPPING FLOOD ELEV.	= 257.5 ft

FOR -L- PLAN, SEE SHEETS 4 & 5

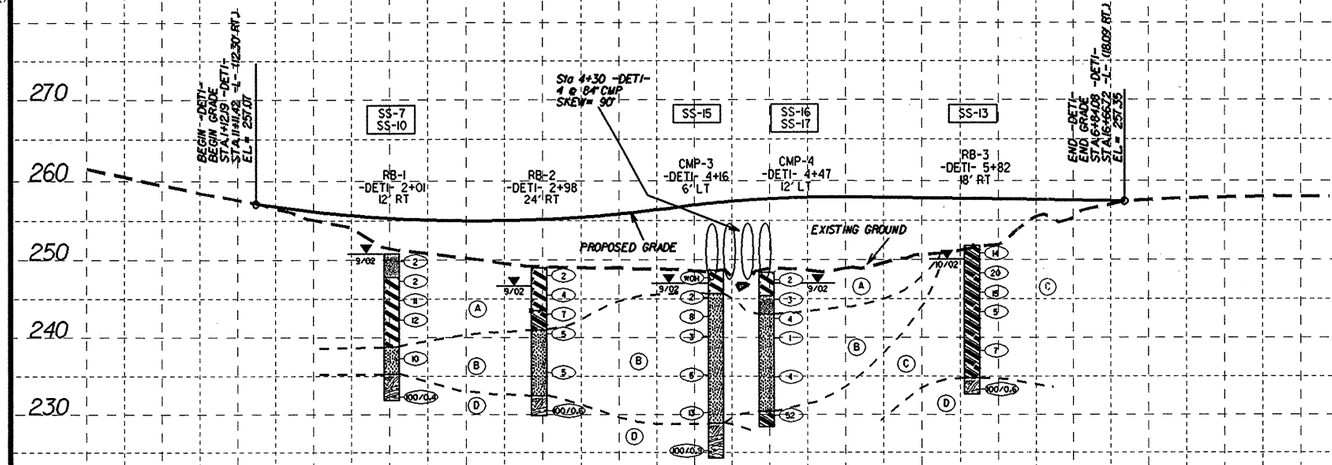
SEE SHEETS S-1 THRU S-? FOR STRUCTURE PLANS

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
33070JJ B-3450	7

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-DET1-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	% BY WEIGHT				% PASSING SIEVES		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-7	12.6	02+01	1.00-2.50	A-7-6(36)	54	23	0.6	2.8	42.3	54.3	100	100	97
SS-10	12.6	02+01	8.50-10.00	A-2-4(0)	23	NP	19.3	52.3	14.4	14.1	100	96	35
SS-15	-6.82	04+16	8.50-10.00	A-2-4(0)	14	NP	56	31	6	8	100	64	14
SS-16	-11.78	04+47	3.50-6.00	A-4(0)	24	3	7	56	19	18	100	97	48
SS-17	-11.78	04+47	18.5-20.0	A-6(8)	37	12	9	8	59	24	86	80	71
SS-13	17.7	08+83	1.00-2.50	A-6(5)	28	12	19.3	52.3	14.4	14.1	100	96	35

FOR -DET1- PLAN, SEE SHEET 3

(A) Alluvial: brown to gray, very soft to stiff, wet, fine sandy silty clay (A-6 / A-7-5 and A-7-6) and brown and gray, very soft to soft, wet, fine sandy silt (A-4) w/ little to trace organic material

(B) Alluvial: gray and brown, very loose to medium dense, silty, fine to coarse sand (A-2-4 and A-1-b)

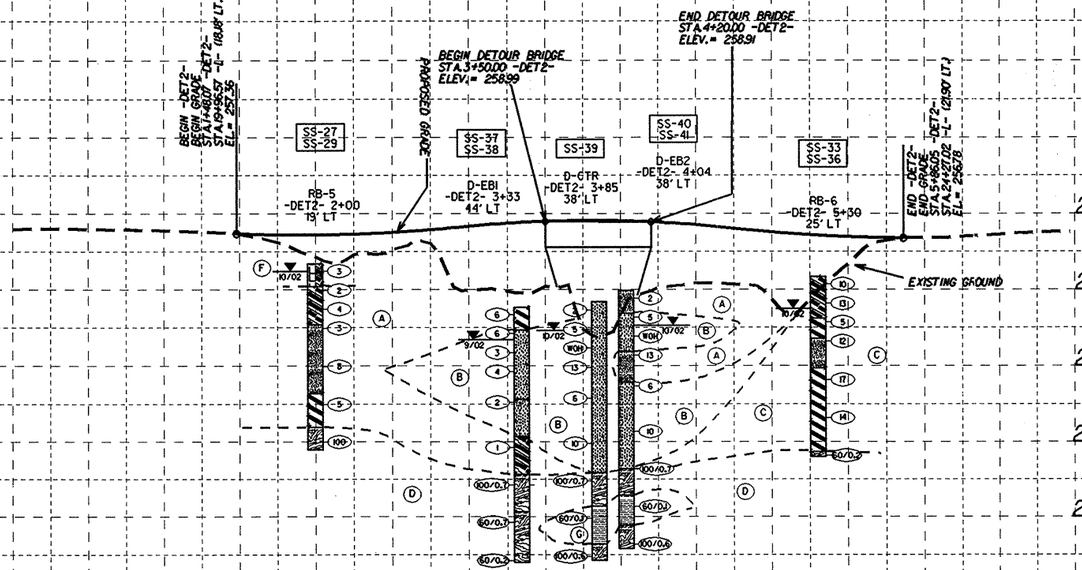
(C) Residual: brown and gray, medium stiff to hard, moist silty clay (A-6, A-7-5 and A-7-6) and sandy silt (A-4)

(D) Weathered Rock (WR): reddish brown to reddish gray, mudstone and sandstone (Triassic)

HYDRAULIC & OVERTOPPING DATA

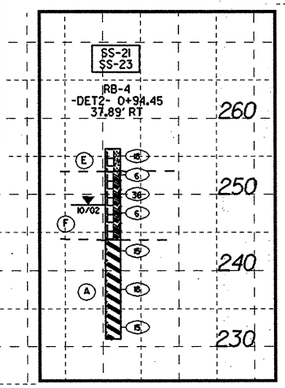
DESIGN DISCHARGE	= 1160 cfs
DESIGN FREQUENCY	= 5 yrs.
DESIGN HIGH WATER ELEV.	= 253.9 ft

-DET2-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	% BY WEIGHT				% PASSING SIEVES		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-27	-19.38	03+00	3.50-5.00	A-7-6(9)	41	19	16.9	18.5	28.4	36.2	84	73	58
SS-29	-19.38	03+00	8.50-10.00	A-4(0)	20	NP	18.1	56.3	16.6	14.1	100	99	38
SS-37	-44.38	03+84	1.00-2.50	A-7-6(7)	44	21	29	9	22	40	99	74	63
SS-38	-44.38	03+84	13.50-15.00	A-1-b(0)	18	NP	81	6	8	5	94	21	13
SS-39	-33.48	03+86	18.5-20.0	A-2-4(0)	19	NP	61	25	15	9	100	92	46
SS-40	-38.15	04+04	1.00-2.50	A-6(5)	28	12	19.3	52.3	14.4	14.1	100	96	35
SS-41	-38.15	04+04	8.50-10.00	A-4(2)	25	9	4	52.0	29	15	100	99	53
SS-33	-27.40	05+30	1.00-2.50	A-6(1)	34	13	21	46	12	22	100	91	39
SS-36	-24.70	05+30	9.50-11.00	A-4(1)	23	6	3.4	47.8	28.6	20.1	100	100	89
SS-21	37.89	0+94	6.00-7.50	A-6(4)	39	16	16	27	38	18	78	87	46
SS-23	37.89	0+94	18.50-15.00	A-7-6(20)	43	21	6	10	46	40	100	97	89



(A) Alluvial: brown to gray, very soft to stiff, wet, fine sandy silty clay (A-6 / A-7-5 and A-7-6) and brown and gray, very soft to soft, wet, fine sandy silt (A-4) w/ little to trace organic material

(B) Alluvial: gray and brown, very loose to medium dense, silty, fine to coarse sand (A-2-4 and A-1-b)

(C) Residual: brown and gray, medium stiff to hard, moist silty clay (A-6, A-7-5 and A-7-6) and sandy silt (A-4)

(D) Weathered Rock (WR): reddish brown to reddish gray, mudstone and sandstone (Triassic)

(E) Roadway Embankment: brown and gray, medium dense, moist, silty fine sand (A-2-4) w/ gravel

(F) Roadway Embankment: brown, soft to hard, moist to wet, sandy clay (A-6)

(G) Non-Crystalline Rock (NCR): gray mudstone (Triassic)

HYDRAULIC & OVERTOPPING DATA

DESIGN DISCHARGE	= 2560 cfs
DESIGN FREQUENCY	= 5 yrs.
DESIGN HIGH WATER ELEV.	= 255.8 ft

FOR -DET2- PLAN, SEE SHEET 4

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

CONTRACT: C200850 ID: U-4009

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4009	1	12

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
35010.1.1		PE
35010.2.1		R/W & UTIL.
35010.3.1		CONST.

CONTENTS:

LINE	STATION	PLAN	X-SECT
-NSR1-	10+00 to 17+25	5	6-8
-NSR2-	10+00 to 18+78	4-5	9-12

NOTE: SEE SHEET 2A FOR PLANSHEET LAYOUT AT THE TIME OF INVESTIGATION

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

STATE PROJECT 35010.3.1 I.D. NO. U-4009

F.A. PROJECT N/A

COUNTY DURHAM

DESCRIPTION SR 1126 (SERVICE ROAD)
AT US 15/501 AND GARRETT ROAD

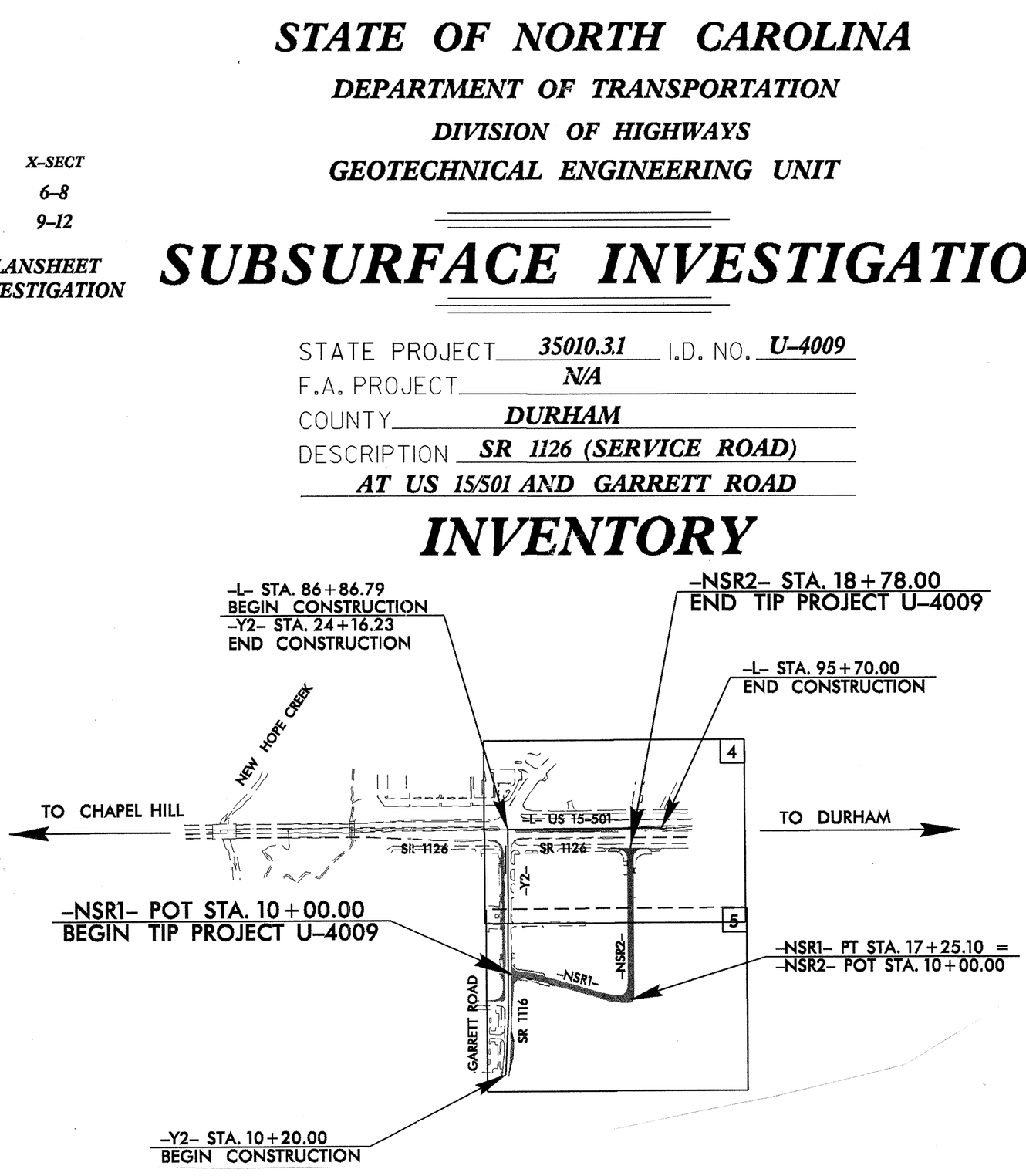
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

INVENTORY



PERSONNEL C. M. WHALEN
L. B. MADISON
W. T. DUGGINS
A. N. KARPA

INVESTIGATED BY R. M. ROGERS

CHECKED BY L. T. PACKER

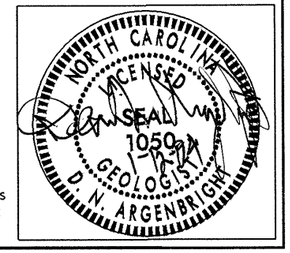
SUBMITTED BY L. T. PACKER

DATE JANUARY, 2004

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.



ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4009	35010.1.1	2	12

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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 • 40 • 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		N.P.	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

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 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	2.0	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT (PLASTIC RANGE (PI))		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — 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, YEL-BRN, 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 ARE 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 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- 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 - CBR 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
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [X] MOBILE B-47
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

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

HAMMER TYPE:
- [ ] AUTOMATIC [X] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
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 ROCKS 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 WHICH 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 IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

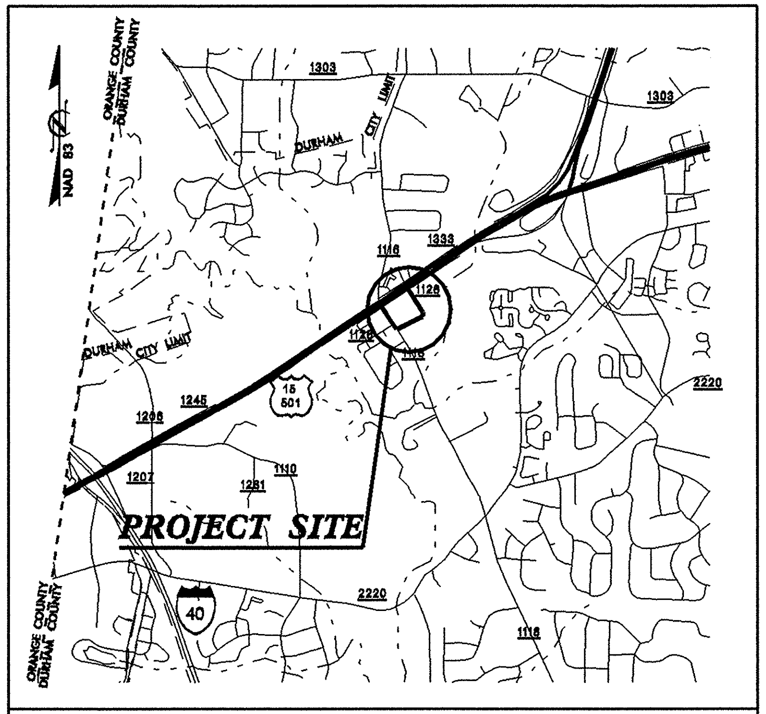
ELEVATION:

NOTES:

REVISED 09/15/00

PROJECT: 9.8059077 U-4009

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

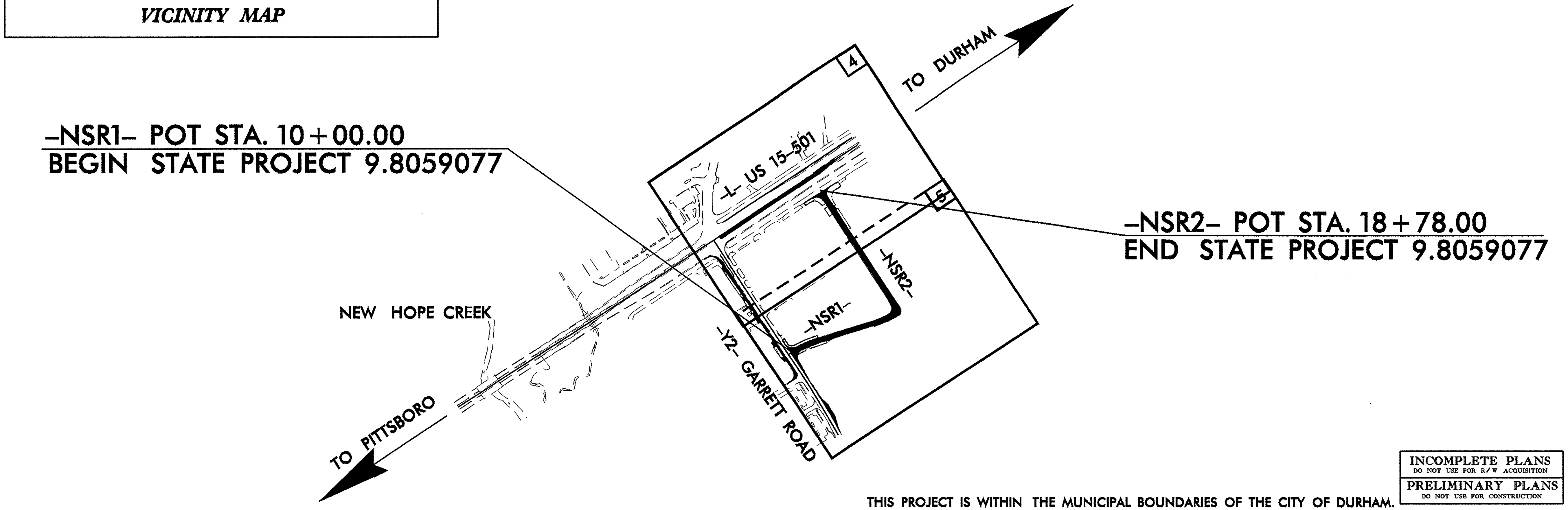
DURHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4009	2A	12

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
9.8059077		PE

LOCATION: SR 1126 (SERVICE ROAD) AT US 15/501 AND GARRETT ROAD

TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING, AND RESURFACING



-NSR1- POT STA. 10+00.00
BEGIN STATE PROJECT 9.8059077

-NSR2- POT STA. 18+78.00
END STATE PROJECT 9.8059077

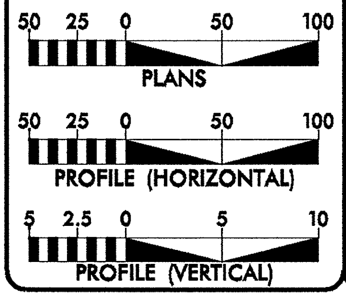
NAD 83

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF DURHAM.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2002 = 1,736
ADT 2025 = 5,600
DHV = 10 %
D = 60 %
T = 3 % *
V = 60 MPH

* DUAL 2 % TTST 1 %

PROJECT LENGTH

TOTAL LENGTH ROADWAY STATE PROJECT 9.8059077 = 0.304 MI

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., NC, 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 21, 2003

LETTING DATE:
SEPTEMBER 21, 2004

RONALD D. ALLEN, P.E.
PROJECT ENGINEER

JEANIE TYSON
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: ___ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: ___ P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER ___ P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR ___ DATE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

1589 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1589

LYNDO TIPPETT
SECRETARY

January 12, 2004

STATE PROJECT: 35010.1.1 (U-4009)
COUNTY: Durham

DESCRIPTION: SR 1126 (Service Road) at US 15/501 and Garrett Road.

SUBJECT: Geotechnical Report – Inventory

Project Description

The proposed project primarily consists of constructing a two-lane service road on new location to provide access to the existing Service Road with Garrett Road when the intersection at US 15/501 is eliminated. The project begins approximately 800 feet south of the existing intersection of US 15/501 on Garrett Road, progresses east for 725 feet (-NSR1-) and then turns north for 878 feet (-NSR2-) to terminate at the existing Service Road. Widenings are proposed along Garrett Road (Y-2) and US 15/501 (-L-), primarily for turning lanes. The investigation of subsurface conditions was confined to the corridor of the proposed new construction.

The following lines were investigated for this project:

Line	Station
(-NSR1-)	10+00 to 17+25
(-NSR2-)	10+00 to 18+78

Areas of Special Geotechnical Interest

1) The following section contains sandy and silty clay soils that typically have high plasticity indices:

Line	Approximately Station
(-NSR1-)	13+00 to 14+50

2) The following intervals were found to exhibit a high water table, seasonal high groundwater, perched water near the surface, or the potential for groundwater related construction problems:

Line	Approximate Station
(-NSR1-)	12+50 to 14+50
(-NSR2-)	12+70 to 13+50

3) The following interval contains artificial fill materials consisting of brick, concrete, asphalt, wood and other construction debris mixed with coarse gravel, sands, and clays:

Line	Approximate Station
(-NSR2-)	12+75 to 15+85

4) Monitoring wells are present at the following approximate locations:

Well No	Line	Station	Offset
MW1	(-NSR2-)	10+50	40 ft. Rt.
MW3	(-NSR2-)	11+50	50 ft. Rt.
MW4	(-NSR2-)	12+50	15 ft. Lt.

Physiography and Geology

The project corridor is located in Durham County in generally the southwest section of the City of Durham near the Orange County Line. The topography borders along an upland and flood plain region of the Piedmont and ranges from flat to moderately sloping with elevations from 254 to 273 feet. Runoff from several parking lots crosses the project from -NSR1- Sta. 13+00 ± to Sta. 14+50 ± and an old sediment trap is located from -NSR1- Sta. 13+20 ± to Sta. 13+70 ± approximately 5 feet left to 40 feet right of roadway centerline. The runoff water flows into a wetland area surrounding Sandy Creek about 300 feet southeast of the project. Surface drainage is generally fair to poor.

The geology of this region primarily consists of Triassic Basin sandstones and mudstones from the Chatham Group as indicated by the 1985 Geologic Map of North Carolina. Recent age alluvial soils were encounted overlaying residual soils in the flood plains locations. Several feet of natural soils along -NSR2- appear to have been removed and replaced with artificial fill and debris.

Groundwater

Groundwater data was collected in early September of 2002 after heavy rainfall but during drought conditions. During the investigation, the water table was generally 4.3 feet or more below the natural ground surface along the upland areas. In the floodplains, groundwater was typically within 1.5 to 2.8 feet below the natural ground surface.

Soils

Soils encountered during this investigation are separated into four major categories based on origin and published data. These categories are Triassic sedimentary residual soils, recent alluvial soils, soils with rootmat and artificial fill soils.

The Triassic residual soils along the project occur along the upland areas and underneath the recent alluvial soils. They generally consist of loose to medium dense fine to very coarse sand (A-2-4), clayey sand (A-2-6), soils underlain by sandy silts (A-4) and sandy clays (A-6, A-7-6). The sandy clays generally have a low to moderate plasticity index (11 to 23) with clay from 18 to 36 percent and typically exhibit good to fair engineering properties.

Moisture contents for the upland sandy clays tested ranged from 17.5 to 20.0 percent. The engineering properties of the sand soils (A-2-4, A-2-6) range from excellent to good.

The alluvial soils that occur within the floodplain (-NSR1- Sta. 13+00 to Sta. 14+50), created by runoff, generally consist of 1 ½ ± feet of organic silty clays underlain by silty clays (A-7-6) with high plasticity indices (35 to 38) and saturated sandy silts (A-4). Engineering properties of these soils (A-7-6, A-4) ranges from poor to fair.

Rootmat along the project ranges in thickness from 0.5 to 1.0 foot in most of the wooded areas of the project.

The area of artificial fill (-NSR2- Sta. 12+75 ± to Sta. 15+85 ±) is located adjacent to a parking lot and contains building construction materials (brick, concrete, wood) and asphalt from an old parking lot which are mixed with coarse sands, gravel and clays. It is underlain by stiff sandy clays (A-6) at depths of 1.5 to 2.0 feet. The engineering properties of the artificial fill varies greatly from excellent to poor. The engineering properties of the underlying clays are generally good.

Respectfully Submitted,

Robert M Rogers
Project Geologist

RMR/kw

File: U-4009 inv

3B

COMPUTED BY:	OJF	DATE:	2/9/2004
CHECKED BY:	BCK	DATE:	2/9/2004

PROJECT NO.	SHEET NO.
U-4009	3-B

RD206394

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF EXISTING ASPHALT PAVEMENT REMOVAL

Line	Station	Station	LOC LT/RT/CL	YD²
-Y2-	23+16		LT	346.65
-Y2-	23+16		RT	580.36
			TOTAL	927.01
			SAY	**1020**

SUMMARY OF FENCE REMOVAL

FOR CONTRACTORS INFORMATION ONLY.

FENCE REMOVAL INCIDENTAL TO CLEARING AND GRUBBING.

Line	Station	Station	LOC LT/RT/CL	LIN FT
-NSR1-	15+82.00		LT & RT	18.52
-NSR1-	15+86.68	16+66.49	RT	79.81
-NSR1-	16+62.00		RT	38.50
-NSR1-	16+67.00		LT	80.00
			NSR1 TOTAL	216.83
-NSR2-	12+18.00	14+75.00	LT	257.00
-NSR2-				
			NSR2 TOTAL	257.00
			TOTAL	473.83
			SAY	**520.00**

COMPUTED BY:
CHECKED BY:

PROJECT NO.	SHEET NO.
U-4009	3-C

RD206394

EARTHWORK BALANCE CARD

Volumes in Cubic Yards

PROJECT: U-4009 COUNTY: Durham DATE 7-3-2007 SHEET 1 of 1 SHEETS

RD09S02B

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +15%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
U-4009 SUMMARY NO. 1															
-L-	86+86.79	98+70.00	621				621						621		621
		SUBTOTAL NO.1	621				621						621		621
U-4009 SUMMARY NO. 2															
-NSR1-	10+20	17+20	187		568		187	2953		2953	3396	3209		568	568
		SUBTOTAL NO.2	187		568		187	2953		2953	3396	3209		568	568
U-4009 SUMMARY NO. 3															
-NSR2-	10+15	18+65	399		533	108	291	1481		1481	1703	1412		641	641
		SUBTOTAL NO.3	399		533	108	291	1481		1481	1703	1412		641	641
U-4009 SUMMARY NO. 4															
-Y2-LT	10+00	25+50	534				534	115		115	132		402		402
		SUBTOTAL NO.4	534				534	115		115	132		402		402
U-4009 SUMMARY NO. 5															
-Y2-RT	10+00	25+50	600				600	28		28	32		568		568
		SUBTOTAL NO. 5	600				600	28		28	32		568		568
SUMMARY TOTAL			2341		1101	108	2233	4577		4577	5263	4621	1591	1209	2800
LOSS DUE TO CLEARING & GRUBBING			-1000				-1000					1000			
ADDITIONAL UNDERCUT					100									100	100
SEDIMENT TRAP CLEANOUT					35									35	35
WASTE IN LIEU OF BORROW												-568	-586		-586
PROJECT TOTAL			1341		1236	108	1233	4577		4577	5263	5053	1023	1344	2349
5% TO REPL TOPSOIL ON BORROW PIT												253			
GRAND TOTAL			**1341**		**1236**	**108**	**1233**	**4577**		**4577**	**5263**	**5306**	**1023**		**2349**
DDE = 340															
BACKFILL UNDERCUT WITH SELECT MATERIAL OR SELECT GRANULAR MATERIAL															

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4009	4
R/W SHEET NO.	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

2002 ADT
2025 ADT

GARRETT RD.

US 15/501 — US 15/501

5160 / 8400 — 4324 / 6900
4332 / 7000 — 5428 / 7900

SR 1126 — SR 1126

108 / 200 — 880 / 1800
108 / 200 — 548 / 1100

WASHINGTON PLACE APARTMENTS

1024 / 1300
508 / 600

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NGS FOR MONUMENT "CAPRI"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 805205.9355(ft) EASTING: 2007211.7729(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999941240
THE NC LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "CAPRI" TO -L- STATION 85+00.00 IS
S 57°12'27.84" W 731.20 FT
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NAD 83

S 10°23'31.4" E

-L- Sta. 86+86.79
-Y2- Sta. 24+16.23

GPS U4012-3
BL- 87+56.04
-BY2- 11+49.45
-L- STA. 89+77.34
OFF 80.84 LEFT

-BL- 95+29.85
GPS U4012-4
-L- STA. 97+51.15
OFF 82.28 LEFT

POT Sta. 98+00.00

-L-
N 56°37'53.0" E

N 37°59'29.2" W

END STATE PROJECT U-4009
-NSR2- STA. 18+78.00

-Y2- STA. 19+50.00 MATCH LINE SEE SHEET 5

SEE SHEET 6 FOR -NSR2- PROFILE

PROPOSED MONOLITHIC ISLAND

$$$$$$$SYSTIME$$$$$$
$$$$$$$SYSDUN$$$$$$
$$$$$$$USERNAME$$$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-4009	5
R/W SHEET NO.	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

-Y2- STA. 19+50.00 MATCH LINE SEE SHEET 4

HOLT & ASSOCIATES

GOLD CENTER

AMPLE STORAGE CENTER

BEGIN STATE PROJECT U-4009
-NSR1- STA. 10+00.00

-NSR1- POT Sta. 10+00.00
-Y2- POT Sta. 15+83.86

-NSR1- PT Sta. 11+91.36

-NSR1- PC Sta. 10+28.00

-NSR1- PC Sta. 15+61.75

-NSR1- PT Sta. 17+25.10
-NSR2- POT Sta. 10+00.00

-BY2- 23+72.15
-Y2- 13+63.42
OFF 23.29' LEFT

PT Sta. 13+46.23

PROPOSED BUS STOP

PC Sta. 10+00.00

N 32° 59' 29.2" W

N 57° 00' 30.8" E

N 77° 36' 28.4" E

NAD 83

-Y2-	-NSR1-	
PI Sta 11+73.23	PI Sta 11+10.18	PI Sta 16+43.93
Δ = 5° 05' 11.5" (LT)	Δ = 15° 35' 58.5" (RT)	Δ = 15° 35' 57.6" (LT)
D = 1° 28' 08.8"	D = 9° 32' 57.5"	D = 9° 32' 57.5"
L = 346.23'	L = 163.36'	L = 163.36'
T = 173.23'	T = 82.19'	T = 82.19'
R = 3,900.00'	R = 600.00'	R = 600.00'
V = 45 + MPH	V = 35 MPH	V = 35 MPH

2002 ADT
2025 ADT

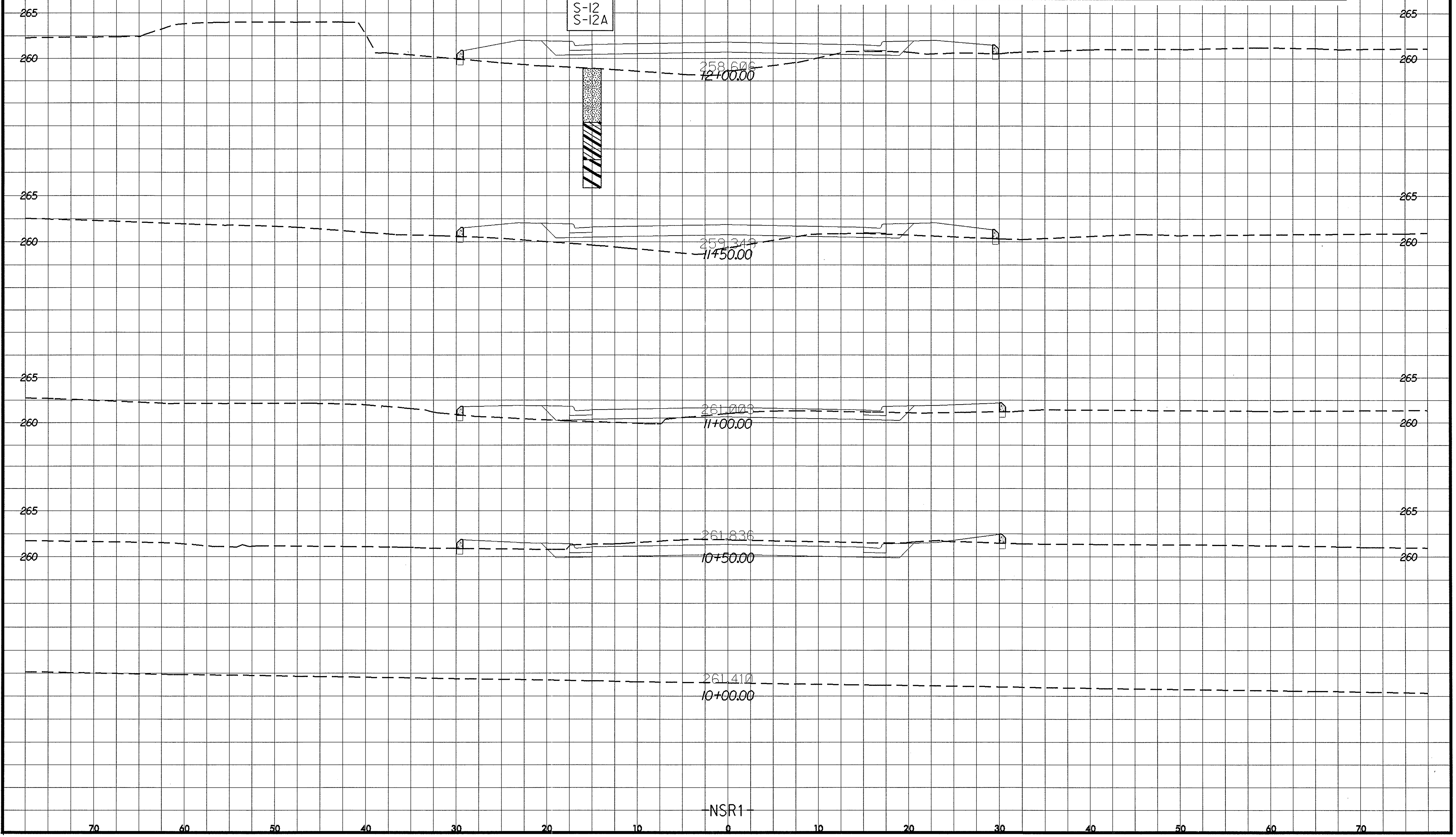
GARRETT RD.
5160 / 8400 | 4324 / 4900
US 15/501 — US 15/501
4332 / 7000 | 7428 / 7900
108 / 200 | 880 / 1800
SR 1126 — SR 1126
108 / 200 | 548 / 1100
1024 / 1400
WASHINGTON PLACE APARTMENTS
508 / 600

SEE SHEET 6 FOR -NSR1- PROFILE
SEE SHEET 6 FOR -NSR2- PROFILE

Rev 3/6/01

SOIL TEST RESULTS

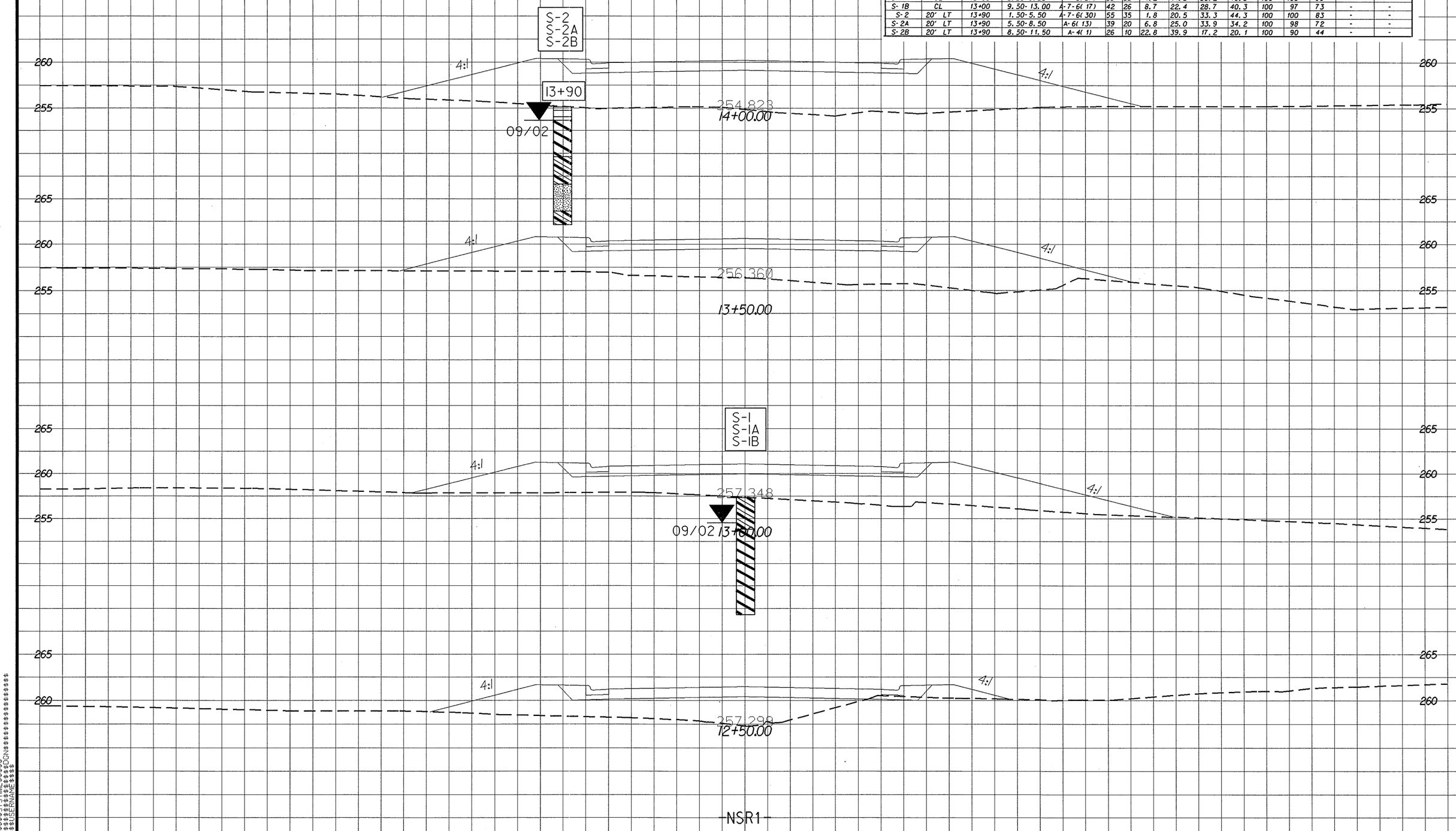
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S- 12	15' LT CL	12+00	0.20-6.00	A-4(0)	26	8	33.5	28.9	19.6	18.1	89	69	38	-	-
S- 12A	15' LT CL	12+00	6.00-10.00	A-6(12)	38	21	9.6	26.5	31.8	32.1	100	96	66	-	-



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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S- 1	CL	13+00	0.00-3.50	A-6(6)	29	13	7.7	33.2	32.9	26.2	100	97	66	-	-
S- 1A	CL	13+00	3.50-9.50	A-7-6(37)	59	38	1.2	14.3	36.2	48.3	100	100	90	-	-
S- 1B	CL	13+00	9.50-13.00	A-7-6(17)	42	26	8.7	22.4	28.7	40.3	100	97	73	-	-
S- 2	20' LT	13+90	1.50-5.50	A-7-6(30)	55	35	1.8	20.5	33.3	44.3	100	100	83	-	-
S- 2A	20' LT	13+90	5.50-8.50	A-6(13)	39	20	6.8	25.0	33.9	34.2	100	98	72	-	-
S- 2B	20' LT	13+90	8.50-11.50	A-4(1)	26	10	22.8	39.9	17.2	20.1	100	90	44	-	-

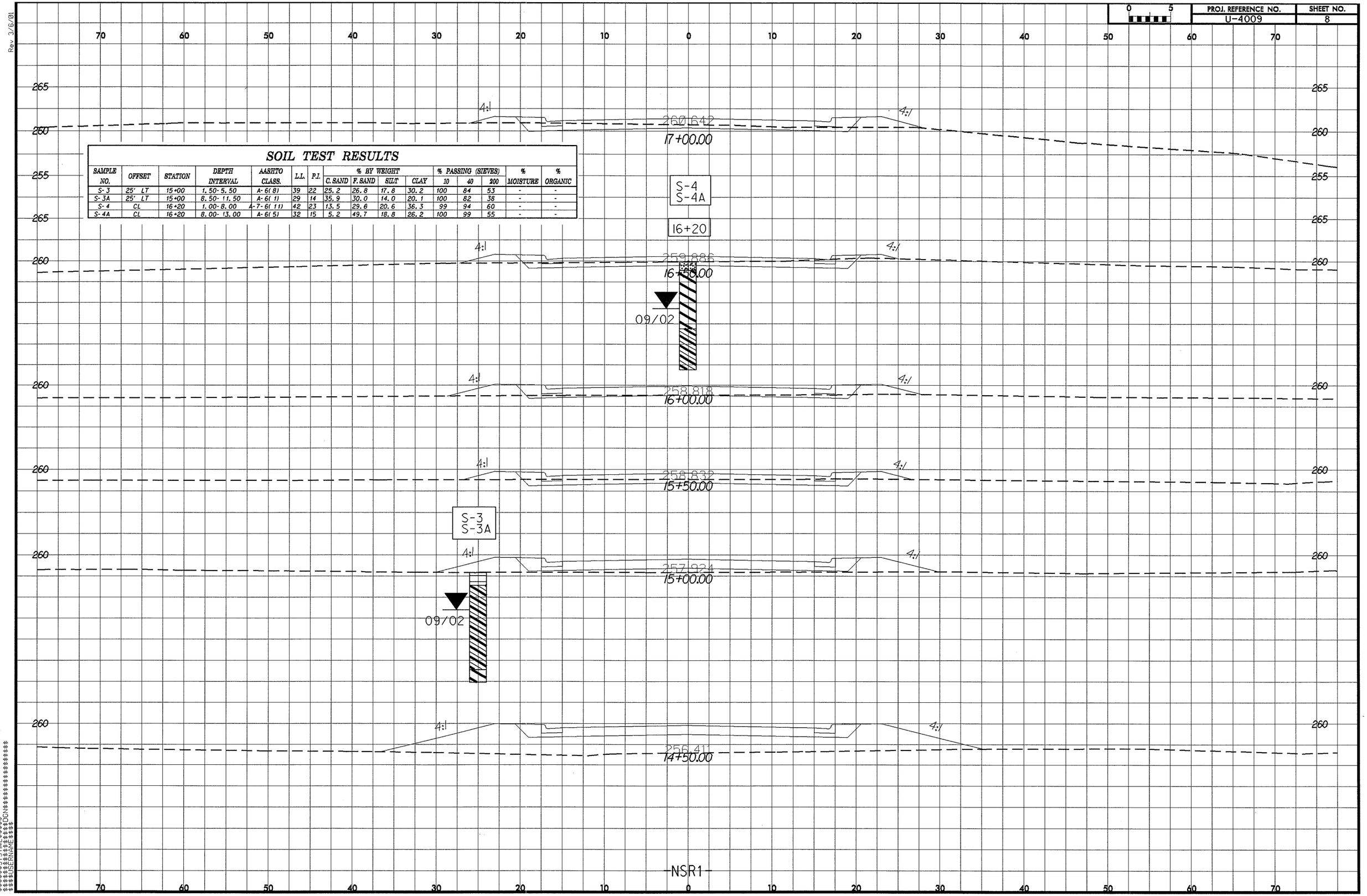


Rev 3/6/01

PROJ. REFERENCE NO.	SHEET NO.
U-4009	8

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-3	25' LT	15+00	1.50-5.50	A-6(8)	39	22	25.2	26.8	17.8	30.2	100	84	53	-	-
S-3A	25' LT	15+00	8.50-11.50	A-6(1)	29	14	35.9	30.0	14.0	20.1	100	82	38	-	-
S-4	CL	16+20	1.00-8.00	A-7-6(11)	42	23	13.5	29.6	20.6	36.3	99	94	60	-	-
S-4A	CL	16+20	8.00-13.00	A-6(5)	32	15	5.2	49.7	18.8	26.2	100	99	55	-	-

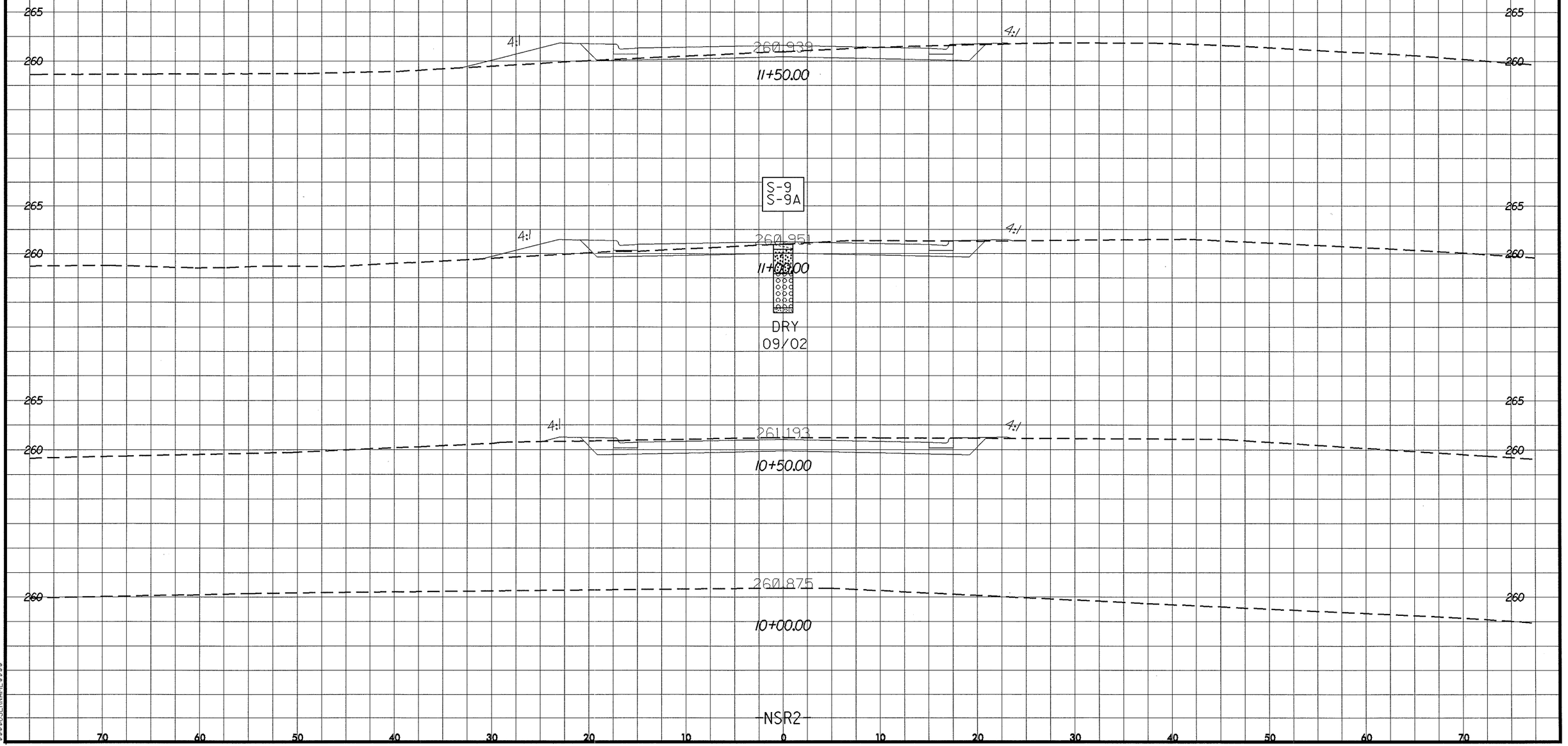


Rev. 3/6/01

PROJ. REFERENCE NO.	SHEET NO.
U-4009	9

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-9	CL	11+00	0.50-3.00	A-2-4(0)	15	NP	24.1	49.5	18.4	8.0	100	91	33	-	-
S-9A	CL	11+00	3.00-6.50	A-6(1)	28	12	22.5	44.5	14.9	18.1	100	91	38	-	-

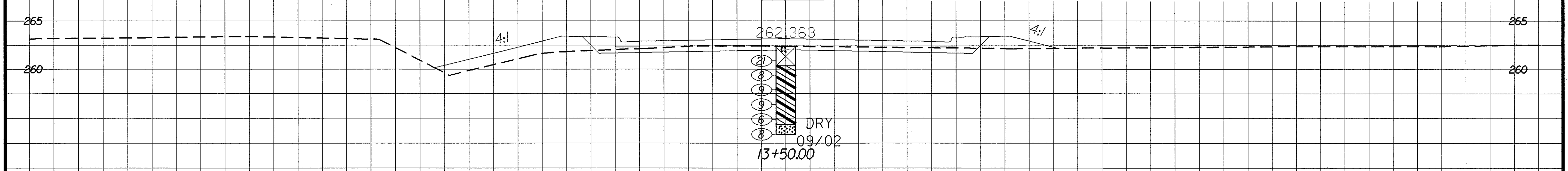


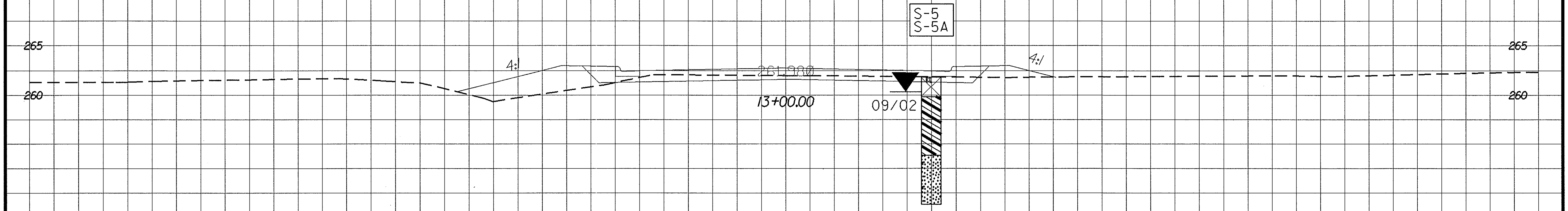
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

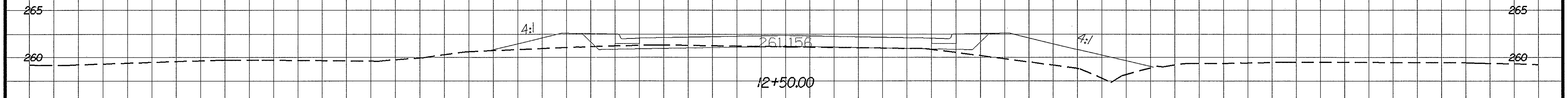
PROJ. REFERENCE NO.	SHEET NO.
U-4009	10

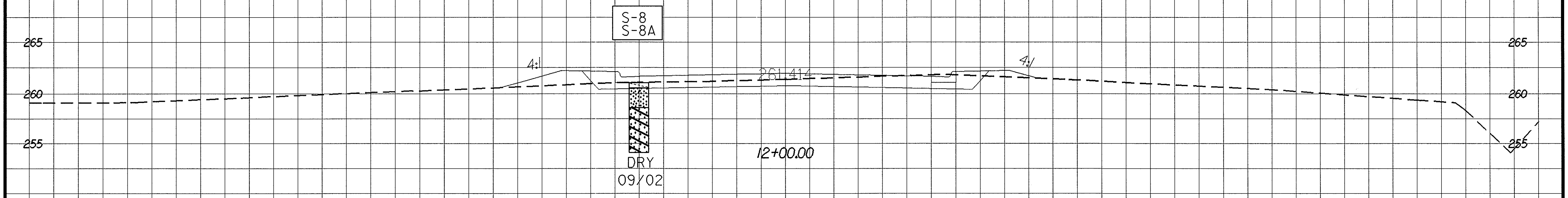
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-8	15' LT	12+00	0.50-2.50	A-2-4(0)	13	NP	27.5	44.9	19.6	8.0	99	86	35	-	-
S-8A	15' LT	12+00	2.50-7.00	A-2-6(1)	31	14	43.5	30.5	9.9	16.0	100	74	29	-	-
S-5	15' RT	13+00	2.00-6.00	A-6(4)	31	16	19.9	36.1	21.9	22.2	97	89	48	-	-
S-5A	15' RT	13+00	8.00-13.00	A-2-4(0)	23	NP	43.5	40.9	7.6	8.1	100	86	18	-	-
SS-10	CL	13+50	0.00-2.00	A-1-a(0)	33	4	54.6	22.7	16.8	6.0	50	28	14	-	-
SS-10A	CL	13+50	2.00-6.00	A-6(9)	39	23	14.8	35.5	21.6	28.1	100	94	55	17.5	-
SS-10B	CL	13+50	6.00-8.00	A-6(2)	25	11	21.3	36.3	22.4	20.1	98	89	46	-	-









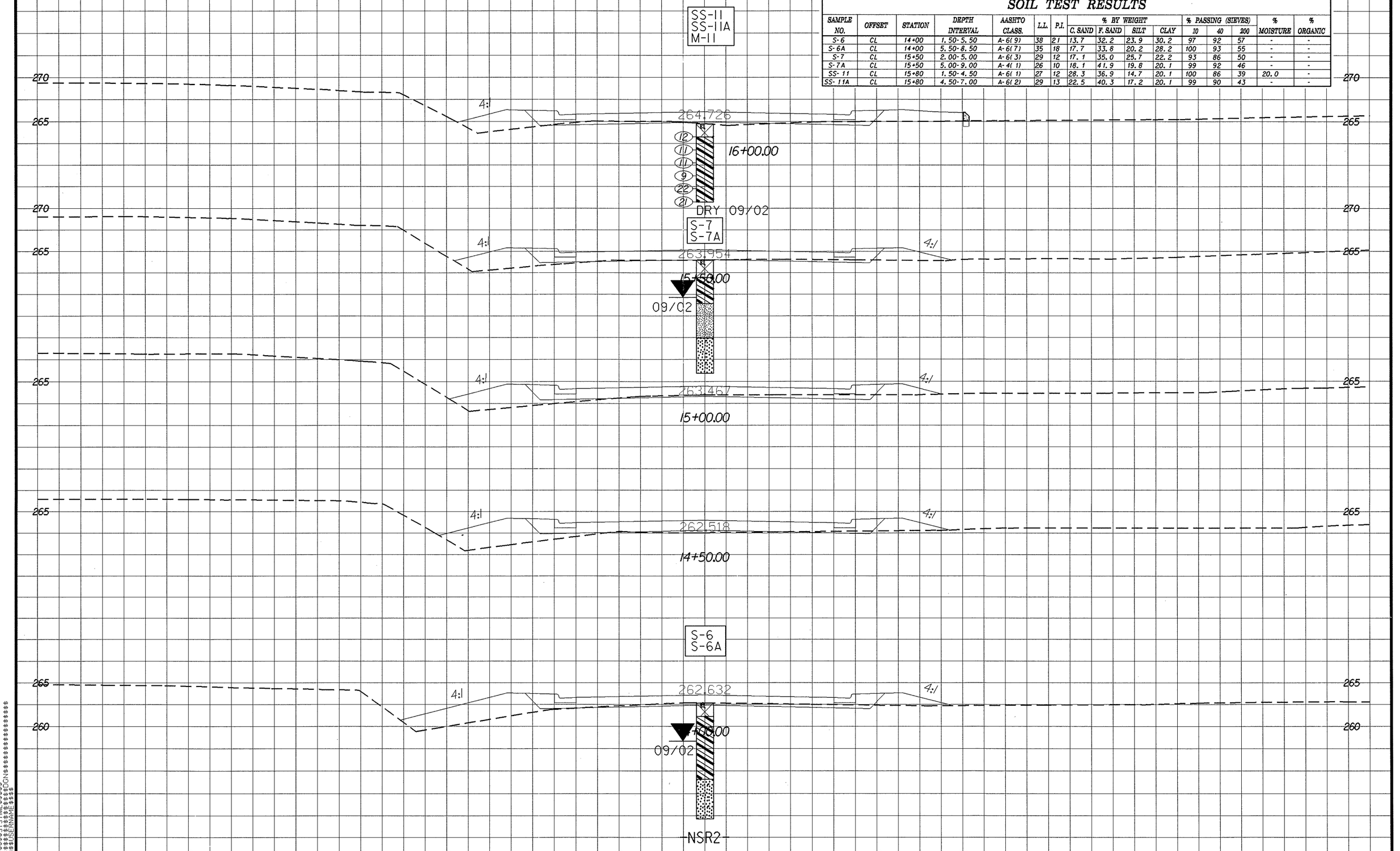
-NSR2-

Rev 3/6/01

0 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4009	11

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-6	CL	14+00	1.50-5.50	A-6(9)	38	21	13.7	32.2	23.9	30.2	97	92	57	-	-
S-6A	CL	14+00	5.50-8.50	A-6(7)	35	18	17.7	33.8	20.2	28.2	100	93	55	-	-
S-7	CL	15+50	2.00-5.00	A-6(3)	29	12	17.1	35.0	25.7	22.2	93	86	50	-	-
S-7A	CL	15+50	5.00-9.00	A-4(1)	26	10	18.1	41.9	19.8	20.1	99	92	46	-	-
SS-11	CL	15+80	1.50-4.50	A-6(1)	27	12	28.3	36.9	14.7	20.1	100	86	39	20.0	-
SS-11A	CL	15+80	4.50-7.00	A-6(2)	29	13	22.5	40.3	17.2	20.1	99	90	43	-	-



0 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4009	12