

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3917	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33351.1.1	BRZ-1379(1)	PE	
33351.2.1	BRZ-1379(1)	RW, UTIL	
33351.3.1	BRZ-1379(3)	CONST.	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	11+50 TO 12+50	4	6	7,8
-L-	12+50 TO 18+00	4	6	7,8
-L-	18+00 TO 22+00	4,5	6	9-13
-L-	22+00 TO 25+25	5	6	7,8

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33351.1.1 (B-3917) F.A. PROJ. BRZ-1379(1)
COUNTY WAKE
PROJECT DESCRIPTION BRIDGE NO. 311 OVER LAKE WHEELER
(SWIFT CREEK) ON SR 1379 (PENNY ROAD)

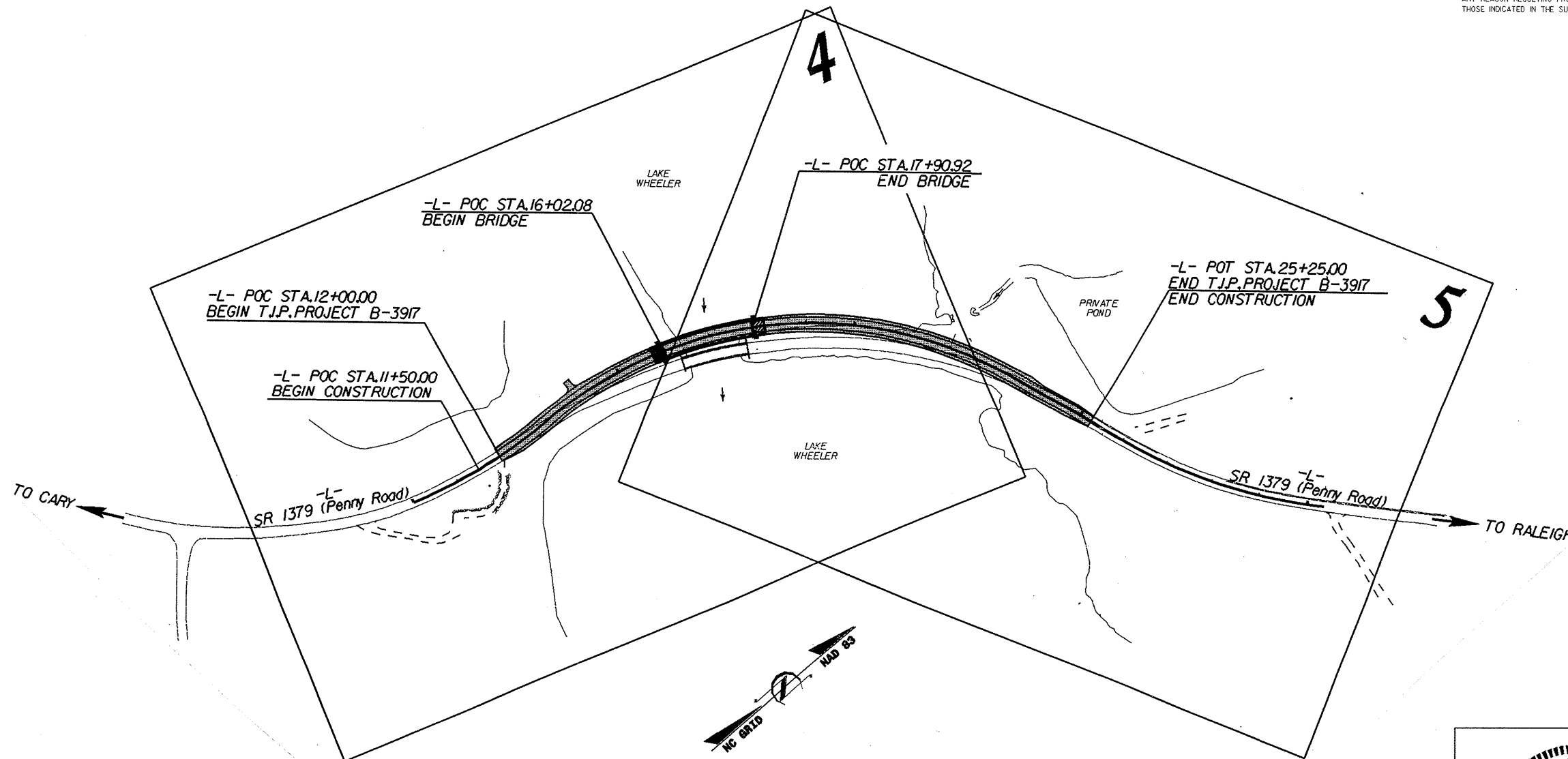
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-1088, NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

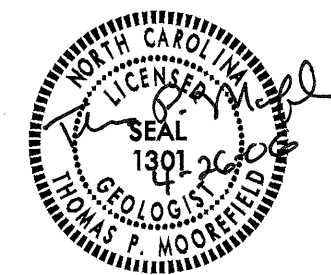
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

INVENTORY



NC DOT PERSONNEL N.D. MOHS
M.L. REEDER
C.D. CZAJKA
T.P. MOOREFIELD
S&ME PERSONNEL S. JOHNSON
A. BROWNING
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INVESTIGATED BY T.P. MOOREFIELD
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE APRIL 2006



DRAWN BY: T.T. WALKER, N.D. MOHS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.

CONTRACT: C201619 ID: B-3917

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33351.JJ	SHEET NO. 2
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SUBSURFACE INVESTIGATION

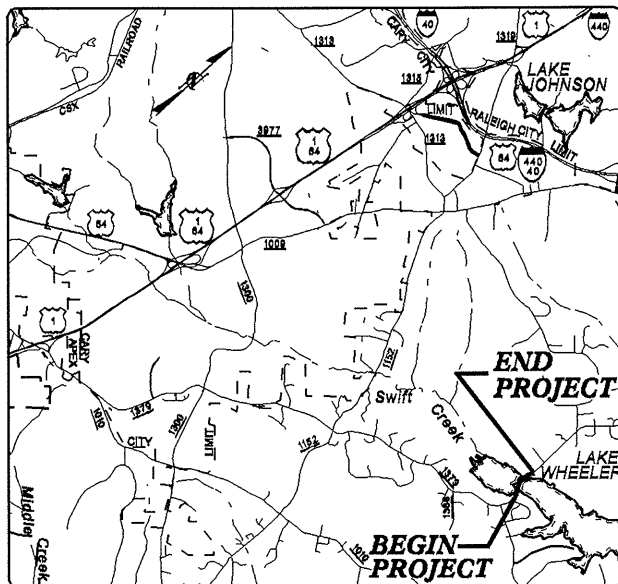
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6</i>	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. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD 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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	WEATHERING	
GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> 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.	
COMPRESSION	PERCENTAGE OF MATERIAL	GROUND WATER	
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE	ORGANIC MATERIAL TRACE OF ORGANIC MATTER LITTLE ORGANIC MATTER MODERATELY ORGANIC HIGHLY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	
LIQUID LIMIT PLASTIC INDEX	GRANULAR SOILS SILT-CLAY SOILS MUCK, PEAT		
GROUP INDEX	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS		
USUAL TYPES OF MAJOR MATERIALS			
GEN. RATING AS A SUBGRADE			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 + PI OF A-7-6 SUBGROUP IS > LL - 30			
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	ROCK HARDNESS	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	
GENERAL GRANULAR MATERIAL (NON-COHESIVE) GENERAL SILT-CLAY MATERIAL (COHESIVE)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	
U.S. STD. SIEVE SIZE OPENING (MM)	ABBREVIATIONS	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CS, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS	DRILL UNITS: <input checked="" type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45C <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST	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
GRAIN SIZE MM IN.	HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 3 1/4" HOLLOW AUGERS <input checked="" type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG.-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 7/8" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG.-CARB. <input type="checkbox"/> CORE BIT	TERMINATION 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.
TEXTURE OR GRAIN SIZE	MOISTURE CONTENT	HAND TOOLS	BEDDING
SOIL MOISTURE - CORRELATION OF TERMS	w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W _u - UNIT WEIGHT W _d - DRY UNIT WEIGHT	<input checked="" type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/> MANUAL <input type="checkbox"/> -B <input checked="" type="checkbox"/> -N0-2 <input type="checkbox"/> -H <input type="checkbox"/> POST HOLE DIGGER <input checked="" type="checkbox"/> HAND AUGER <input checked="" type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	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
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		
PLASTICITY			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY	PLASTICITY INDEX (PI) DRY STRENGTH 0-5 VERY LOW 6-15 SLIGHT 16-25 MEDIUM 26 OR MORE HIGH		
COLOR			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			

TIP PROJECT: B-3917

PROJECT: 33351.1.1

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



VICINITY MAP OF B-3917

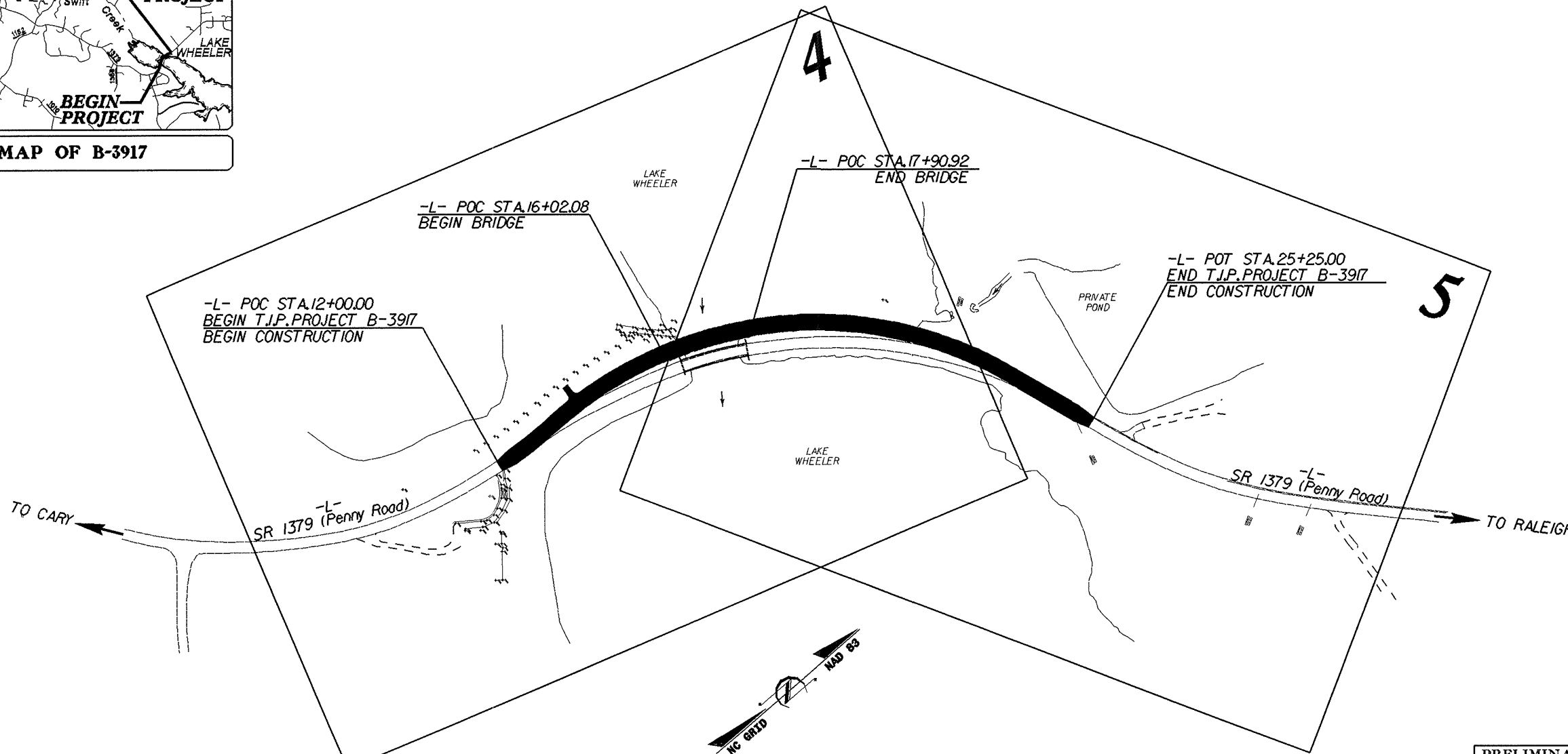
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

LOCATION: BRIDGE NO. 311 OVER LAKE WHEELER (SWIFT CREEK)
ON SR 1379 (PENNY ROAD)

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

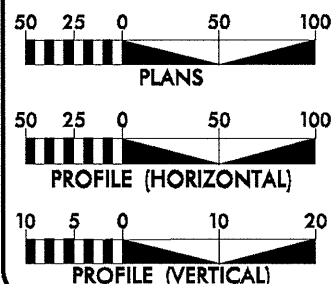
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3917	2A	
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
33351.1.1	BRZ-1379(1)	PE	
33351.2.1	BRZ-1379(1)	RW,UTIL	



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2005 = 6,149
ADT 2024 = 13,800
DHV = 10%
D = 60%
T = 5%
TTST 2% DUAL 3%
V = 50 mph
FUNC CLASS = LOCAL
* DESIGN EXCEPTIONS FOR STOPPING SIGHT DISTANCE AND VERTICAL CURVE LENGTH ARE REQUIRED

PROJECT LENGTH

LENGTH ROADWAY T.I.P. PROJECT B-3917 = 0.215 MILES
LENGTH STRUCTURES T.I.P. PROJECT B-3917 = 0.036 MILES
TOTAL LENGTH OF T.I.P. PROJECT B-3917 = 0.251 MILES



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2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 30, 2005

LETTING DATE:
DECEMBER 19, 2006

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EARTH TECH PROJECT MANAGER

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DAVIDIAN BYRD
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STATE OF NORTH CAROLINA



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DEPARTMENT OF TRANSPORTATION

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Lyndo Tippet
SECRETARY

April 26, 2006

STATE PROJECT: 33351.1.1 (B-3917)
F.A. PROJECT: BRZ-1379(1)
COUNTY: Wake
DESCRIPTION: Bridge No. 311 on -L- (SR 1379, Penny Rd.) over Lake Wheeler (Swift Creek) at Station 16+96.5
SUBJECT: Geotechnical Report – Inventory

Project Description

A four-span bridge, 189-feet in length, is proposed on -L- (SR 1379, Penny Rd.) over the west end of Lake Wheeler. The proposed bridge, which will replace the existing structure, will be located approximately 40 feet left of the existing bridge. The existing causeway north of the structure will be widened to accommodate the new bridge approach. The proposed two-lane bridge and roadway will be slightly wider than the existing structure. The existing bridge will remain in service while the new bridge is being constructed.

The subsurface investigation for the roadway was conducted during the period November 2005 through February 2006. Several borings from the structure investigation have been incorporated in this roadway inventory. An additional boring, at -L- Sta. 17+63/ 35'RT, from a preliminary investigation in November 2004, is also included in this report. A CME-45C drill machine mounted on a barge was used to drill the in-water borings. An ATV-mounted Mobile B-52 drill machine was used to drill the boring at -L- Sta. 16+05/ 2'LT. Standard Penetration Tests were performed at each drilled boring location. Four borings were completed using a hand auger. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis. An insitu soil sample, ST-2 from -L- Sta. 18+50/20'LT, was submitted to the Materials and Tests Unit for consolidation testing.

The -L- alignment, approximately 1325 feet in length, was investigated. A subsurface soil profile and relevant cross-sections are included in this report.

Soil Properties

Roadway Embankment Soils: Roadway embankment soil occurs in each approach to the existing bridge. The embankment was sampled at the northern end bent of the bridge. The embankment soil is generally ten to fifteen feet in thickness. The embankment soil consists of soft, wet, silty clay (A-6).

Alluvial Soils: Alluvial soil was present in all the in-water borings. The majority of the alluvial soil was deposited in the Swift Creek floodplain prior to the construction of the Lake Wheeler dam. In the vicinity of the current channel (Sta. 16+50 to 17+50), the alluvial soil consists of two to three feet of alluvial sand and sandy clay overlying either residual soil, or weathered rock. From Sta. 17+50 ahead, the alluvial soil thickens to as much as 15 to 18 feet before thinning at Sta. 20+10. This lower zone of alluvial soil consists of medium stiff to very stiff, sandy silt (A-4 and A-5) from Sta. 17+85 to Sta. 19+50. From Sta. 19+50 ahead, the lower zone of alluvial soil consists of one to two feet of coarse sand (A-2-4 and A-1-a) with gravel. The lower silt and sand zone is overlain by 3 to 10 feet of medium stiff to stiff sandy clay (A-6). The upper clay zone is overlain by recently deposited sediments, which include very soft to soft, sandy silt (A-4), sandy clay (A-6), and sand (A-2-4).

Residual Soils: The residual soils are derived from the in-place weathering of the underlying gneissic bedrock. The residual soil occurs as stiff to very stiff, sandy silt (A-4 and A-5), from 5.2 to 10.5 feet thick.

Rock Properties

Weathered rock and crystalline rock underlie the entire project. The weathered rock, generally one to two feet in thickness, is derived from the underlying Raleigh Gneiss bedrock. The gneissic bedrock trends in a north-northeastward direction. Outcrops of the gneiss occur along the shoreline directly west of the proposed bridge.

Crystalline rock was recovered in four of the borings completed for the structure subsurface investigation. Only one of the core borings is presented in this report (see Profile Sheet No. 6, Sta. 16+93/17'RT). Core Recovery (REC) ranged from 85% to 97%, with an average of 92%. Rock Quality Designation (RQD) ranged from 72% to 95%, with an average of 82%. Testing indicates the gneiss has a unit weight ranging from 156.9 pcf to 164.9 pcf. Compressive strength ranges from 4.28 ksi to 38.1 ksi. More detailed rock descriptions can be found in the Structure Subsurface Investigation Report.

Groundwater

Groundwater was present at elevation 283.3 feet at Sta. 16+05/2'LT. The remaining borings were located beneath the water surface. Surface water in Lake Wheeler was measured at elevation 283.0 feet in February 2006.

Prepared by,

Handwritten signature of Thomas P. Moorefield in black ink.

Thomas P. Moorefield, LG
Project Geologist

EARTHWORK BALANCE SHEET

Volumes in Cubic Feet

PROJECT B-3917

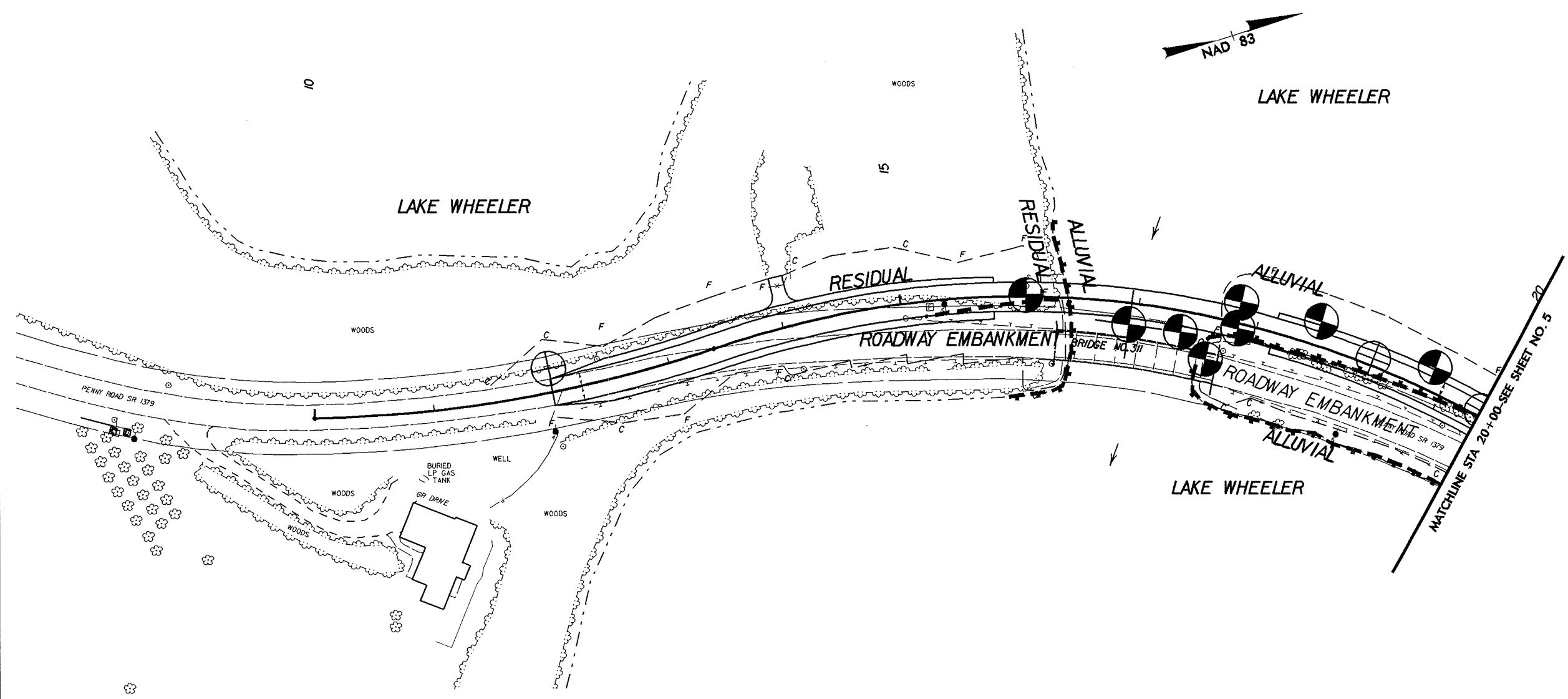
COUNTY Wake

DATE June 20, 2006

SHEET 34 OF 13 SHEETS

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +20%	BORROW	WASTE		
													SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-L-	12+00	16+02.08 (Begin Bridge)	262				262	1633		1633	1960	1698			
-L-	17+90.92 (End Bridge)	25+25	688				688	3855		3855	4626	3938			
TOTAL			950				950	5488		5488	6586	5636			
Loss due to clearing and grubbing			-125				-125					125			
Estimated Shoulder Material								350		350	420	420		470	470
Remove Ex.End Bent Embankment			470				470								
PROJECT TOTALS			1295				1295	5838		5838	7006	6181	470		470
Estimated to replace topsoil on borrow pits												309			
GRAND TOTALS			1295									6490			
SAY			1300									6500			
Estimated Undercut 200 CY															
Note: This does not include quantities for rock embankment or rock plating as detailed in the Geotechnical plans															

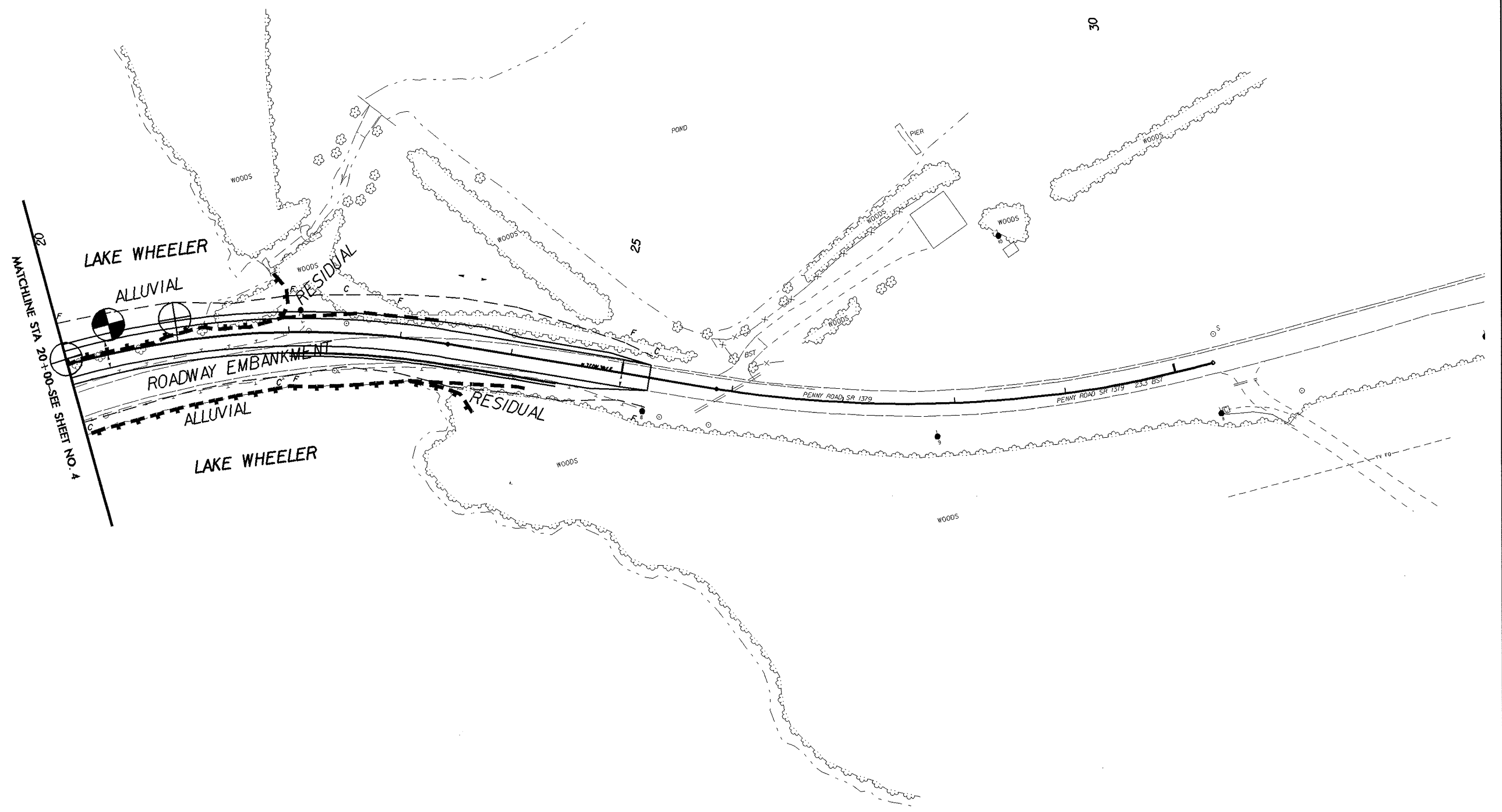
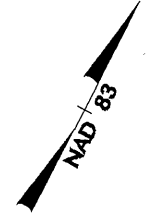
Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on the subsurface data provided by the Geotechnical Engineering Unit.



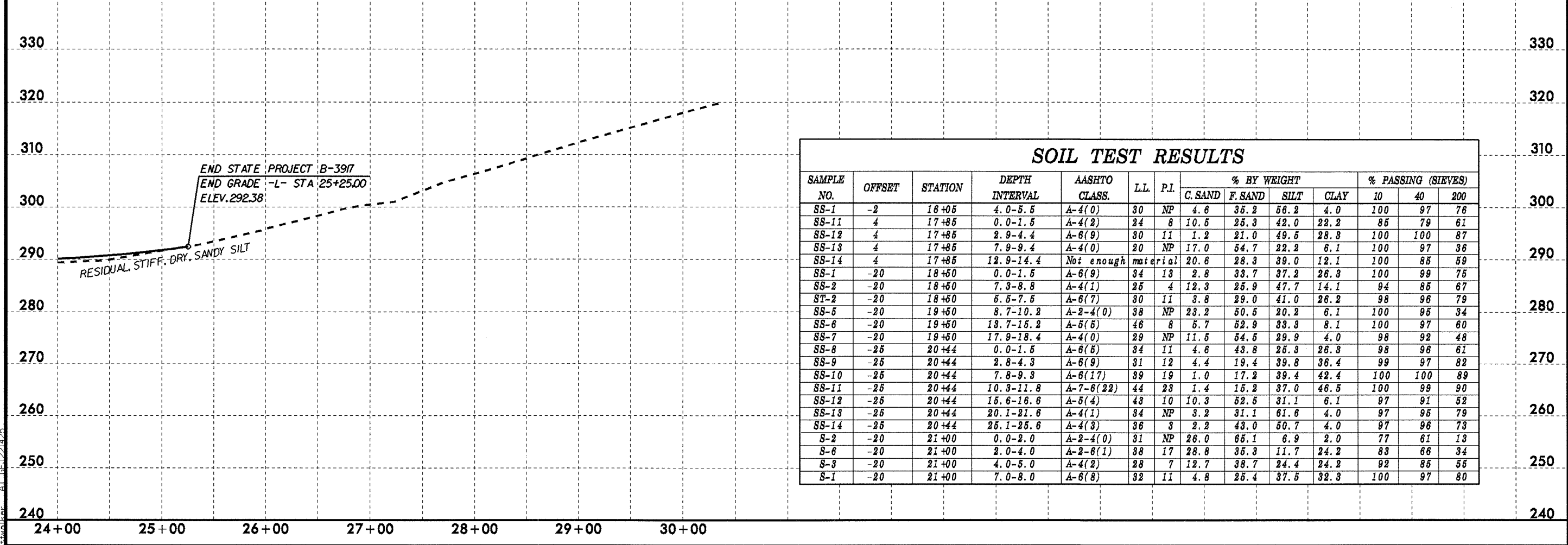
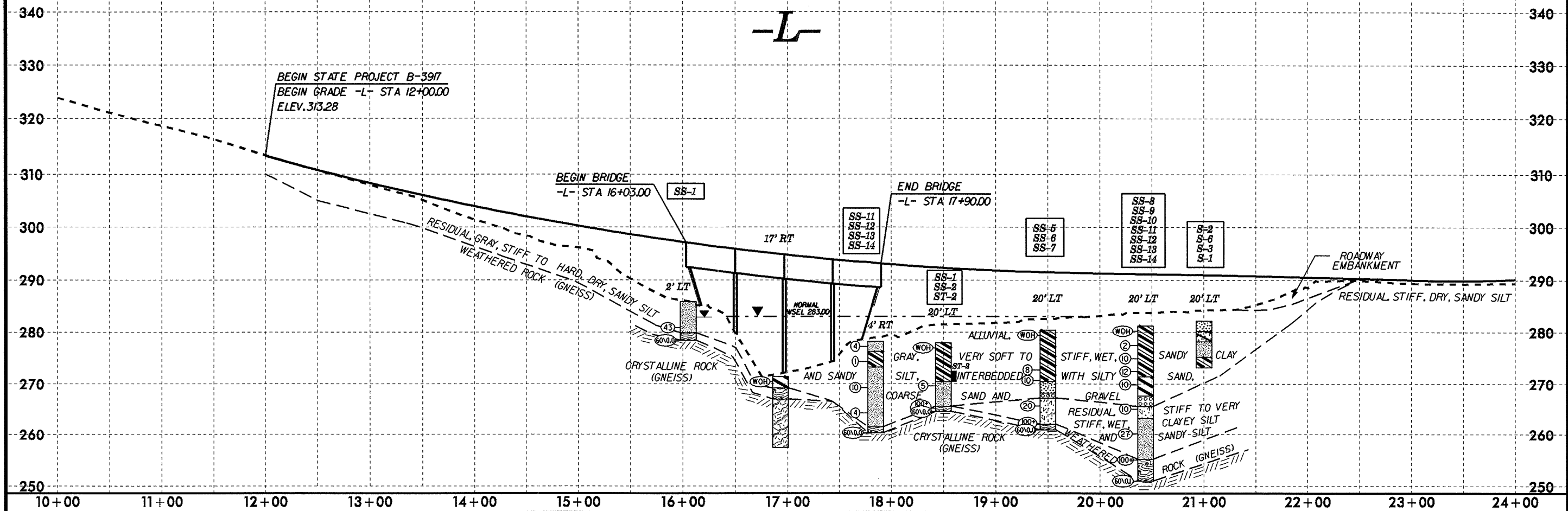
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PROJECT REFERENCE NO.	SHEET NO.
B-3917	5
GRAPHIC SCALE	
SCALE IN FEET	



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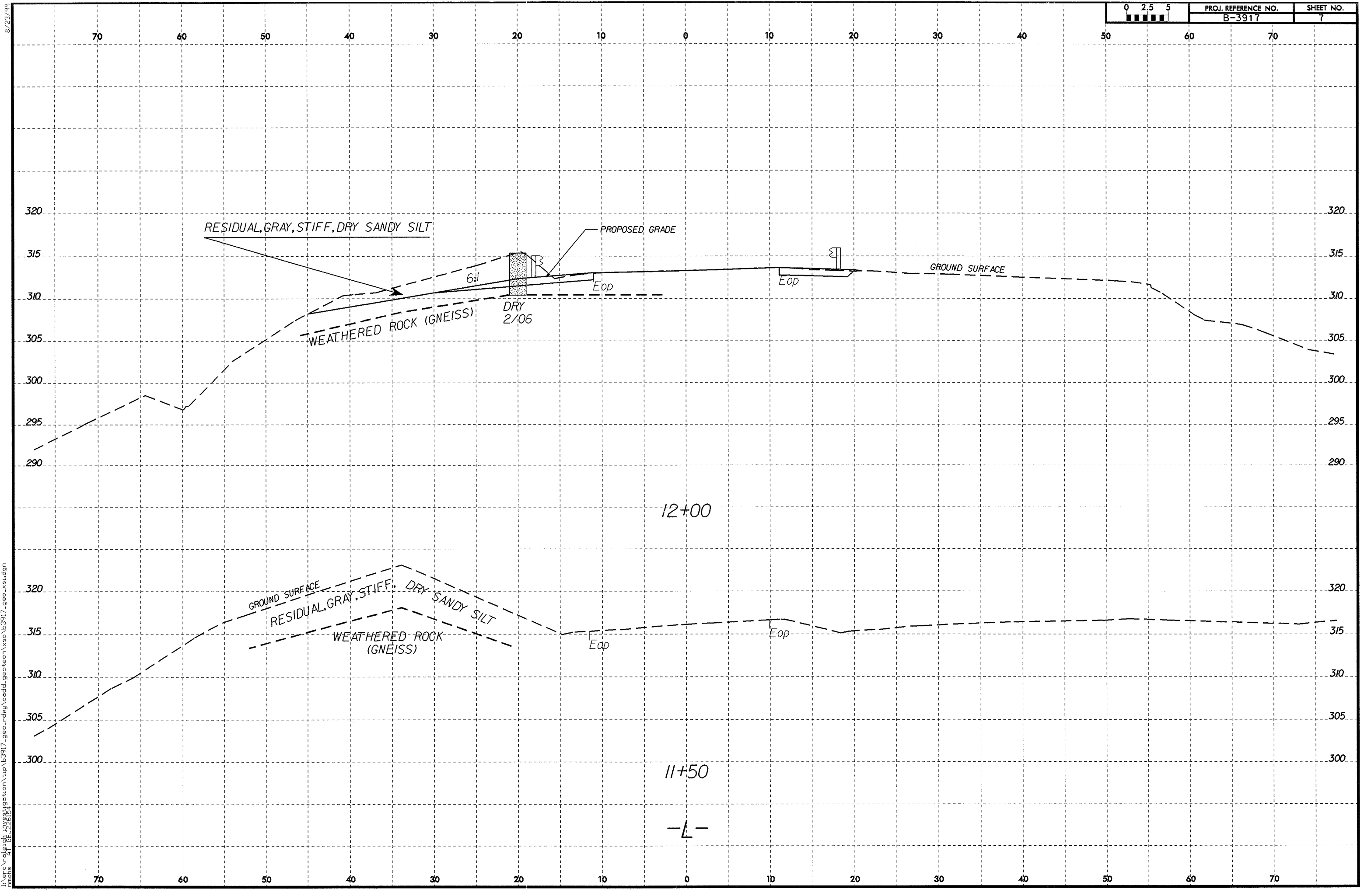


SOIL TEST RESULTS

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
SS-1	-2	16+05	4.0-5.5	A-4(0)	30	NP	4.6	35.2	56.2	4.0	100	97	76
SS-11	4	17+85	0.0-1.5	A-4(2)	24	8	10.5	25.3	42.0	22.2	85	79	61
SS-12	4	17+85	2.9-4.4	A-6(9)	30	11	1.2	21.0	49.5	28.8	100	100	87
SS-13	4	17+85	7.9-9.4	A-4(0)	20	NP	17.0	54.7	22.2	6.1	100	97	36
SS-14	4	17+85	12.9-14.4	Not enough material			20.6	28.3	39.0	12.1	100	85	59
SS-1	-20	18+50	0.0-1.5	A-6(9)	34	13	2.8	33.7	37.2	26.3	100	99	75
SS-2	-20	18+50	7.3-8.8	A-4(1)	25	4	12.3	25.9	47.7	14.1	94	85	67
ST-2	-20	18+50	5.5-7.5	A-6(7)	30	11	3.8	29.0	41.0	26.2	98	98	79
SS-5	-20	19+50	8.7-10.2	A-2-4(0)	38	NP	23.2	50.5	20.2	6.1	100	95	34
SS-6	-20	19+50	13.7-15.2	A-5(5)	46	8	5.7	52.9	33.3	8.1	100	97	60
SS-7	-20	19+50	17.9-18.4	A-4(0)	29	NP	11.5	54.5	29.9	4.0	98	92	48
SS-8	-25	20+44	0.0-1.5	A-6(5)	34	11	4.6	43.8	25.3	26.3	98	96	61
SS-9	-25	20+44	2.8-4.3	A-6(9)	31	12	4.4	19.4	39.8	36.4	99	97	82
SS-10	-25	20+44	7.8-9.3	A-6(17)	39	19	1.0	17.2	39.4	42.4	100	100	89
SS-11	-25	20+44	10.3-11.8	A-7-6(22)	44	23	1.4	15.2	37.0	46.5	100	99	90
SS-12	-25	20+44	15.6-16.6	A-5(4)	43	10	10.3	52.5	31.1	6.1	97	91	52
SS-13	-25	20+44	20.1-21.6	A-4(1)	34	NP	3.2	31.1	61.6	4.0	97	95	79
SS-14	-25	20+44	25.1-25.6	A-4(3)	36	3	2.2	43.0	50.7	4.0	97	96	73
S-2	-20	21+00	0.0-2.0	A-2-4(0)	31	NP	26.0	65.1	6.9	2.0	77	61	13
S-6	-20	21+00	2.0-4.0	A-2-6(1)	38	17	28.8	35.3	11.7	24.2	83	66	34
S-3	-20	21+00	4.0-5.0	A-4(2)	28	7	12.7	38.7	24.4	24.2	92	85	55
S-1	-20	21+00	7.0-8.0	A-6(8)	32	11	4.8	25.4	37.5	32.3	100	97	80

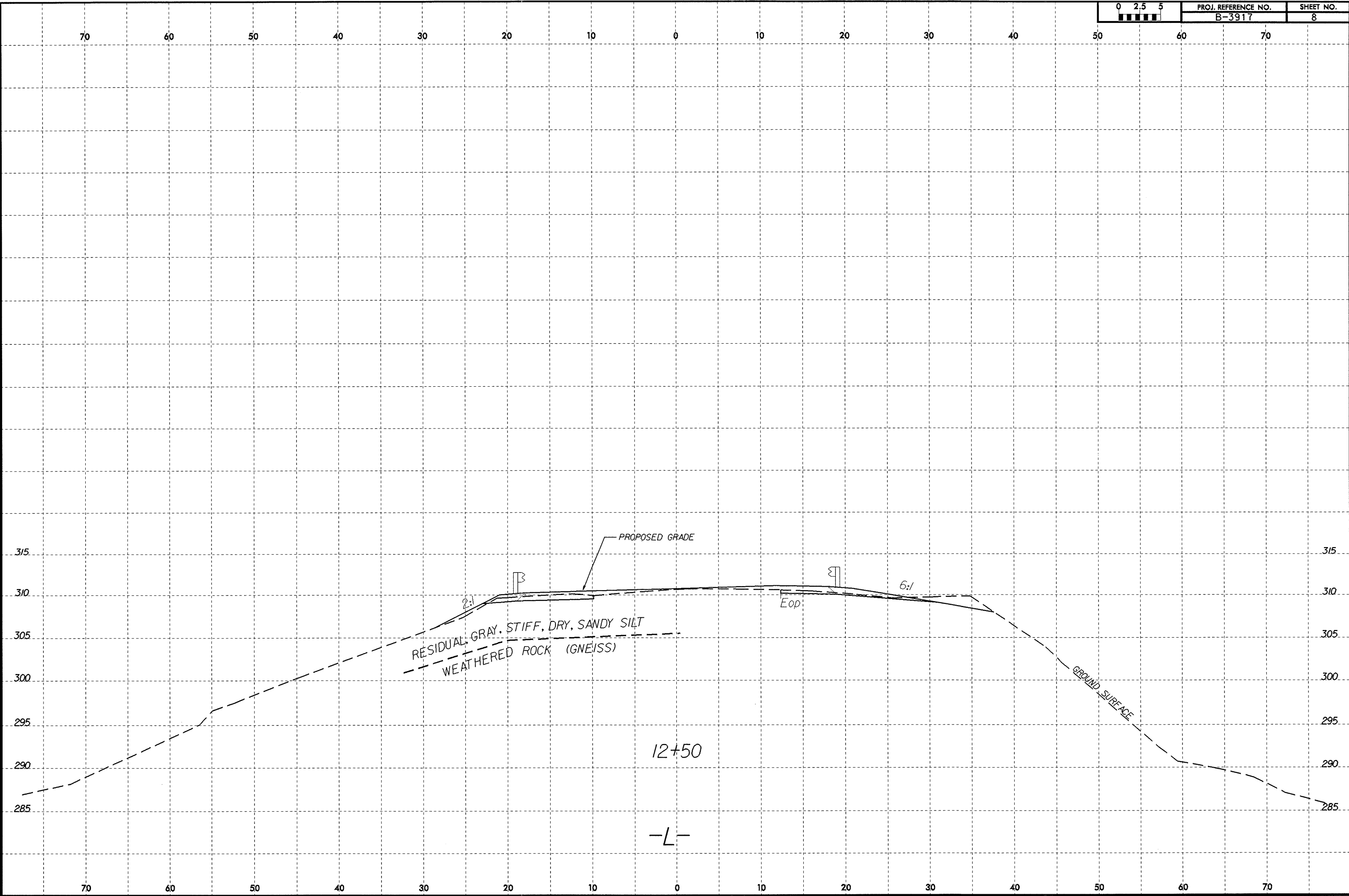
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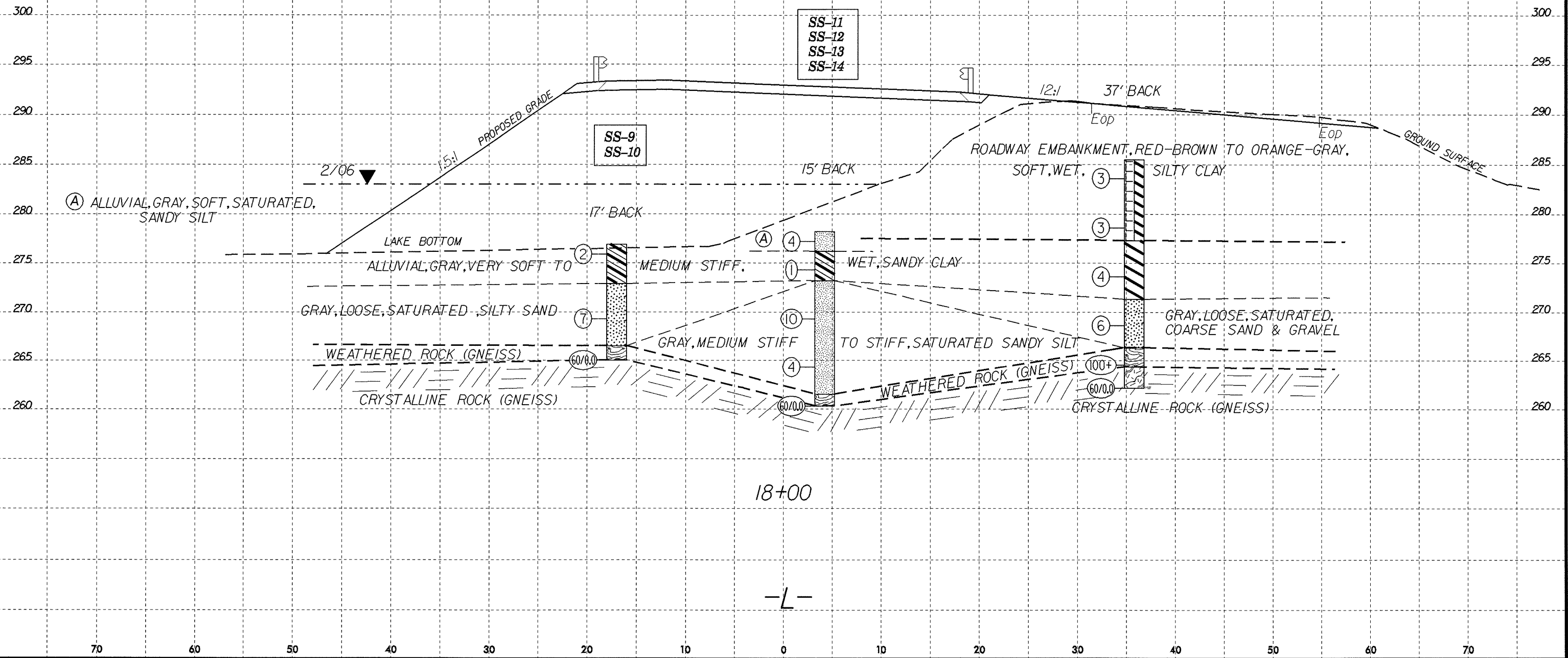
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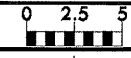
SOIL TEST RESULTS

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
SS-9	-17	17+83	0.0-1.5	A-6(9)	32	NP	1.2	21.6	48.9	28.3	100	100	85
SS-10	-17	17+83	6.6-8.1	A-2-4(0)	21	NP	36.5	46.2	13.3	4.0	100	85	23
SS-11	4	17+85	0.0-1.5	A-4(2)	24	8	10.5	25.3	42.0	22.2	85	79	61
SS-12	4	17+85	2.9-4.4	A-6(9)	30	11	1.2	21.0	49.5	28.3	100	100	87
SS-13	4	17+85	7.9-9.4	A-4(0)	20	NP	17.0	54.7	22.2	6.1	100	97	36
SS-14	4	17+85	12.9-14.4	Not enough material			20.6	28.3	39.0	12.1	100	85	59

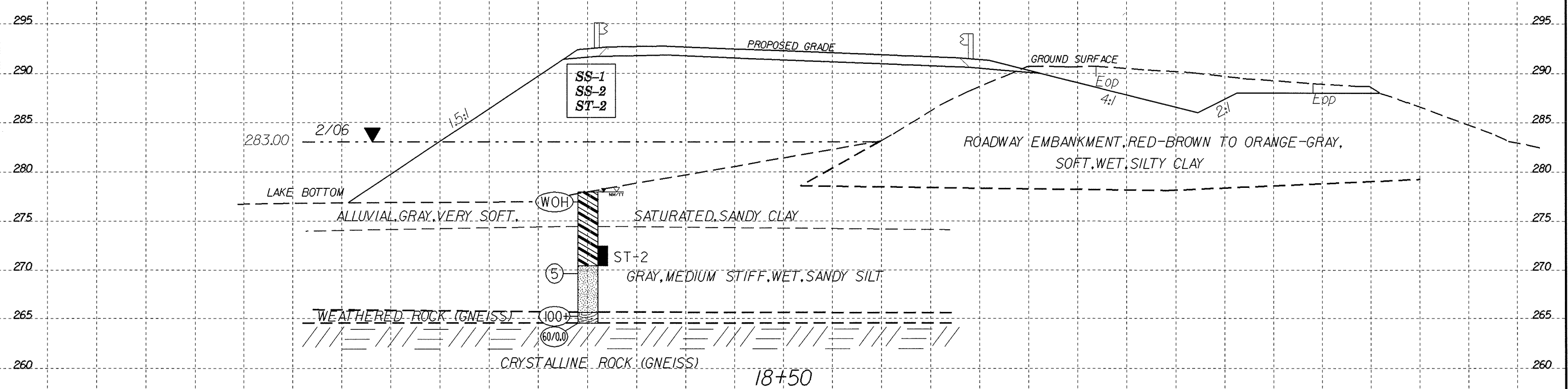
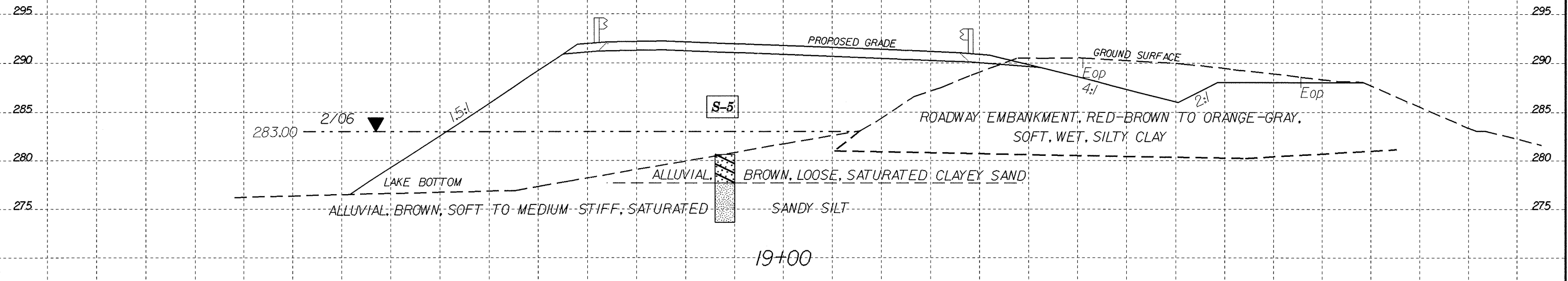


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SOIL TEST RESULTS													
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
S-5	-6	19+00	3.0-4.0	A-4(3)	28	10	21.4	28.4	28.0	22.2	93	79	55
SS-1	-20	18+50	0.0-1.5	A-6(9)	94	13	2.8	33.7	37.2	26.3	100	99	75
SS-2	-20	18+50	7.3-8.8	A-4(1)	25	4	12.3	25.9	47.7	14.1	94	85	67
ST-2	-20	18+50	5.5-7.5	A-6(7)	30	11	3.8	29.0	41.0	26.2	98	96	79

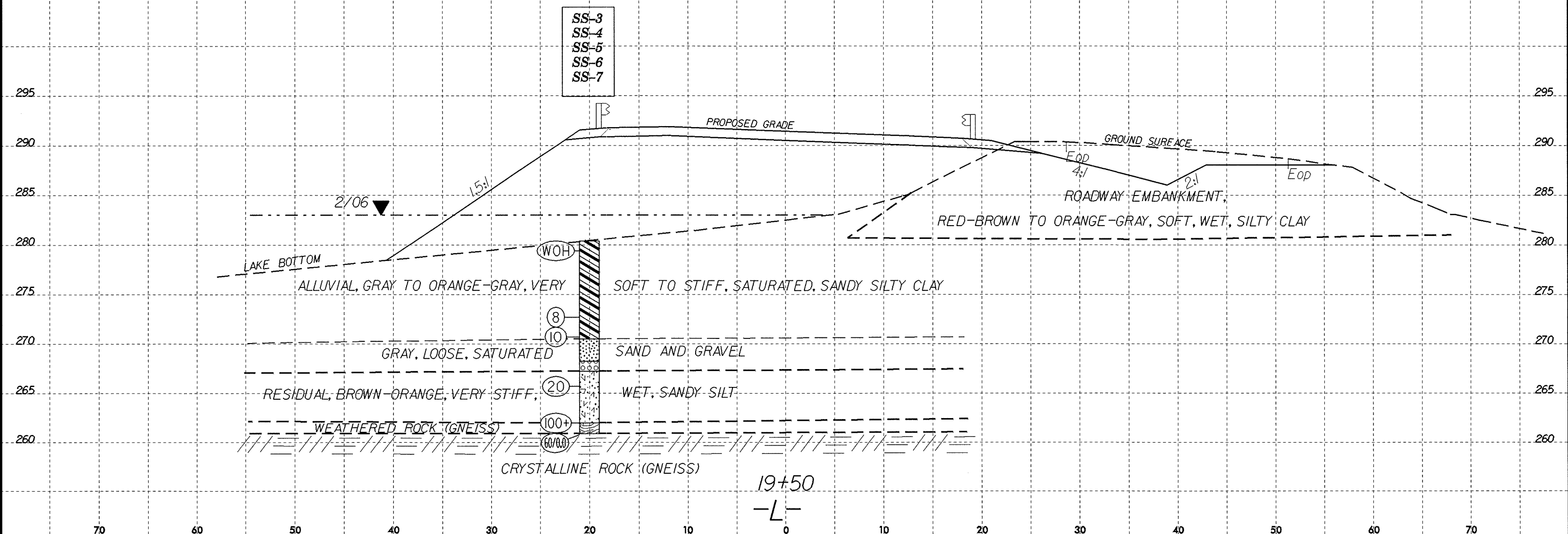
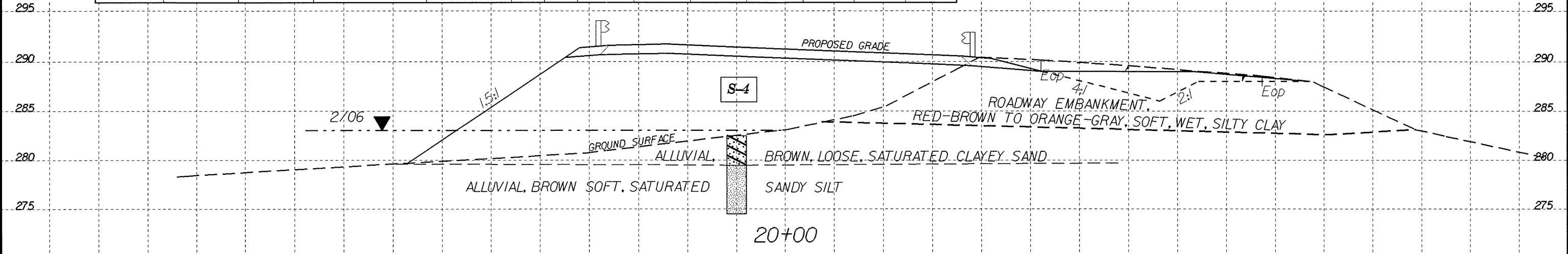


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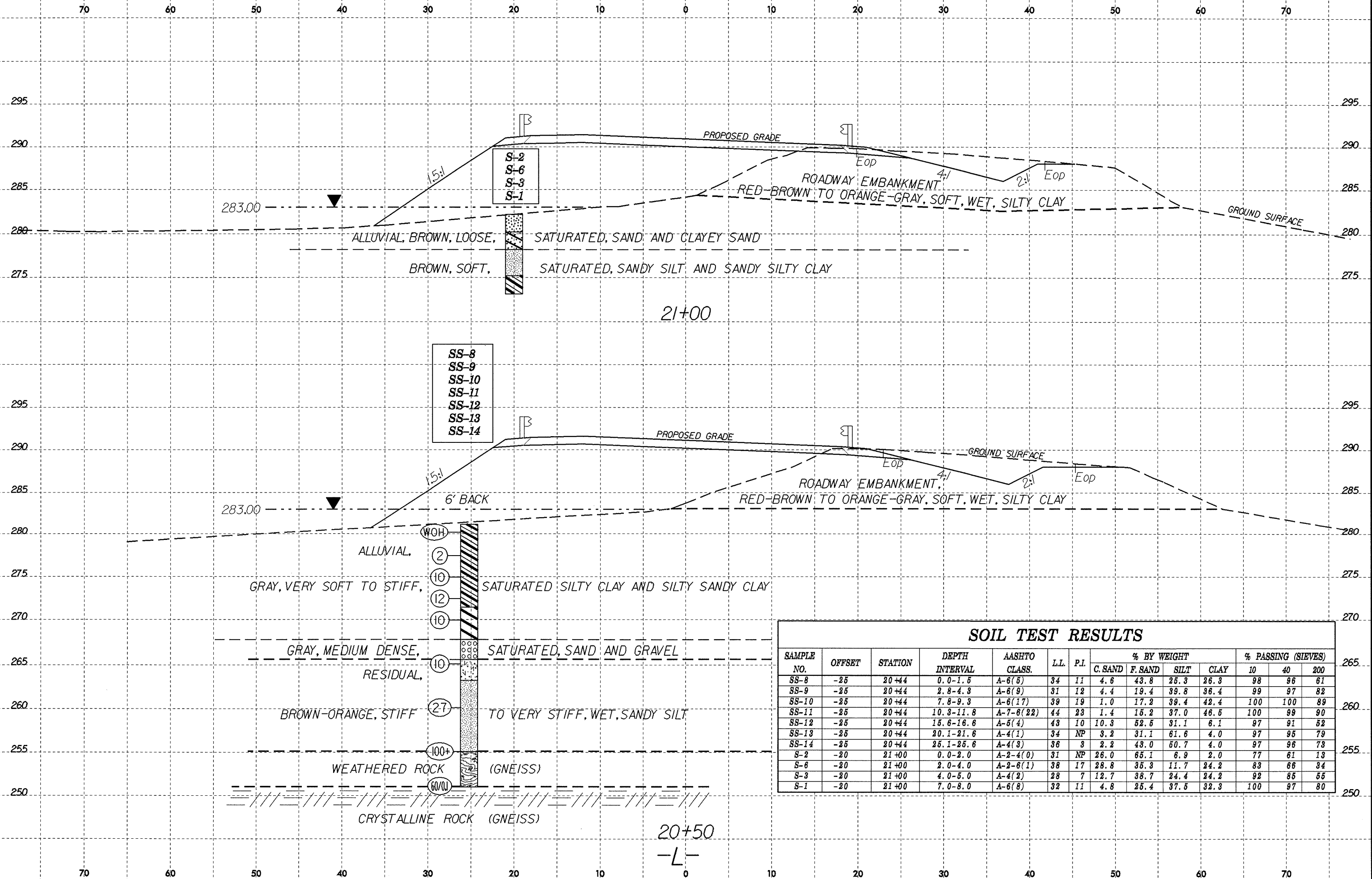
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SOIL TEST RESULTS

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
SS-3	-20	19+50	0.0-1.5	A-6(7)	33	11	1.2	38.4	36.2	24.2	100	100	73
SS-4	-20	19+50	6.7-2.2	A-6(5)	32	12	4.4	42.4	30.9	22.2	100	95	63
SS-5	-20	19+50	8.7-10.2	A-2-4(0)	38	NP	23.2	50.5	20.2	6.1	100	95	34
SS-6	-20	19+50	13.7-15.2	A-5(5)	46	8	5.7	52.9	33.3	8.1	100	97	60
SS-7	-20	19+50	17.9-18.4	A-4(0)	29	NP	11.5	54.5	29.9	4.0	98	92	48
S-4	-5	20+00	6.0-7.0	A-4(3)	29	8	11.3	27.3	35.3	26.2	89	82	63



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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
SS-8	-25	20+44	0.0-1.5	A-6(5)	34	11	4.6	43.8	25.3	26.3	98	96	61
SS-9	-25	20+44	2.8-4.3	A-6(9)	31	12	4.4	19.4	39.8	36.4	99	97	82
SS-10	-25	20+44	7.8-9.3	A-6(17)	39	19	1.0	17.2	39.4	42.4	100	100	89
SS-11	-25	20+44	10.3-11.8	A-7-6(22)	44	23	1.4	15.2	37.0	46.5	100	99	90
SS-12	-25	20+44	15.6-16.6	A-6(4)	43	10	10.3	52.5	31.1	6.1	97	91	52
SS-13	-25	20+44	20.1-21.6	A-4(1)	34	NP	3.2	31.1	61.6	4.0	97	95	79
SS-14	-25	20+44	25.1-25.6	A-4(3)	36	3	2.2	48.0	50.7	4.0	97	96	73
S-2	-20	21+00	0.0-2.0	A-2-4(0)	31	NP	26.0	65.1	6.9	2.0	77	61	13
S-6	-20	21+00	2.0-4.0	A-2-6(1)	38	17	28.8	35.3	11.7	24.2	83	66	34
S-3	-20	21+00	4.0-5.0	A-4(2)	28	7	12.7	38.7	24.4	24.2	92	85	55
S-1	-20	21+00	7.0-8.0	A-6(8)	32	11	4.8	25.4	37.5	32.3	100	97	80

