CONTEN	NTS	
<u>LINE</u> -I REV-	<u>STATION</u> 14+42 TO 28+82	<u>PLAN</u> 4-5
-LREV- CROSS S. LINE -LREV-		1.5
	OT ATLON	<u>SHEETS</u>
-LREV-	<u>STATION</u> 14+42 TO 28+82	6-19
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2		

SEE SHEET 3 FOR PLAN SHEET LAYOUT

## STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

# **ROADWAY** SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND

PROJECT DESCRIPTION BRIDGE NO. 250025 OVER BEAVER DAM CREEK ON NC 242

**INVENTORY** 

STATE PROJECT REFERENCE NO. STATE TOTAL SHEETS NO. 19 N.C **BR-0014** 1

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (99) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAIL

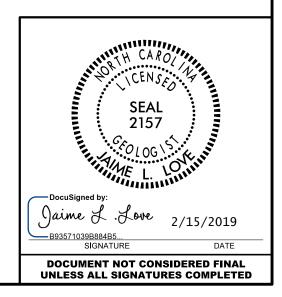
CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNIGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL 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 CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION STO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENSATIONS FOR ANY EXTENSION OF TIME FOR ANY RESON RESULTING FOR THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PERSONNEL

A. N. KINTNER
D. G. PINTER
R. E. CLARKE
NVESTIGATED BY I. LOVE
RAWN BY <u>A. N. KINTNER</u>
CHECKED BY N. T. ROBERSON
SUBMITTED BY N. T. ROBERSON
DATE DECEMBER 2018
···· <b>-</b>



# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

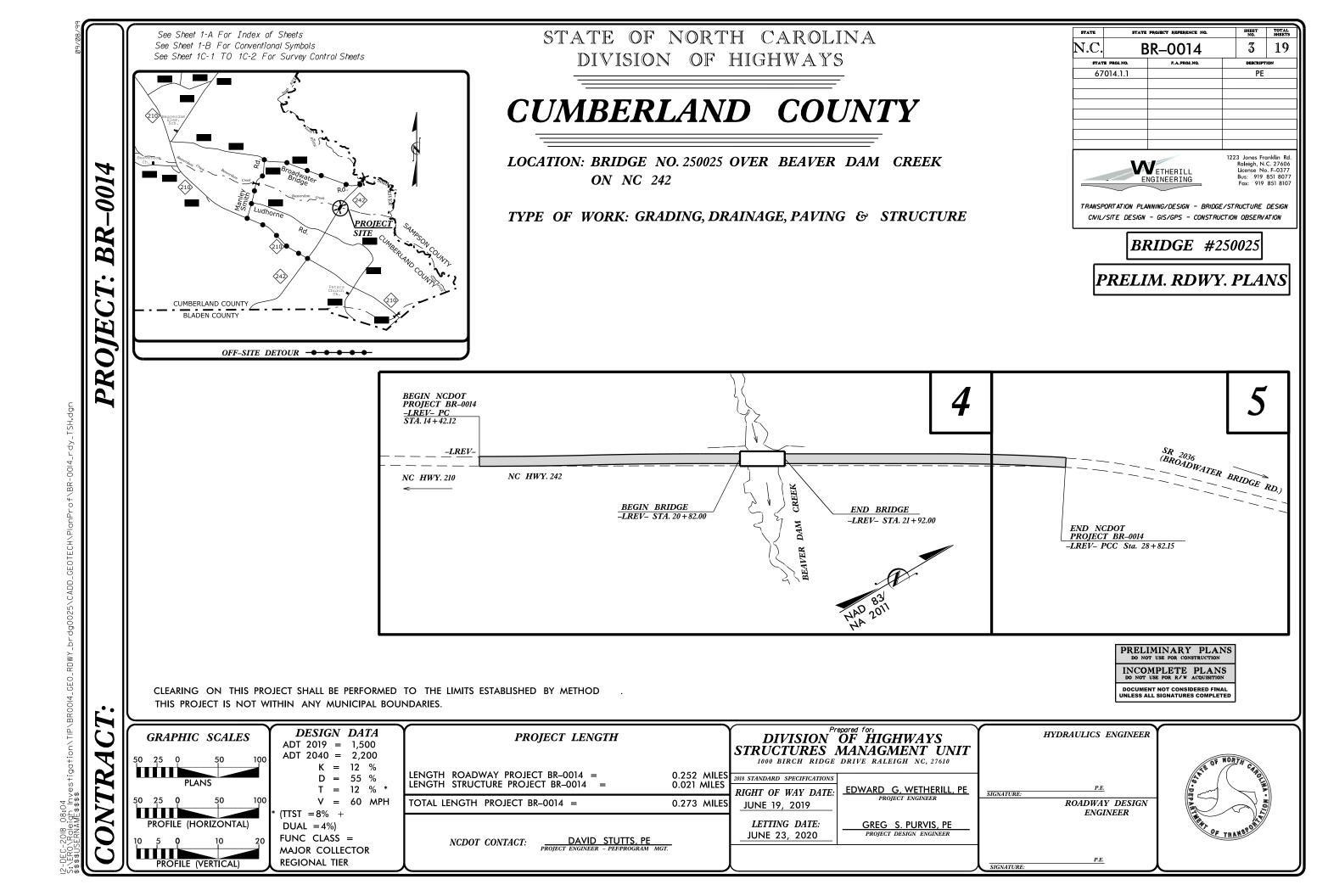
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOLL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTH DIBGB, SOLL CLASSIFICATION IS BASED ON THE AASHTD SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING. CONSISTENCY, COLOR, TEXTURE, MONISTURE, AASHTD CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTI ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0. BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SP1 ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
CENERAL         GRANULAR MATERIALS         SILT-CLAY MATERIALS         ORGANIC MATERIALS           CLASS.         (≤ 35% PASSING *200)         (> 35% PASSING *200)         (> 35% PASSING *200)         ()	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS OUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE
CROUP         A-1         A-3         A-2         A-4         A-5         A-6         A-7         A-1, A-2         A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-75, A-3 A-6, A-7		POCK (NCP)
SYMBOL SOCIETY STATES	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN
2 PASSING "10 50 MX GRANULAR SILT-	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS
*40 30 MX 50 MX 51 MN SOILS CLAY PEAT	GRANULAR SILT - CLAY	WEATHERING
• 2000         15         MX         25         MX         35         MX         35         MX         36         MN         40         MN         41         MN         40         MN         41         MN         40         MN         41         MN <th< td=""><td>ORGANIC MATERIAL         SOILS         OTHER MATERIAL           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE I - 10%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE 10 - 20%           MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%</td><td>FRESH         ROCK         FRESH, CRYSTALS         BRIGHT, FEW         JOINTS         MAY         SHOW         SLIGHT         STAINING,         ROCK           VERY         SLIGHT         ROCK         GENERALLY         FRESH, JOINTS         STAINED,         SOME         JOINTS         MAY         SHOW         THIN CLAY         C           VERY         SLIGHT         ROCK         GENERALLY         FRESH, JOINTS         STAINED, SOME         JOINTS         MAY         SHOW         THIN CLAY         C           (V         SLI.)         CRYSTALS         ON         BROKEN         SPECIMEN         FACE         SHIME         BRIGHTLY, ROCK         RINGS         UNDER         H</td></th<>	ORGANIC MATERIAL         SOILS         OTHER MATERIAL           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE I - 10%           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE 10 - 20%           MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%	FRESH         ROCK         FRESH, CRYSTALS         BRIGHT, FEW         JOINTS         MAY         SHOW         SLIGHT         STAINING,         ROCK           VERY         SLIGHT         ROCK         GENERALLY         FRESH, JOINTS         STAINED,         SOME         JOINTS         MAY         SHOW         THIN CLAY         C           VERY         SLIGHT         ROCK         GENERALLY         FRESH, JOINTS         STAINED, SOME         JOINTS         MAY         SHOW         THIN CLAY         C           (V         SLI.)         CRYSTALS         ON         BROKEN         SPECIMEN         FACE         SHIME         BRIGHTLY, ROCK         RINGS         UNDER         H
PI         6 MX         NP         18 MX         18 MX         11 MN         18 MX         18 MX         11 MN         11 MN         11 MN         11 MN         MODERATE         ORGANIC           GROUP INDEX         0         0         4 MX         8 MX         12 MX         16 MX         N0 MX         AMOUNTS OF         ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL, AND SAMD CRAVEL AND SAMD SOLIS SOLIS	✓     WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING       ✓     STATIC WATER LEVEL AFTER 24 HOURS	SLIGHT NOCK GENERALLI FRESH, SUINTS STAINED AND DISCULMATION EXTRUSIS INTO AL (SLI.) I INCH. DPEN JUINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONA CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEI MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECT
CEN BATING	$\nabla$ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOUD FAIR TO POUR POOR POUR ONSOLIABLE	Spring or seep	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SULL ITPE CONSISTENCY PENELHAILUN RESISTENCE LUMPRESSIVE STRENDTH (N-VALUE) (TONS/FT <sup>2</sup> ) CENERALLY VERY LOOSE < 4	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL ST ST S	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS & TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR         LOOSE         4         TO         10           GRANULAR         MEDIUM DENSE         10         TO         300         N/A		IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NDN-COHESIVE)         UENDE VERY DENSE         30 IU 30 > 50           VERY SOFT         < 2	THAN ROADWAY EMBANKMENT AUGER BORING CONCEPTENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAMMENTS OI (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTICES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N V</u>
GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2           (COHESIVE)         VERY STIFF         15 TO 30         2 TO 4	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE VITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS ALSO AN EXAMPLE.
HARD > 30 > 4	INSTREERTION	ROCK HARDNESS
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
GRAIN         MM         305         75         2.0         0.25         0.05         0.005	ABBRE VIATIONS           AR - AUGER REFUSAL         MED MEDIUM         VST - VANE SHEAR TEST	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DI HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE D BY MODERATE BLOWS.
SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	BT         BORING TERMINATED         MICA MICACEOUS         WEA WEATHERED           CL CLAY         MOD MODERATELY         Y - UNIT WEIGHT           CPT - CONE PENETRATION TEST         NP - NON PLASTIC         Y - DRY UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE O HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD POINT OF A GEOLOGIST'S PICK.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE         ORG ORGANIC           DMT - DILATOMETER TEST         PMT - PRESSUREMETER TEST         SAMPLE ABBREVIATIONS           DPT - DYNAMIC PENETRATION TEST         SAP- SAPROLITIC         S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINCER PRESSURE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID         PATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE           FOSS FOSSILIFEROUS         SL SLIGHTLY         RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH FINGERMAIL.
PLASTIC RANGE - WET - (W) SEMISOLID; REQUIRES DRVING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES         TCR - TRICONE         REFUSAL         RT - RECOMPACTED         TRIAXIAL           FRAGS FRAGMENTS         w - MOISTURE         CONTENT         CBR - CALIFORNIA         BEARING	FRACTURE SPACING BEDDING
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	EQUIPMENT USED ON SUBJECT PROJECT           DRILL UNITS:         ADVANCING TOOLS:           HAMMER TYPE:         CME-45C           CME-45C         CLAY BITS	VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED           WIDE         3 TO 10 FEET         THICKLY BEDDED         1           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.           CLOSE         0.16 TO 1 FOOT         VERY THILY BEDDED         0.0
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY		
PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         0-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	CME-550         HARD FACED FINGER BITS           TUNG,-CARBIDE INSERTS           VANE SHEAR TEST	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST     TRICONE     W/ ADVANCER     POST HOLE DIGGER       VIND PORTABLE HOIST     TRICONE     STEEL TEETH     X HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR	TRICONE TUNGCARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT         VANE SHEAR TEST           SAMPLER PROBE         X	EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

# PROJECT REFERENCE NO.



	TERMS AND DEFINITIONS
ED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
1 FOOT PER 60	ADUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	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
T N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
OCK THAT NCLUDES GRANITE,	SURFACE.
AL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
TC. MAY NOT YIELD	OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
STONE, CEMENTED	COME MELOVERY REL INTAL LENGTH OF ALL MATERIAL RELOVERED 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.
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
COATINGS IF OPEN, HAMMER BLOWS IF	HORIZONTAL. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
OCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
AL FELDSPAR R BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
IS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELT SPACED PARALLEL PLANES.
AY. ROCK HAS	PARENT MATERIAL.
H AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
LOSS OF STRENGTH	
WHEN STRUCK.	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
EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OF PROJECTION OF ROLK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	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
RE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
OF STRONG ROCK T ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
IS. SAPROLITE IS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
NS REQUIRES	ROCK.
BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUGED ROCKS.
DEEP CAN BE DETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
-	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
OR PICK POINT.	A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
D BLOWS OF THE	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
N FRAGMENTS NT. SMALL, THIN	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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
. PIECES 1 INCH HED READILY BY	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
NEU REMULT BI	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: N/A
THICKNESS	
4 FEET 1.5 - 4 FEET	ELEVATION: N/A FEET
.16 - 1.5 FEET	NOTES:
03 - 0.16 FEET 08 - 0.03 FEET	ELEVATIONS TAKEN FROM br0014_Is_tin.tin FILE DATED 07/10/2018.
< 0.008 FEET	
EAT, PRESSURE, ETC.	
TEEL PROBE:	
PROBE:	
E;	DATE: 8-15-14
	DATE: 8-13-14





### STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

ROY COOPER GOVERNOR

December 12, 2018

STATE PROJECT: 67014.1.1 (BR-0014) FEDERAL PROJECT: COUNTY: **CUMBERLAND DESCRIPTION:** Replace Bridge Number 250025 over Beaver Dam Creek on NC-242 SUBJECT: Geotechnical Report – Inventory

The Geotechnical Engineering Unit has completed a subsurface investigation for this project and presents the following inventory.

### **Project Description**

This project consists of replacing Bridge Number 250025 on NC-242 over Beaver Dam Creek and grading, drainage, and paving of NC-242. The bridge inventory will be reported separately at a later date.

A geotechnical investigation was conducted during October and November of 2018. Twelve hand auger borings and five sampler probe borings were performed by the Geotechnical Engineering Unit. 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 alignment, totaling 0.27 miles, was investigated. Subsurface plans and cross sections of this alignment are included in this report.

Line	<b>Stations</b>
-LREV-	$14 + \overline{42} \text{ to } 28 + 82$

### **Physiography and Geology**

The project is located within the township of Beaver Dam, and within the Coastal Plain province of North Carolina. Alluvial deposits of sands, clays, and muck overlay clays and sands of the Undivided Coastal Plain. The terrain is relatively flat with some low-lying wetland areas. The new widening project area is a mixture of woods and wetlands, crossing over Beaver Dam Creek.

Mailing Address: NC DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT 1589 MAIL SERVICE CENTER RALEIGH NC 27699-1589

Telephone: 919-707-6850 Fax: 919-250-4237 Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location CENTURY CENTER COMPLEX ENTRANCE B-2 1020 BIRCH RIDGE DRIVE RALEIGH NC

JAMES H. TROGDON, III

SECRETARY

### **Soils Properties**

Soils encountered during this investigation are Roadway Embankment, Alluvial, and Undivided Coastal Plain.

Roadway Embankment soils are present throughout the entire project. These soils primarily consist of gray, tan, brown, and orange, loose to medium dense, moist to saturated, silty and clavey sand (A-2-4, A-2-6) and coarse sand (A-1-b) with trace root fragments and organics.

Undivided Coastal Plain soils are also present throughout the entire project. These soils are characterized by orange, tan, and gray, very loose to medium dense, moist to saturated, silty and clayey sand (A-2-4, A-2-6) and coarse sand (A-3) with trace root fragments and mica, and brown and gray with tan and red mottling, stiff, moist, silty clay (A-7-6). Plastic indices for these soils range from 27 to 55.

Alluvial Soils are present along alignment -LREV- from sta. 15+75 to sta. 25+25, left and right of the alignment. These soils consist of dark gray, brown, and tan, very loose to loose, moist to saturated, silty and clayey sand (A-2-4, A-2-6) and coarse sand (A-1-b, A-3) with trace to moderate organics, and dark gray, very soft to soft, moist to saturated, muck and silty clay (A-7-6) with trace to moderate organics. Plastic indices for these soils range from 10 to 19.

#### Groundwater

Groundwater measurements were taken in October and November 2018 during average rainfall conditions. Groundwater was present in all borings and ranged from 0.6 to 4.1 feet from the ground surface.

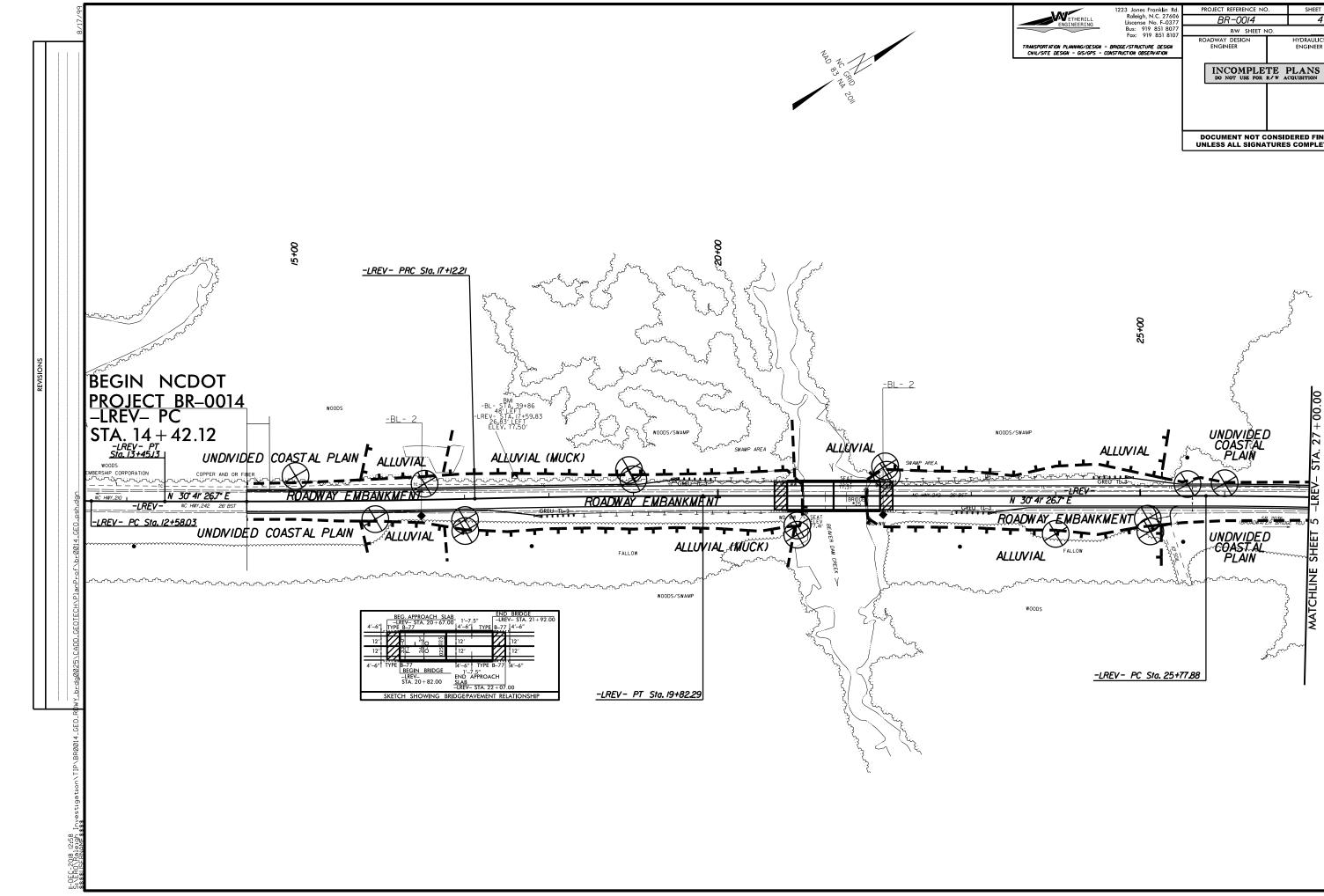
#### **Areas of Special Geotechnical Interest**

- 1) High Groundwater: All borings exhibited groundwater within 6.0 feet of proposed grade.
- 2) Highly Organic Soils: Highly organics soils (muck) were encounter on the project at the following locations:

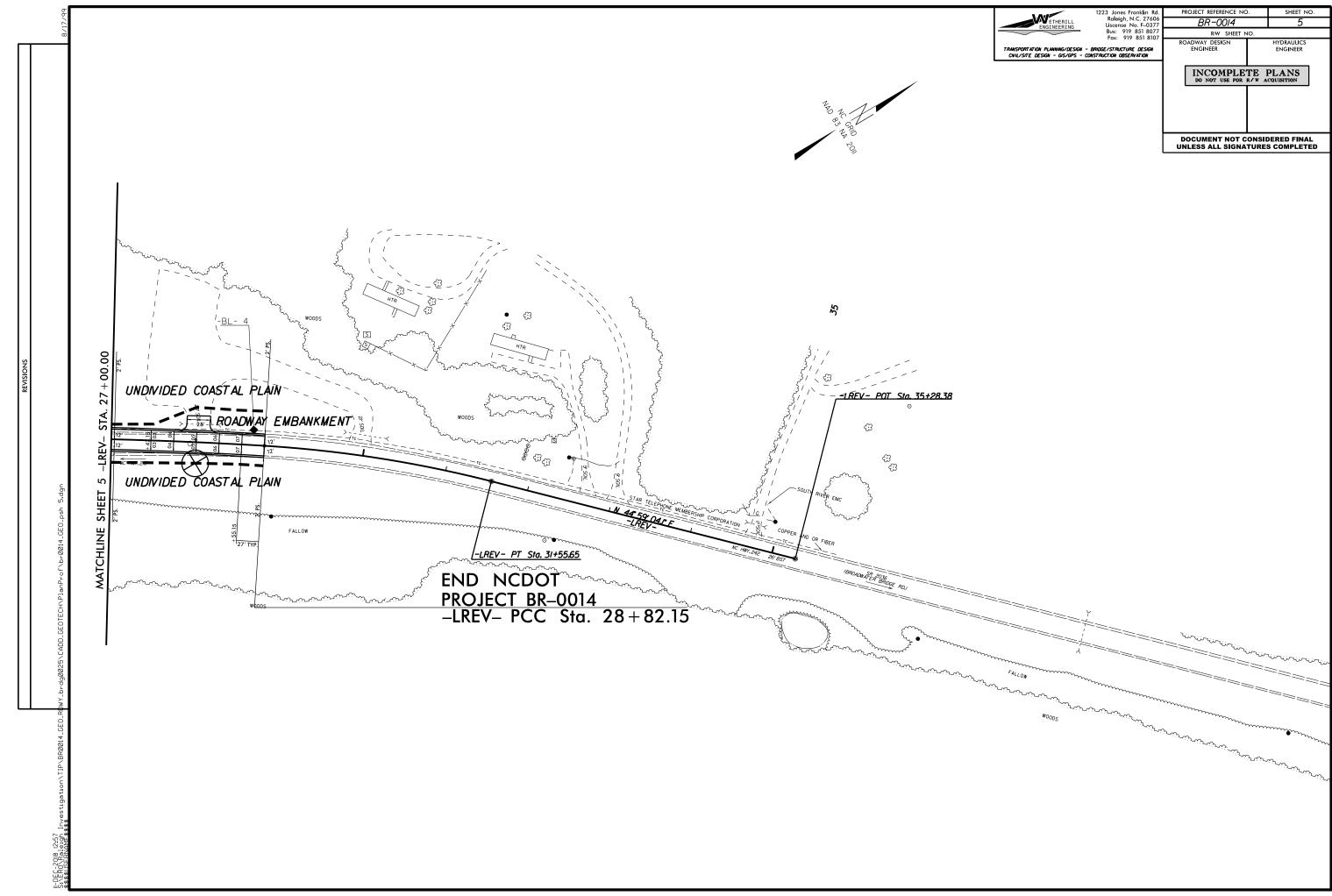
Line	<b>Stations</b>	<u>Offsets</u>
-LREV-	17+00	25'RT
-LREV-	19+00	20'LT

3) <u>Highly Plastic Soils</u>: Highly plastic soils (PI > 25) were encountered on the project at the following locations:

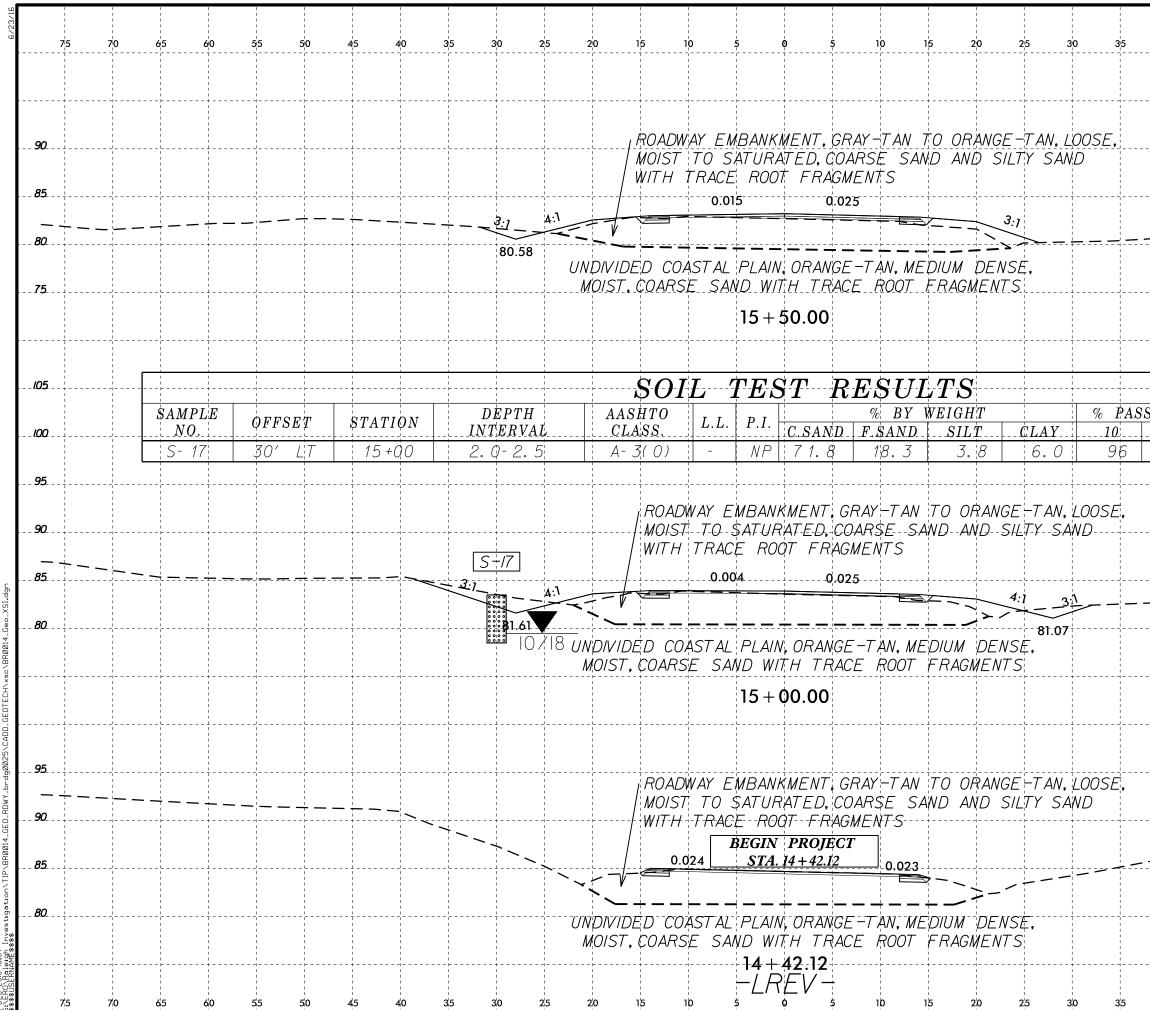
Line	<b>Stations</b>	Offsets
-LREV-	25+09	27' RT
-LREV-	25+56	14' LT
-LREV-	26+00	15' LT



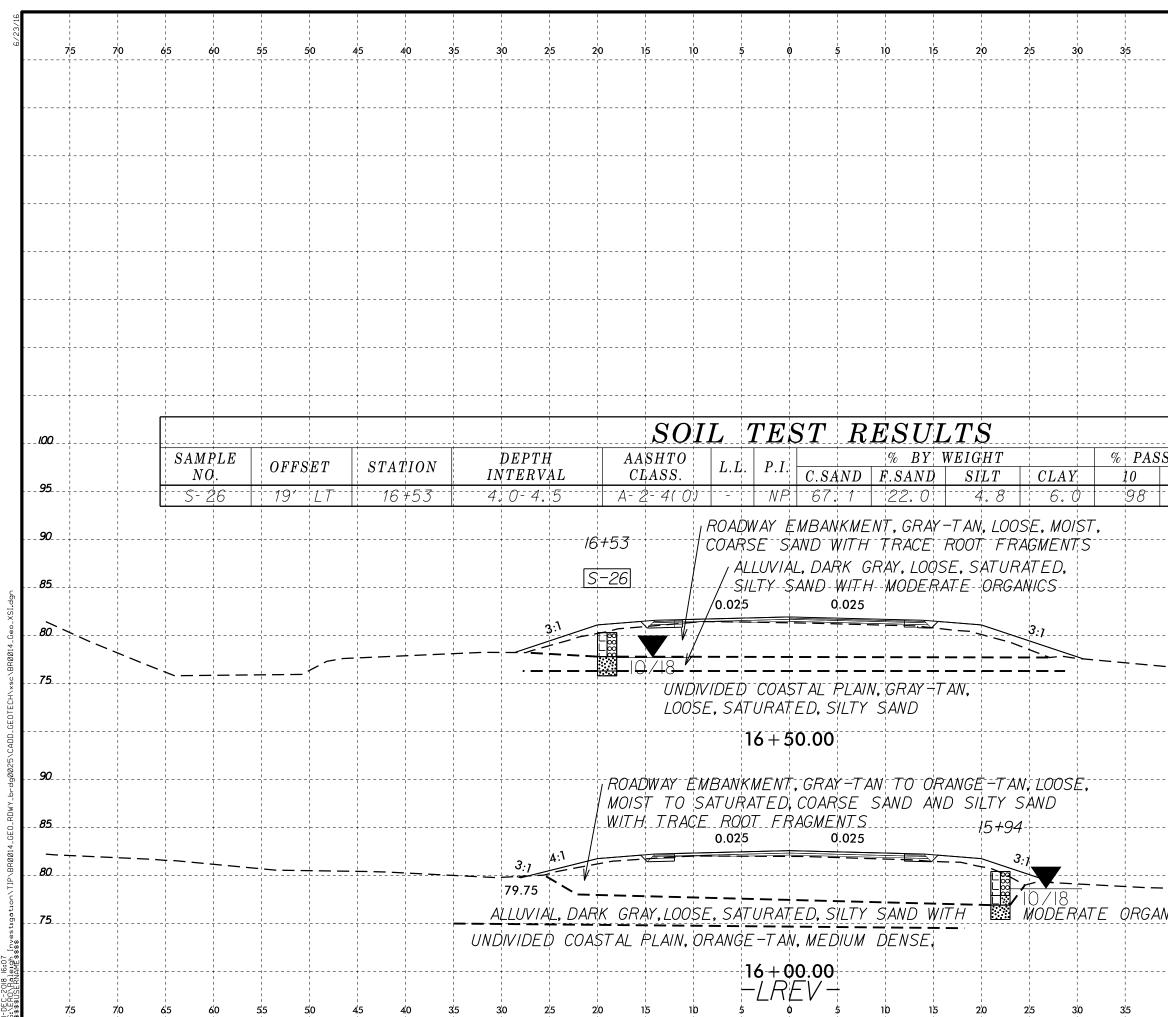
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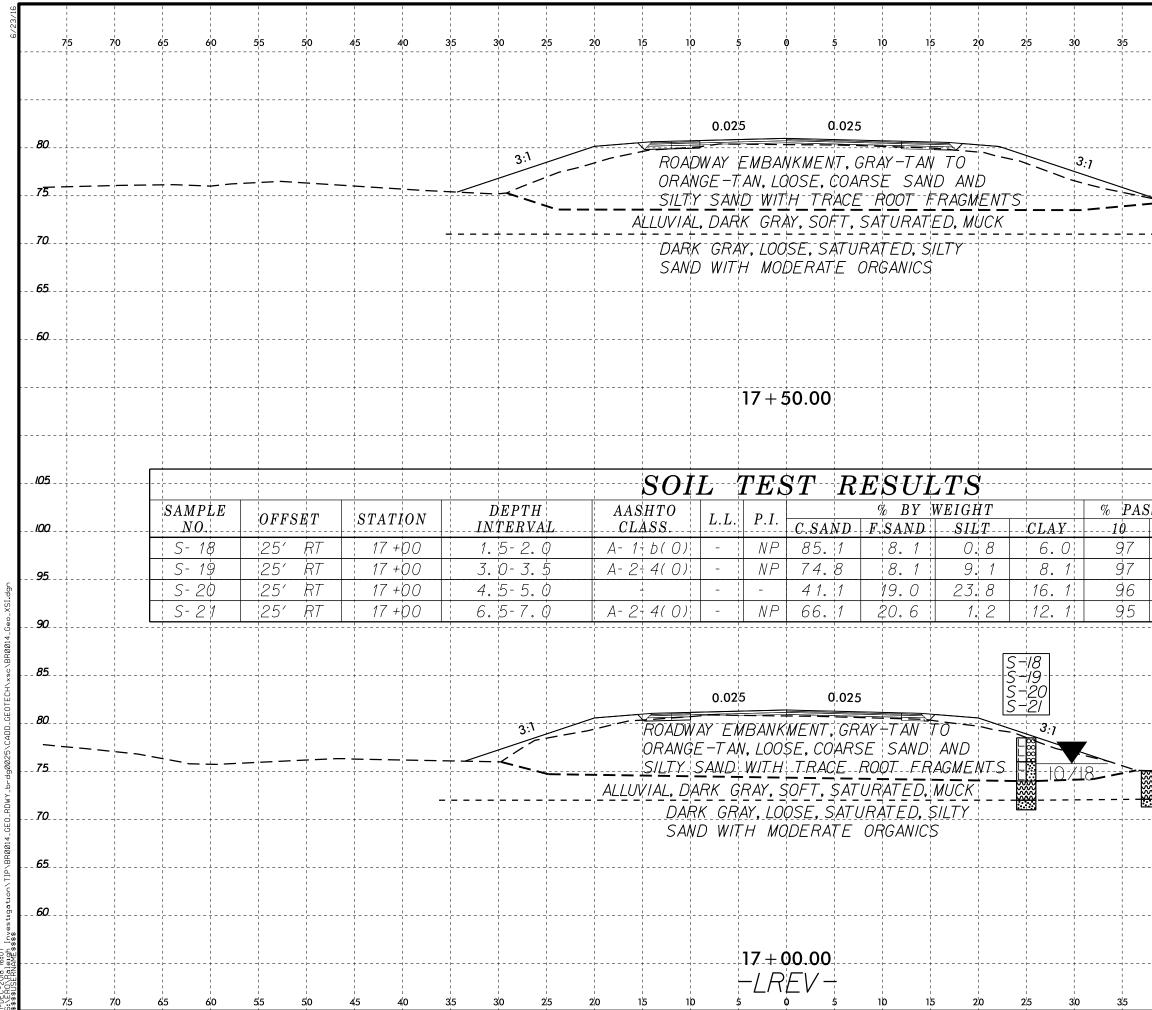
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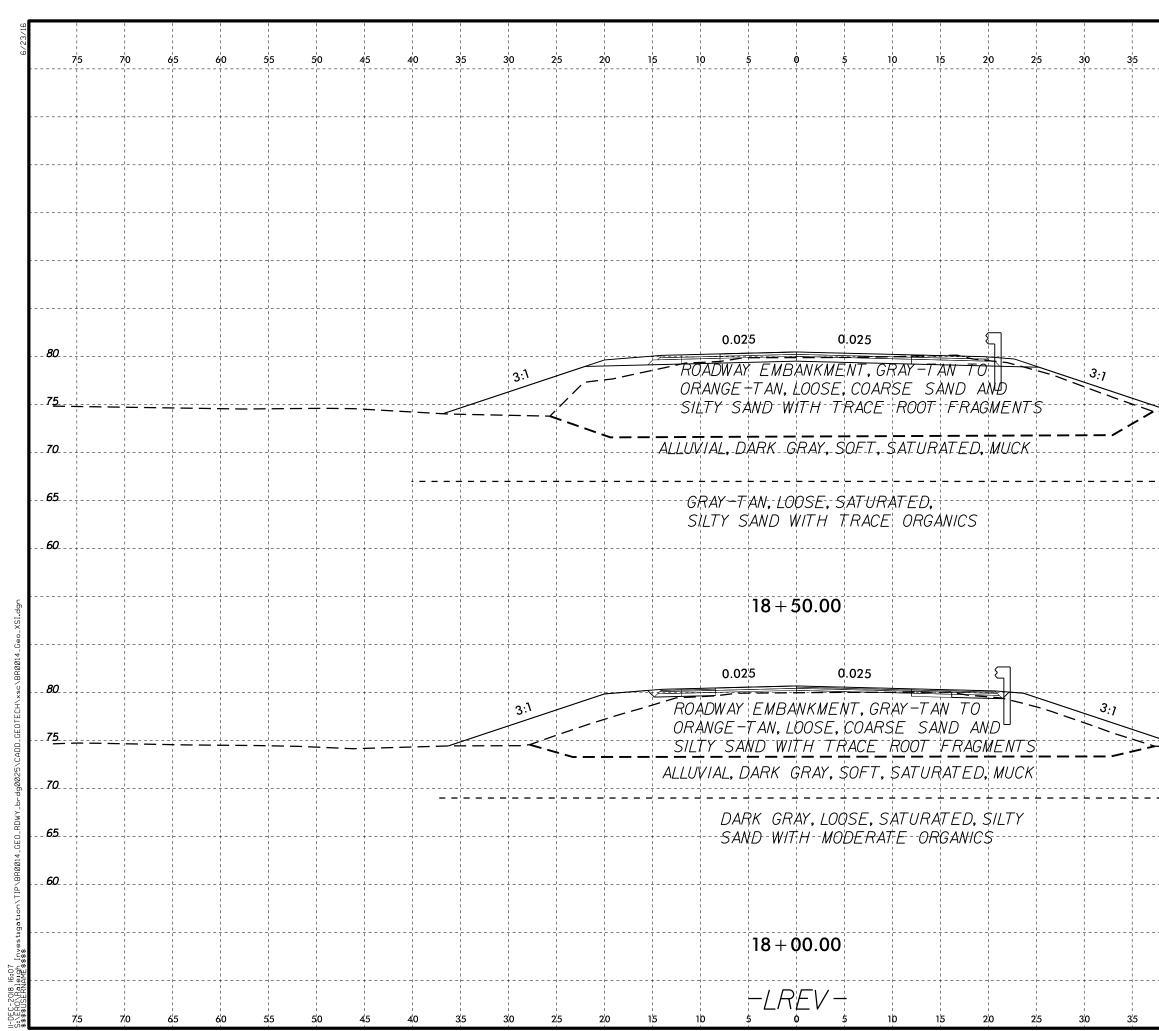
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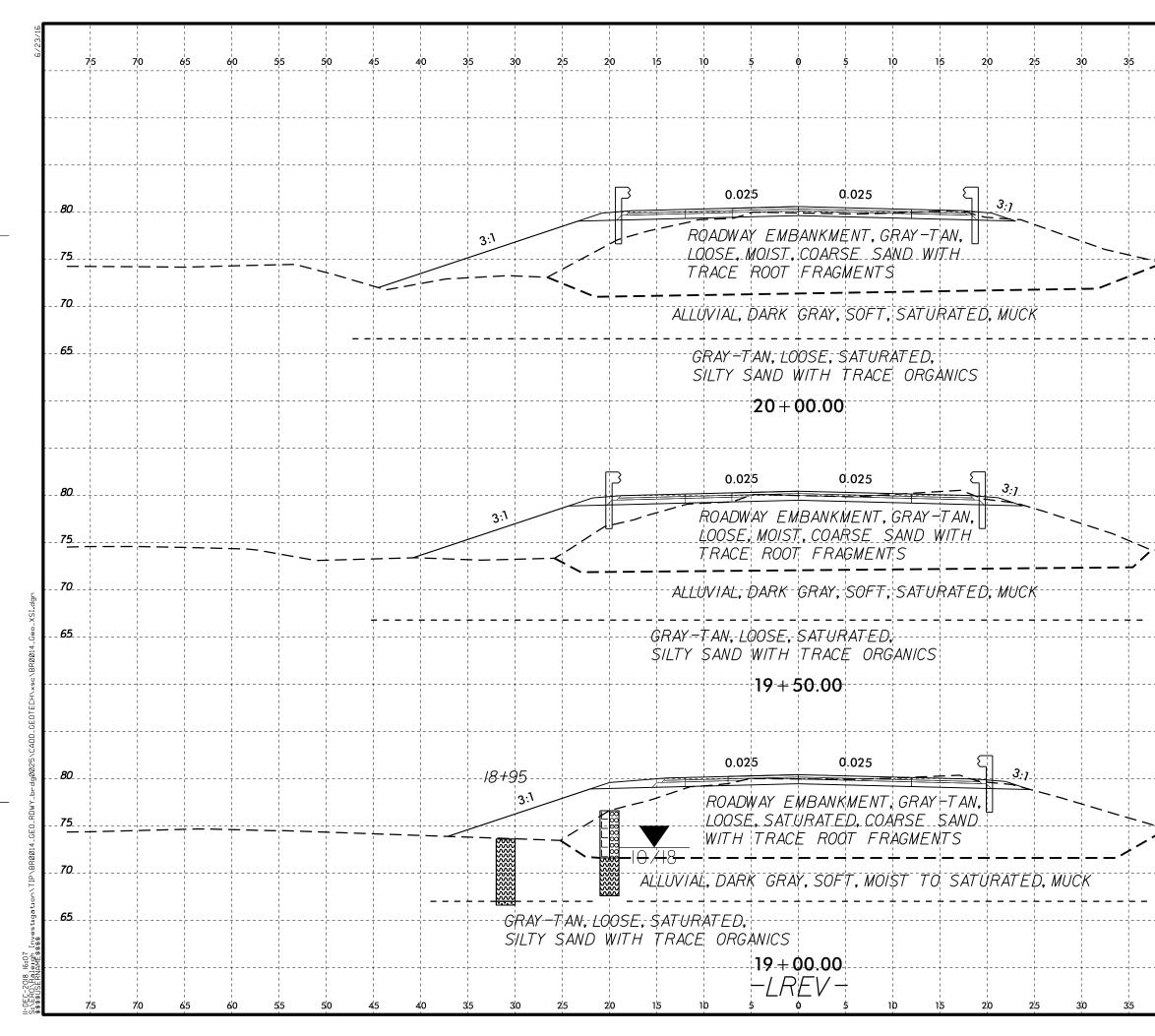
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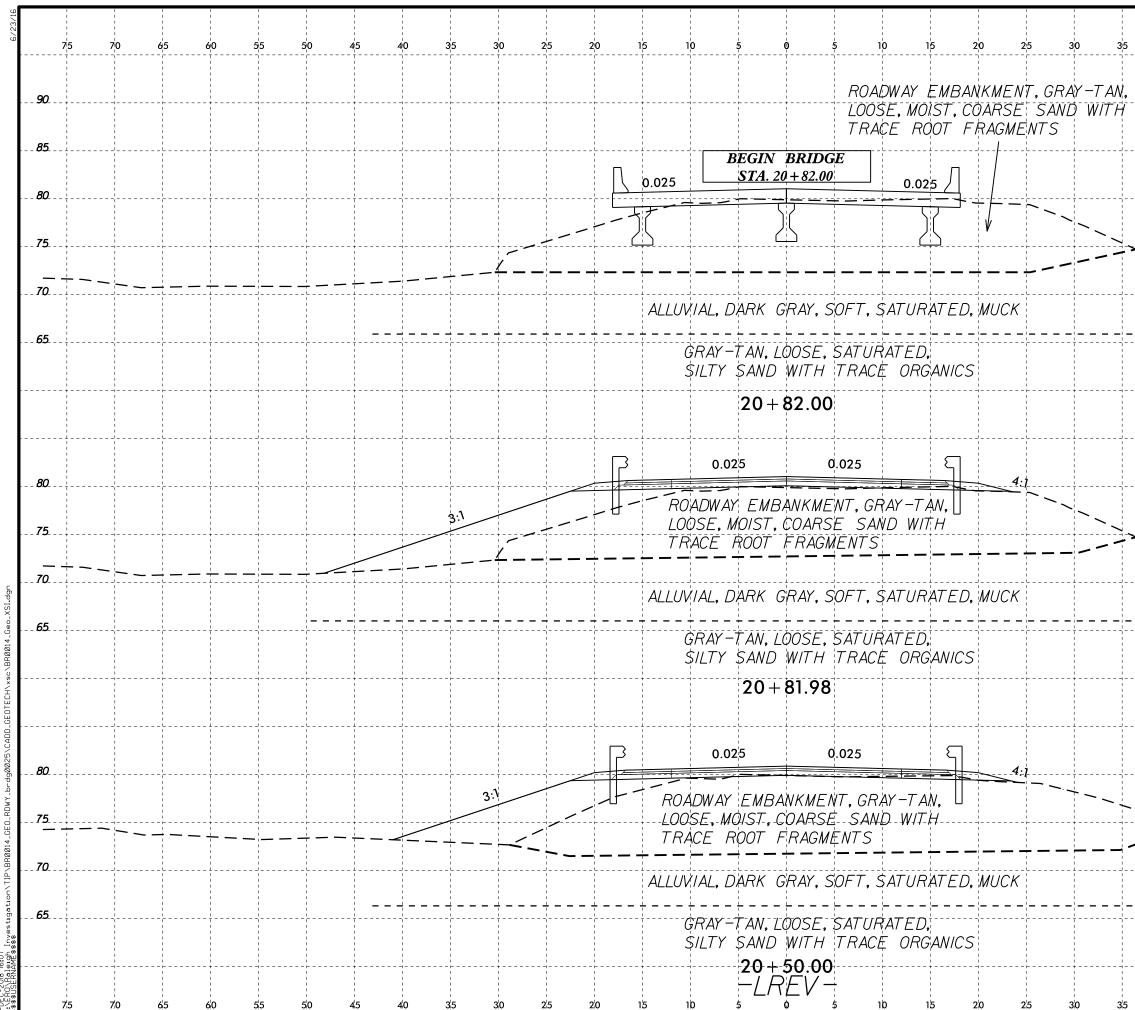
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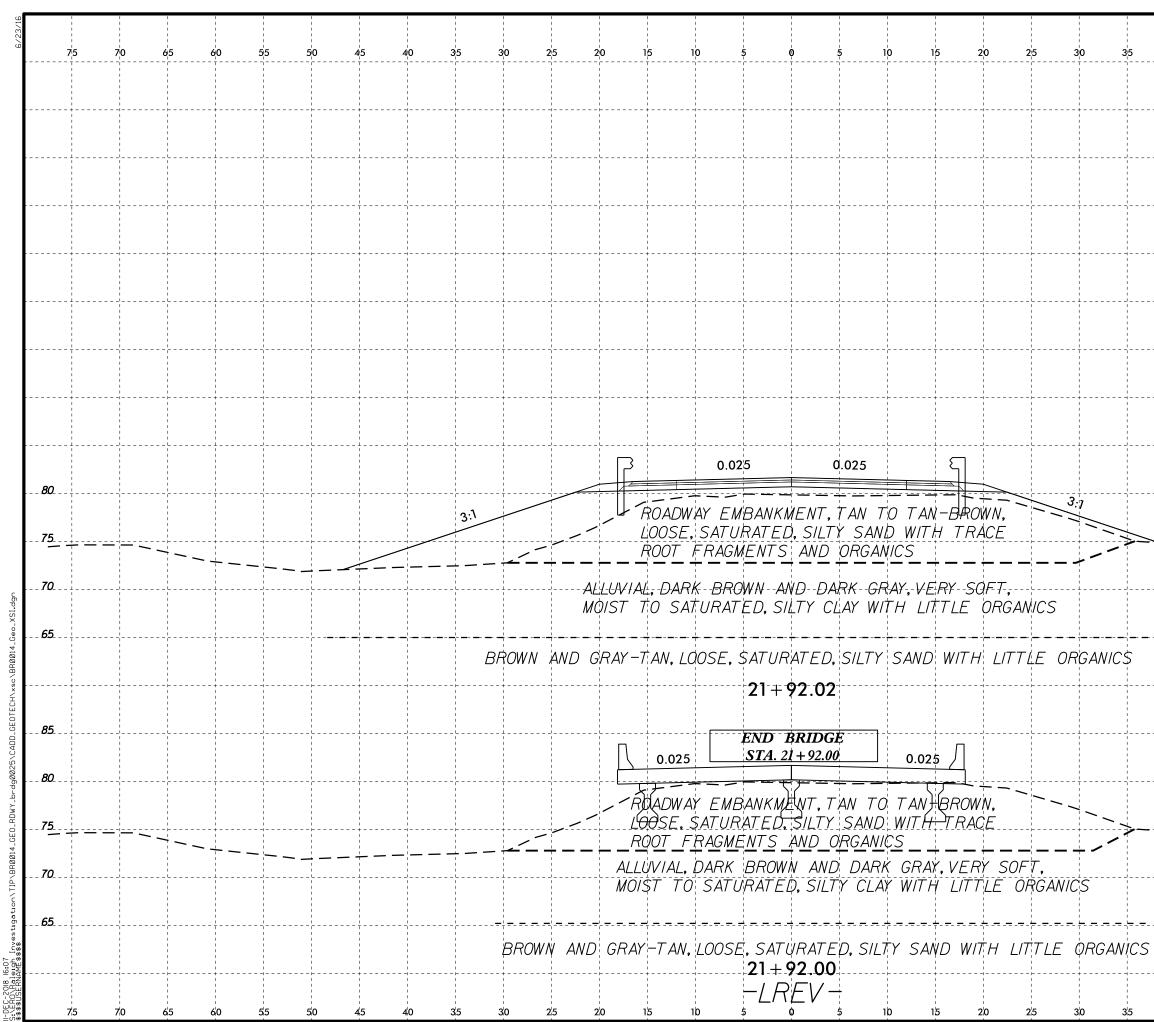


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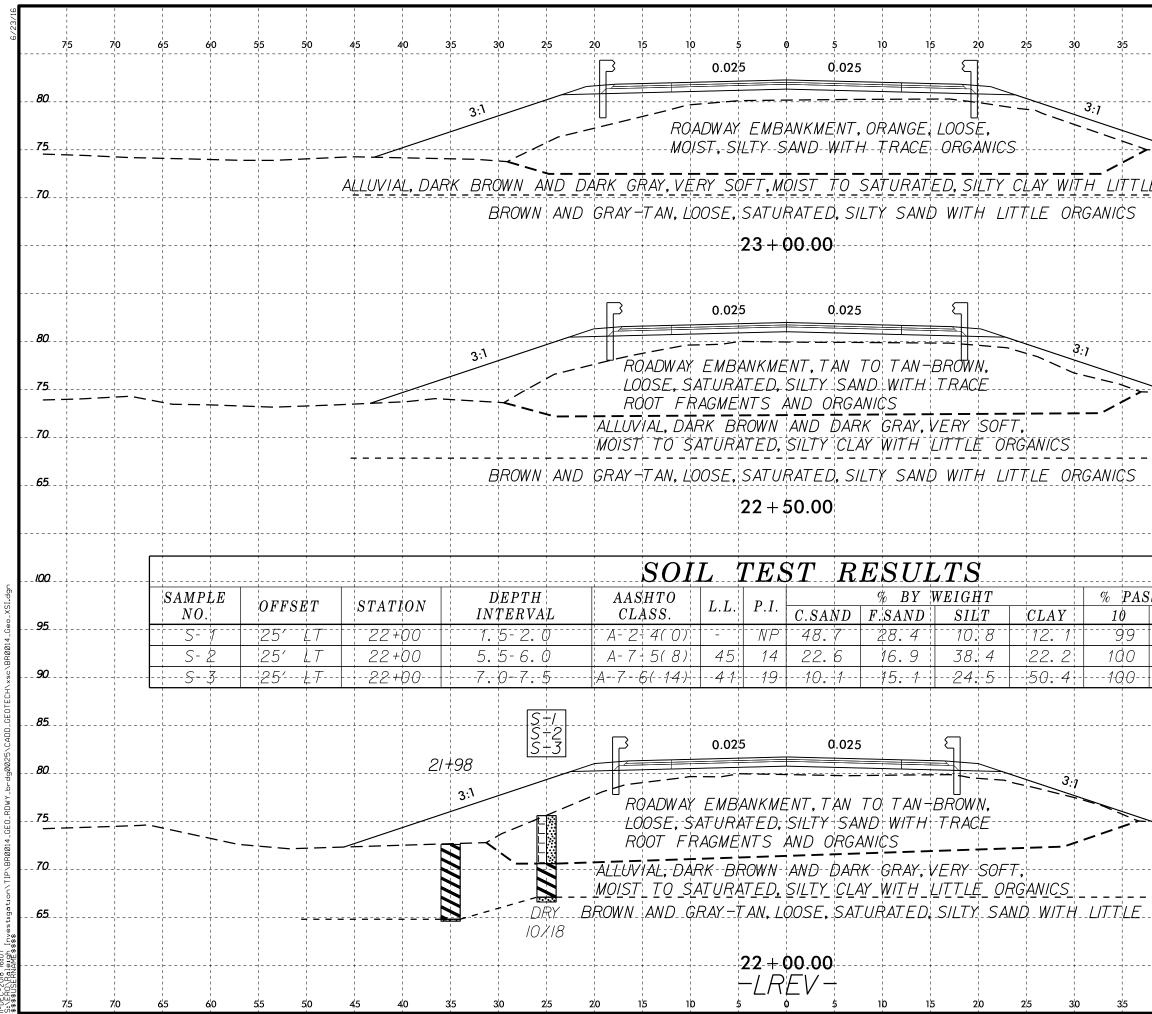
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<b>75</b>	S-4 45' RT 24+00 0.5-1.0 A-4(0) 25 10 49.5 14.7 15.6 20.1 100
90	S-5       45'       RT       24+00       2.0-2.5       A-2-4(0)       25       4       47.5       27.4       11.0       14.1       99         S-6       45'       RT       24+00       3.0-3.5       A-1+b(0)        NP<73.3
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<b>50</b>	3:1ROADWAY EMBANKMENT, ORANGE, LOOSE,
	MOIST, SILTY SAND WITH TRACE ORGANICS
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	3.1 ROADWAY EMBANKMENT, ORANGE, LOOSE, MOIST SUTX SAND WITH TRACE OPCANICS
75	MOIST, SILTY SAND WITH TRACE ORGANICS
       	ALLUVIAL, DARK BROWN, GRAY, AND TAN, VERY LOOSE TO LOOSE, SATURATED, SILTY SAND AND COARSE
	23+50.00
75	

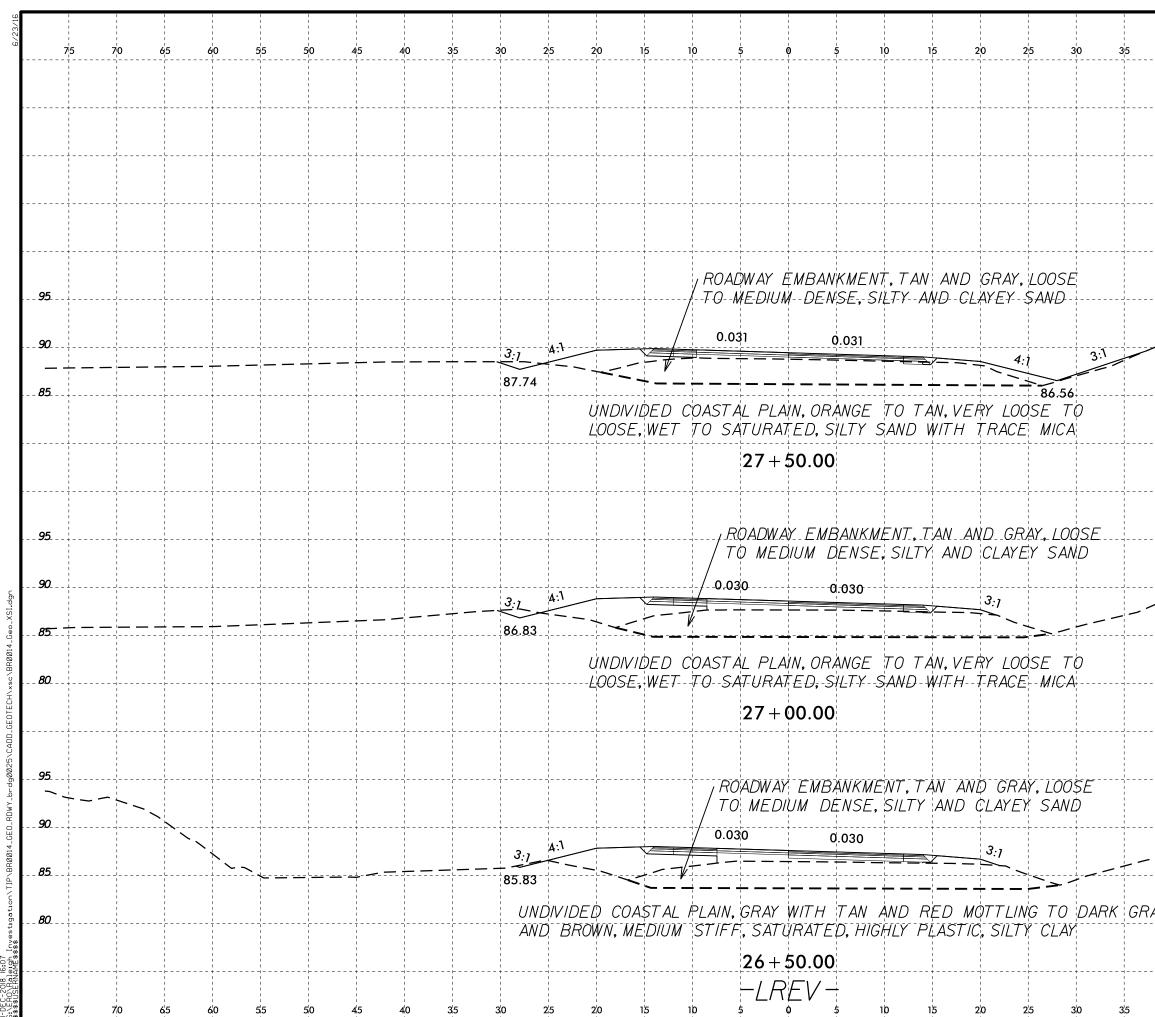
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	S-9	15' LT	26+00	2. 2-2.5	A-7-5(57)		51	3.4	3.2	14.8	78.5	100
	S- 10	15' LT	26 +00	4.5-5.0	A-7-5(36)	73	33	9.3	3.4	30.9	56.4	100
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	S- 15	14' <u>L</u> T	25+56	2.0-2.5	A-7-6(8)		27	45.8	7.5	14.5	32.3	
	S- 15 S- 16	14' <u>L</u> T 14' LT	25+56 25+56	2.0-2.5	A-7+6(8)		27 55	45.8 15.9	7.5	14.5 18.1	32.3 62.5	100
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