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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.	P-5208B	1	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1.STRO5T1B	FRA-FR-HSR-0006-10-01-00	PE, UHl, PE	
50000.1.STRO6T3		PE, UHl, PE	
43219.2.STRO9P5208		ROW	
50000.3.STRO2T4D		UTIL CONSTRUCT	

CONTENTS

DESCRIPTION	SHEET			
SOIL TEST RESULTS	17			
LINE	STATION	PLAN	PROFILE	XSECT
-L-	10+00 to 39+00	4-6	8-9	12-14
-Y1-	10+00 to 15+80	4	9	-
-Y2-	10+00 to 18+22.50	4, 7	10	-
-Y3-	10+00 to 19+08.42	5	10	-
-Y4-	10+00 to 32+10	5, 7	11	15-16

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 50000.1.STRO5T1B (P-5208B) F.A. PROJ. _____
COUNTY CABARRUS
PROJECT DESCRIPTION GRADE SEPARATION: -L- (SR 1158) OVER -Y4- (NC 49) AND NCRR/NORFOLK SOUTHERN RAILROAD

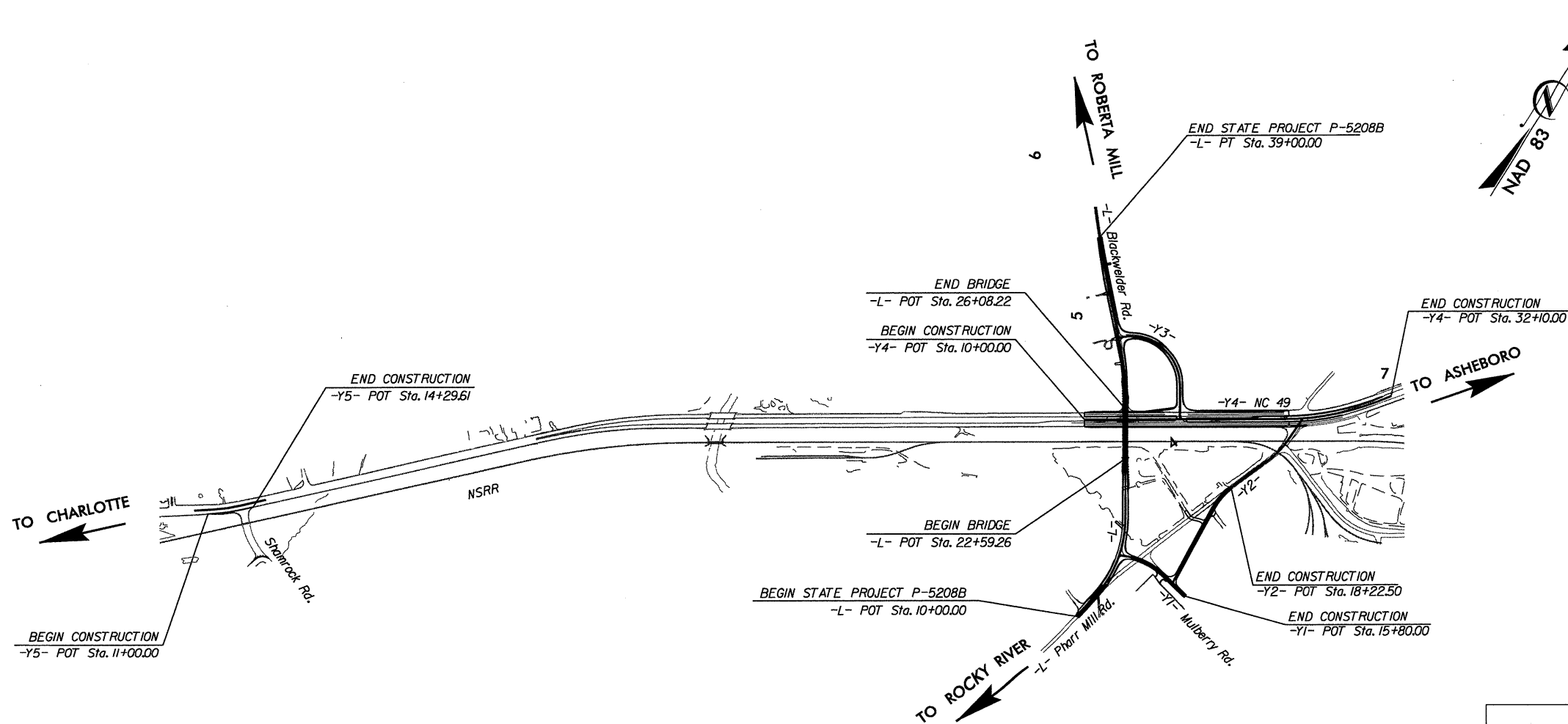
INVENTORY

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

CONTRACT: C203145 ID: P-5208B



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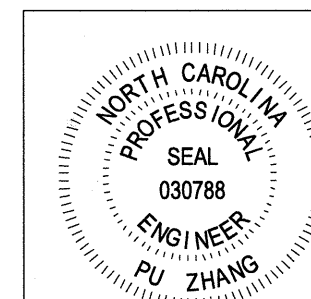
SUBMITTED BY P. ZHANG

DATE AUGUST, 2012

DRAWN BY: S. CROCKETT

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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.




Pu Zhang
8-23-12
SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 50000.ISTRO5T1B (P-5208B)	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, HIGHLY 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.				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: 				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 DISLOADED 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 IMPERVIOROUS 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 IN 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 (SROD) - 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				GROUND WATER			
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.				WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING			
GROUP CLASS. A-1-a, A-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6, A-3, A-4, A-5, A-6, A-7				SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				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.				STATIC WATER LEVEL AFTER 24 HOURS			
SYMBOL				PERCENTAGE OF MATERIAL				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.				PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA			
% PASSING #10, #40, #200				ORGANIC MATERIAL GRANULAR SILTS SILT-CLAY OTHER MATERIAL				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.				SPRING OR SEEP			
LIQUID LIMIT PLASTIC INDEX				TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%				FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.				PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30			
GROUP INDEX				SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER				VERY SLIGHT (V SL.) 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.				CONSISTENCY OR DENSENESS			
USUAL TYPES OF MAJOR MATERIALS				HIGHLY ORGANIC SOILS				SLIGHT (SL.) 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.				PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F ²)			
GEN. RATING AS A SUBGRADE				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION				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.				GENERAL GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE			
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30				ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT				SEVERE (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				GENERAL SILT-CLAY MATERIAL (COHESIVE) VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD			
TEXTURE OR GRAIN SIZE				INFERRED SOIL BOUNDARY				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				U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270			
BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)				INFERRED ROCK LINE				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.				GRAIN SIZE MM, IN. 305, 75, 2.0, 0.25, 0.05, 0.005			
SOIL MOISTURE - CORRELATION OF TERMS				ALLUVIAL SOIL BOUNDARY				ROCK HARDNESS				SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL, PL, OM, SL				DIP & DIP DIRECTION OF ROCK STRUCTURES				VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.				SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			
PLASTICITY				DIP & DIP DIRECTION OF ROCK STRUCTURES				HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.				WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE			
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.				MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE			
COLOR				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.				DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE			
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.				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.			
MISCELLANEOUS SYMBOLS				DIP & DIP DIRECTION OF ROCK STRUCTURES				ROCK HARDNESS				SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION				DIP & DIP DIRECTION OF ROCK STRUCTURES				VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.				SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			
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INFERRED SOIL BOUNDARY				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.				DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE			
INFERRED ROCK LINE				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.			
ALLUVIAL SOIL BOUNDARY				DIP & DIP DIRECTION OF ROCK STRUCTURES				VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.				SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			
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09/08/12

TIP PROJECT: P-5208B

CONTRACT: C203145

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

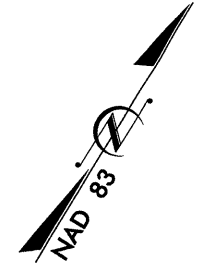
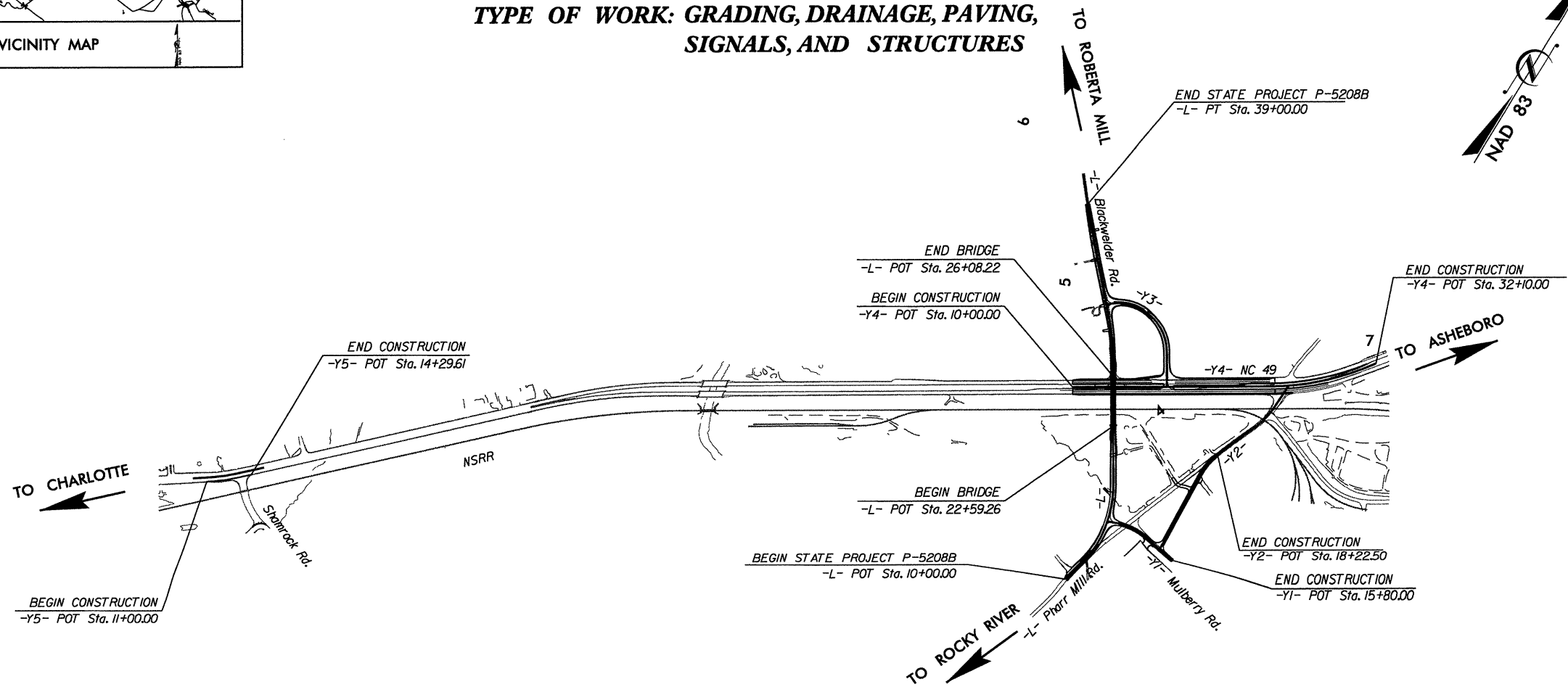
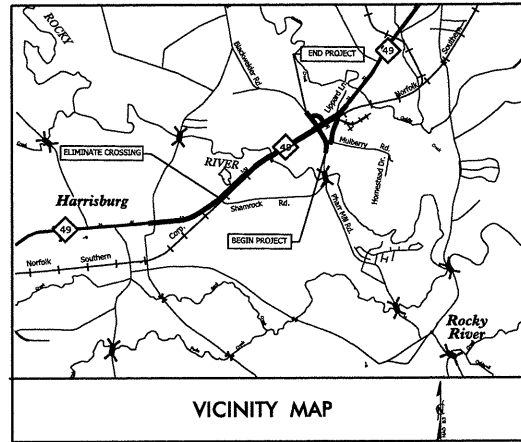
CABARRUS COUNTY

LOCATION: PHARR MILL ROAD /BLACKWELDER
ROAD GRADE SEPARATION OVER NCRR /NS

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



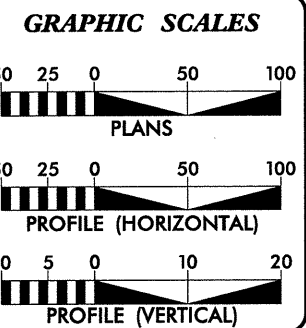
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208B	2A	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1.STR05T1B	FRA-FR-HSR-0006-10-01-00	PE, Util. PE	
50000.1.STR06T3		PE, Util. PE	
43219.2.STR09P5208		ROW	
50000.3.STR02T4D		UTIL. CONSTRUCT	



CLEARING ON THIS PROJECT SHEE BE PERFORMED
TO THE LIMITS ESTABLISHED BUY METHOD III.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: 65% PLANS
DATE: APRIL 20, 2012



DESIGN DATA

ADT 2010 =	2400
ADT 2035 =	11,200
DHV =	10 %
D =	75 %
T =	1 % *
V =	50 MPH
* TTST =	2% DUAL
FUNC CL =	COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY =	0.48 Miles
LENGTH BRIDGE =	0.07 Miles
TOTAL LENGTH =	0.55 Miles

Prepared In the Office of:

URS
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: **EDWARD G. EDENS, PE**
APRIL 16, 2012
PROJECT ENGINEER

LETTING DATE: **JEFFREY R. HEXT**
APRIL 2013
PROJECT DESIGN ENGINEER

RAIL ENGINEER

SIGNATURE: _____ P.E.

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

1/30/2013
A:\P5208B.GEO_RDWY\CADD_GEO\TECH\Plan\Prof\P5208B_rdy_tsh.dgn
paul_zhang



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

August 23, 2012

STATE PROJECT: 50000.1.STR05T1B
TIP NO.: P-5208B
COUNTY: Cabarrus

DESCRIPTION: Grade Separation: -L- (SR 1158) over -Y4- (NC 49) and NCRR/ Norfolk Southern Railroad

SUBJECT: Geotechnical Report –Inventory

Project Description

The project consists of realigning Pharr Mill Road (SR 1158) on new location south of the existing facility, construction of a new bridge with a length of approximately 350 feet that spans the existing and proposed NCRR/NS Mainline tracks at Milepost 361.73 and existing NC 49, where the alignment then connects to existing Blackwelder Road on the north side of NC 49. The project also includes a connector loop and intersection improvements. This new grade separation includes the closure and removal of the existing public at-grade crossings for existing Pharr Mill Rd. and Shamrock Rd.

A geotechnical investigation was conducted in January through February 2012. Borings were advanced utilizing an ATV mounted CME-550 or Mobile B-57 drill machine with an automatic hammer. Standard Penetration Tests were performed at each boring location. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis. The following alignments were investigated. The investigation for the new grade separation bridge will be submitted under a separate cover.

<u>Line</u>	<u>Station(±)</u>
-L-	10+00 to 39+00
-Y1-	10+00 to 15+80
-Y2-	10+00 to 18+23

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
ENGINEERING AND SAFETY BRANCH
1556 MAIL SERVICE CENTER
RALEIGH NC 27699-1556

TELEPHONE: 919-715-8803
FAX: 919-733-0997

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
862 CAPITAL BOULEVARD
RALEIGH NC

-Y3-
-Y4-

10+00 to 19+08
10+00 to 32+10

Areas of Special Geotechnical Interest

- 1) Highly Plastic Clays: Highly plastic ($PI \geq 26$) clays were encountered on the project at the following interval.

<u>Line</u>	<u>Station (±)</u>	<u>Offset (ft)</u>
-L-	17+00 to 18+00	LT to RT
-L-	35+00 to 37+00	LT to RT
-Y1-	13+50 to 14+50	LT to RT
-Y4-	21+00 to 23+00	25' LT to 10' RT

- 2) Artificial Fill: Artificial fill was encountered at the following locations.

<u>Line</u>	<u>Station (±)</u>	<u>Offset (ft)</u>
-L-	21+10 to 22+60	LT to RT

Several smaller areas of artificial fill are present throughout the project corridor and are related to gravel and soil driveways, as well as previous construction of utility lines.

- 3) Water Wells: One water well was found in close proximity to the proposed right of way. The well is located 80' Rt. of -L- (SR 1158) near Station 10+00.

- 4) Ponds: No ponds were found within or in close proximity to the proposed right of way.

Physiography and Geology

The project is located in the Piedmont Province. Land use along the project corridor consists of roadways, railroads, homes, commercial businesses, and woods. Geologically, the project is located within the Charlotte Belt. Gabbro of Concord Plutonic Suite intrusive rock (DOgb) was encountered at the project site. Rocky River and its branches and a few ditches drain the project.

Soil Properties

Soils encountered at the project site include roadway embankment, artificial fill, residual, weathered rock, and crystalline rock of Gabbro.

Roadway Embankment soils are present along the existing roadways and consist of orange and brown, soft to very stiff, sandy and silty clays (A-6, A-7-6) with Plasticity Index (PI) ranging from 17 to 40.

Artificial fill soils were encountered primarily along gravel and soil driveways and utility easements, consisting of brown, stiff to very stiff silty clay (A-6), and medium dense silty sand (A-2-4) with gravel. The artificial fill is underlain by residual soils.

Residual soils were encountered throughout the project. These soils consist primarily of gray, orange and brown, soft to hard silts and clays (A-4, A-5, A-6, A-7-5, A-7-6) with PI ranging from 4 to 38, and very loose to very dense silty sand (A-2-4).

Rock Properties

Weathered rock was encountered during the roadway investigation at elevations ranging from 545.9 to 586.8 feet. It originates from the underlying Gabbro.

Crystalline rock was encountered at depths greater than 6 feet below proposed grades during the roadway investigation at elevations ranging 557.2 to 590.2 feet, consisting of Gabbro.

Ground Water

Groundwater was encountered in multiple borings at depths greater than 5 feet below existing grades, and ranges in elevation from 566.7 to 572.6 feet. Groundwater may fluctuate with seasonal precipitation.

BULK SAMPLES

The following bulk samples were taken for tests to determine the engineering properties of the soil:

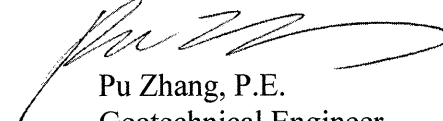
<u>Sample No.</u>	<u>Line</u>	<u>Station</u>	<u>Offset (ft)</u>	<u>Depth (ft)</u>	<u>Test</u>
S-1	-Y4-	21+98	20 LT	0-5.0	California Bearing Ratio
S-2	-Y3-	16+50	2 LT	0-5.0	California Bearing Ratio

UNDISTURBED SAMPLES

The following Undisturbed sample was taken for tests to determine the engineering properties of the soil:

<u>Sample No.</u>	<u>Line</u>	<u>Station</u>	<u>Offset (ft)</u>	<u>Depth (ft)</u>	<u>Test</u>
ST-1	-L-	21+04	49 RT	6.0-8.0	Consolidation

Prepared by,



Pu Zhang, P.E.
Geotechnical Engineer

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT P5208B

COUNTY Volumes in Cubic Yards

1/7/2013

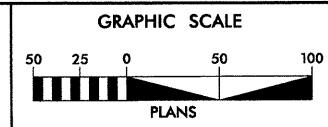
PROJECT REFERENCE NO. 50000.I.LSTRO5TIB (P-5208B)	SHEET NO. 3B
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RD10501C

LINE	STATION TO	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. 20%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
SUMMARY POINT 1															
-L-	STA. 10+00	STA. 22+59.26	908				908	43696		43696	52435	51527		0	0
-Y1-	STA. 10+00.00	STA. 15+80	249				249	5270		5270	6324	6075			0
-Y2-	STA. 10+00.00	STA. 18+22.50	646				646	4973		4973	5968	5322			0
SUBTOTAL SUMMARY POINT 1			1803				1803	53939		53939	64727	62924		0	0
SUMMARY POINT 2															
-L-	STA. 26+08.22	STA. 39+00.00	1719		500		1719	11130		11130	13356	11637		500	500
-Y3-	STA. 10+47.24	STA. 19+08.42	11865				11865	618		618	742	0	11123		11123
SUBTOTAL SUMMARY POINT 2			13584		500		13584	11748		11748	14098	11637	11123	500	11623
SUMMARY POINT 3															
-Y4-	STA. 10+00.00	STA. 32+10.00	6070				6070	837		837	1004	0	5066		5066
SUBTOTAL SUMMARY POINT 3			6070				6070	837		837	1004	0	5066		5066
SUMMARY POINT 4															
-Y5-	STA. 11+13.00	15+50.00	139				139	507		507	608	469			0
-Y6-	STA. 9+00.00	STA. 28+50.00	536		550		536	6255		6255	7506	6970		550	550
SUBTOTAL SUMMARY POINT 4			675		550		675	6762		6762	8114	7439		550	550
SHEET SUBTOTALS (SUMMARIES 1-4):			22132		1050		22132	73286		73286	87943	82000	16189	1050	17239
SUMMARY POINT SUBTOTALS:			22132		1050		22132	73286		73286	87943	82000	16189	1050	17239
LOSS DUE TO CLEARING AND GRUBBING			-3920				-3920					3920			
WASTE IN LIEU OF BORROW												-16189	-16189		-16189
SHOULDER MATERIAL								820		820	984	984			
ADDITIONAL UNDERCUT					2000			2000		2000	2400	2400		2000	2000
PROJECT SUBTOTAL			18212		3050		18212	76106		76106	91327	73115		3050	3050
ESTIMATE 5% TO REPLACE TOPSOIL ON BORROW PIT												3656			
PROJECT TOTALS:			18212		3050		18212	76106		76106	91327	76771			3050
SAY:			18,220	-	3,050				-			76,800	-	-	

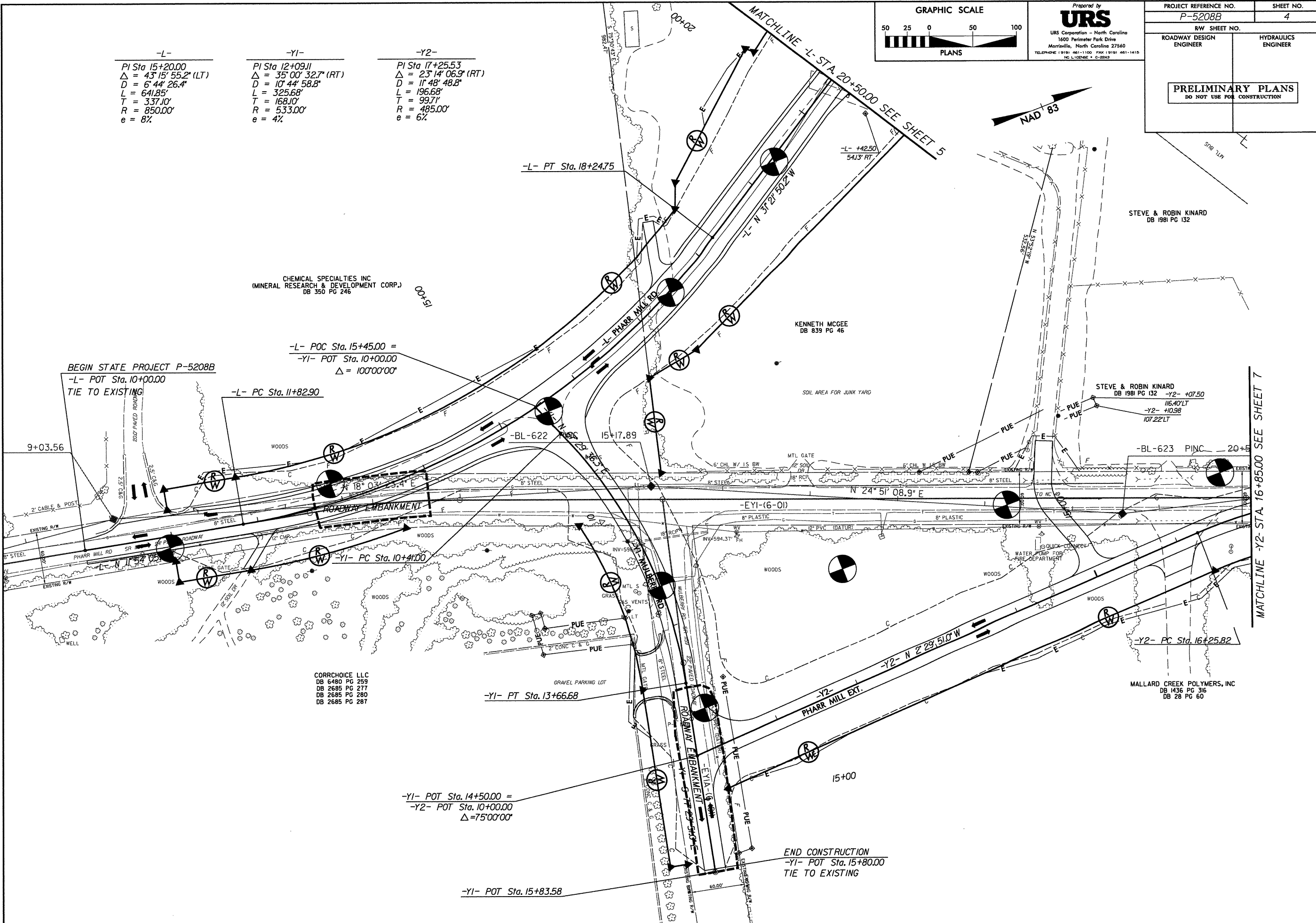
EST. SHALLOW UNDERCUT = 800 CY
 EST. SHALLOW UNDERCUT BY STATIONS = 500 CY
 TOTAL SHALLOW UNDERCUT= 1,300 CY

-L-	-Y1-	-Y2-
PI Sta 15+20.00	PI Sta 12+09.11	PI Sta 17+25.53
$\Delta = 43^{\circ} 15' 55.2" (LT)$	$\Delta = 35^{\circ} 00' 32.7" (RT)$	$\Delta = 23^{\circ} 14' 06.9" (RT)$
D = 6' 44' 26.4"	D = 10' 44' 58.8"	D = 1' 48' 48.8"
L = 641.85'	L = 325.68'	L = 196.68'
T = 337.10'	T = 168.10'	T = 99.71'
R = 850.00'	R = 533.00'	R = 485.00'
e = 8%	e = 4%	e = 6%



Prepared by
URS
 URS Corporation - North Carolina
 1600 Perimeter Park Drive
 Morrisville, North Carolina 27560
 TELEPHONE: (919) 461-1100 FAX: (919) 461-1415
 NC L10286E • C-2823

PROJECT REFERENCE NO. P-5208B	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



BEGIN STATE PROJECT P-5208B
 -L- POT Sta. 10+00.00
 TIE TO EXISTING

-L- POC Sta. 15+45.00 =
 -Y1- POT Sta. 10+00.00
 $\Delta = 100'00'00"$

-L- PC Sta. 11+82.90

-Y1- PC Sta. 10+41.00

-Y1- PT Sta. 13+66.68

-Y1- POT Sta. 14+50.00 =
 -Y2- POT Sta. 10+00.00
 $\Delta = 75'00'00"$

-Y1- POT Sta. 15+83.58

END CONSTRUCTION
 -Y1- POT Sta. 15+80.00
 TIE TO EXISTING

CHEMICAL SPECIALTIES INC
 (MINERAL RESEARCH & DEVELOPMENT CORP.)
 DB 350 PG 246

CORRCHOICE LLC
 DB 6480 PG 259
 DB 2685 PG 277
 DB 2685 PG 280
 DB 2685 PG 287

KENNETH MCGEE
 DB 839 PG 46

STEVE & ROBIN KINARD
 DB 1981 PG 132

STEVE & ROBIN KINARD
 DB 1981 PG 132 -Y2- +07.50
 116.40'LT
 -Y2- +10.98
 107.22'LT

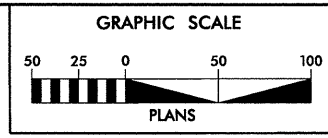
MALLARD CREEK POLYMERS, INC
 DB 1436 PG 316
 DB 28 PG 60

MATCHLINE -Y2- STA. 16+85.00 SEE SHEET 7

MATCHLINE -L- STA. 20+50.00 SEE SHEET 5

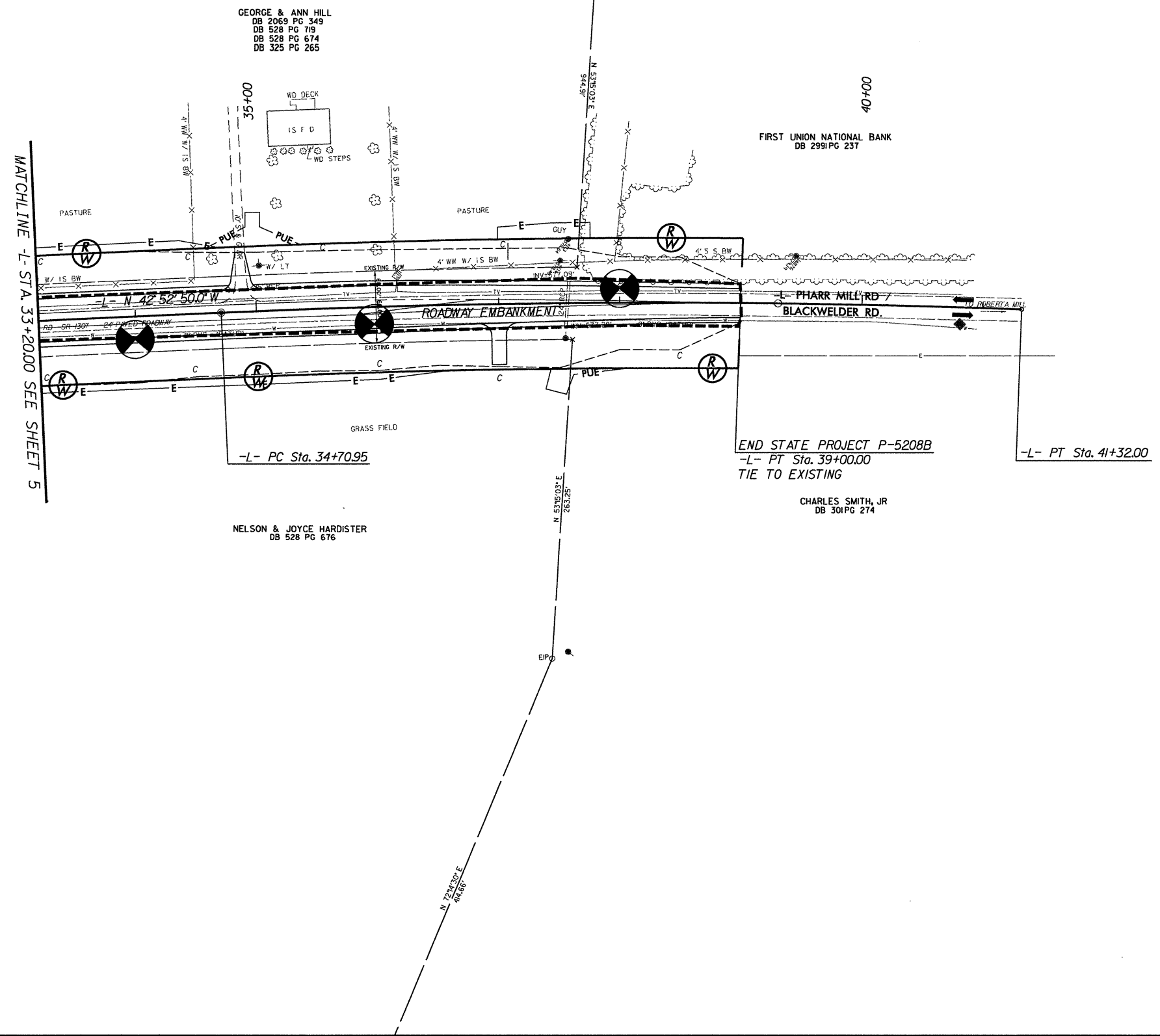


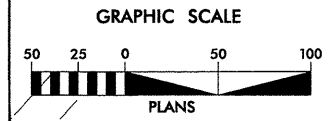
-L-
 PI Sta 38+01.69
 $\Delta = 4' 37' 10.0'' (RT)$
 $D = 0' 41' 55.4''$
 $L = 661.12'$
 $T = 330.74'$
 $R = 8,200.00'$
 $e = NC$



Prepared by
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 URS Corporation - North Carolina
 1600 Perimeter Park Drive
 Morrisville, North Carolina 27560
 TELEPHONE (919) 461-1100 FAX (919) 461-1415
 NC LICENSE # C-2843

PROJECT REFERENCE NO. <i>P-5208B</i>	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



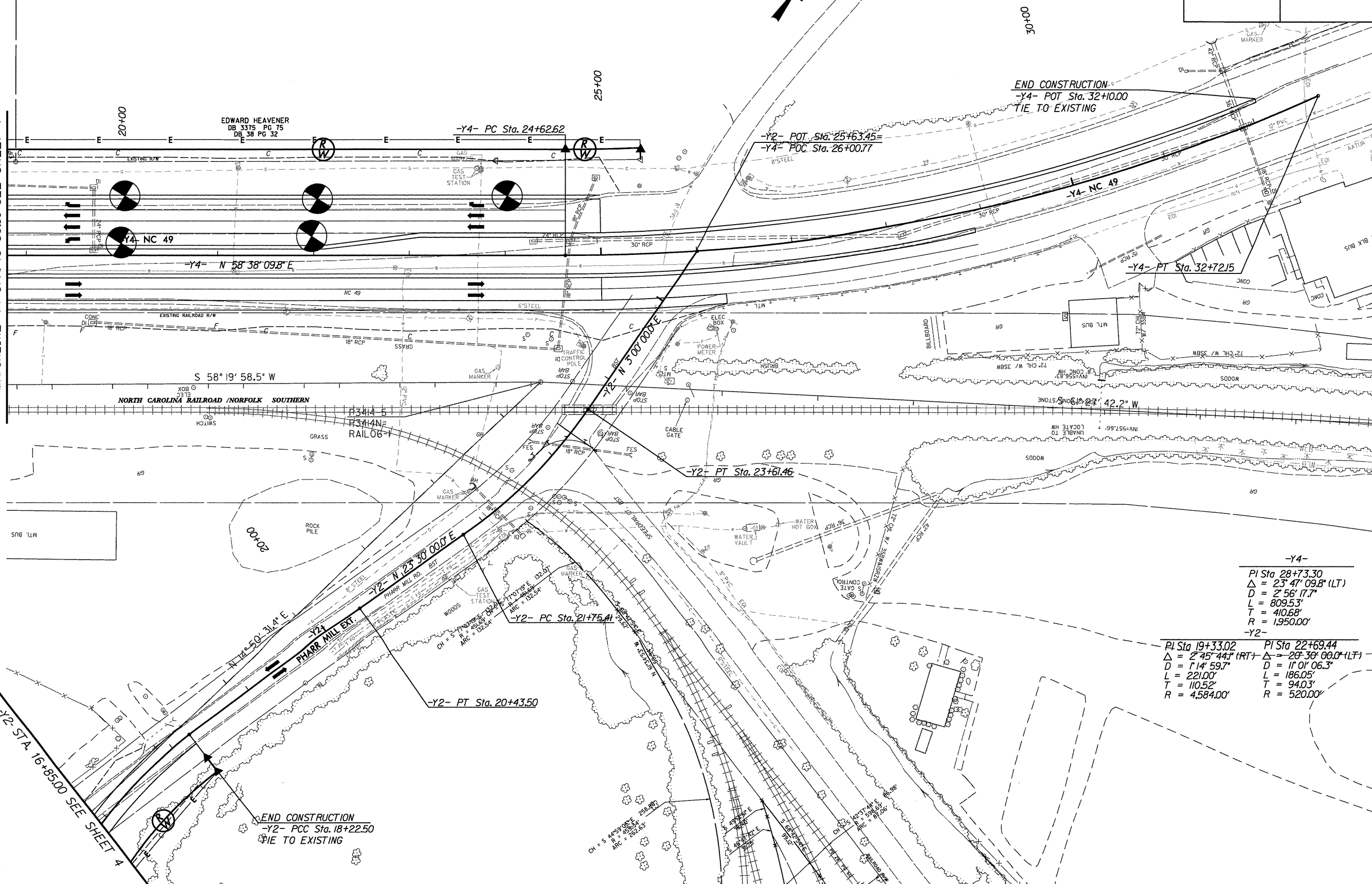


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NC L1 0296 - C-2843

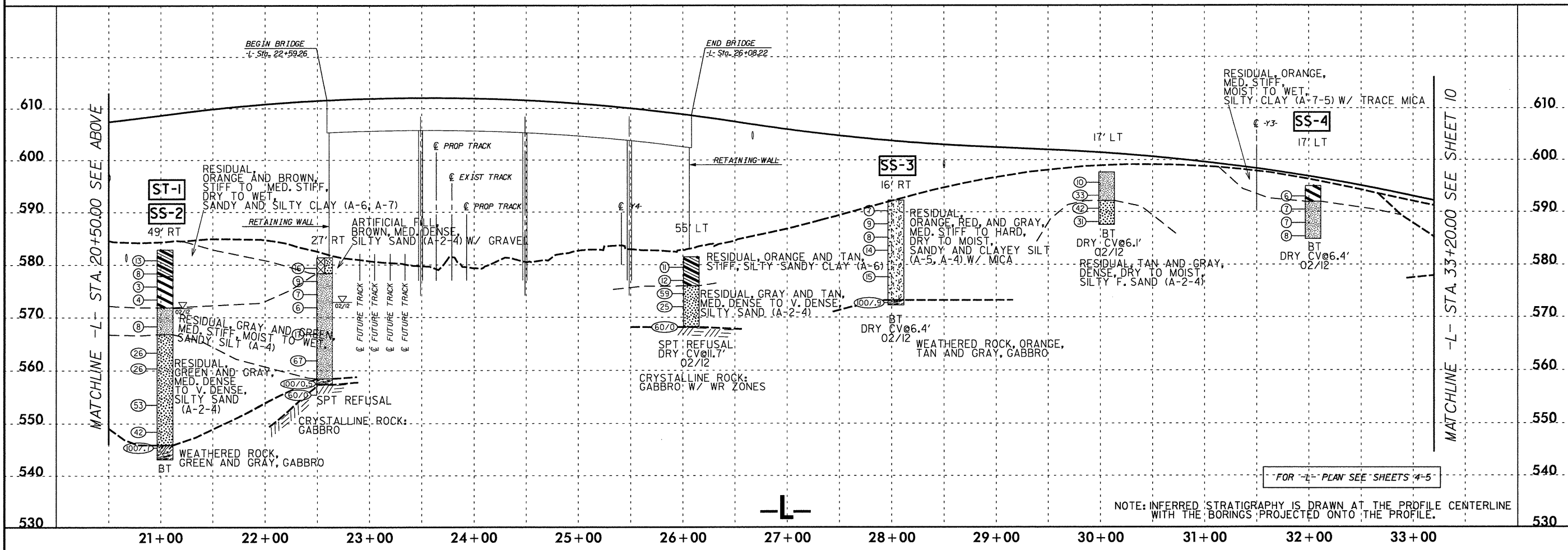
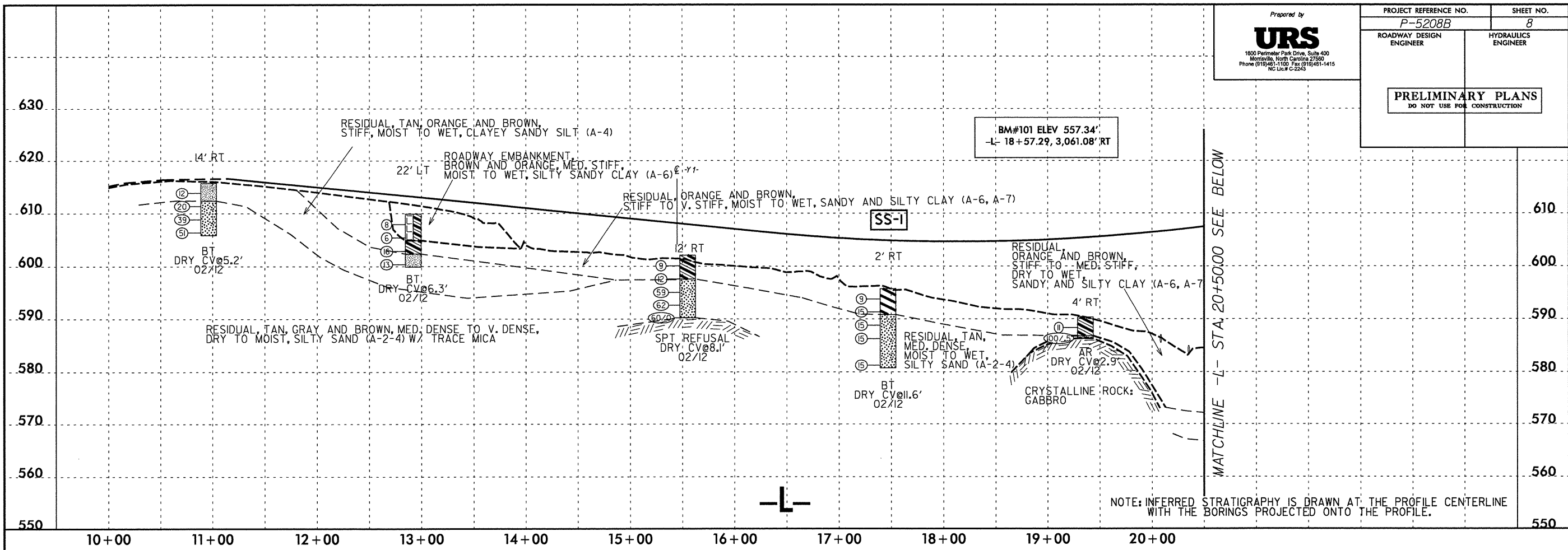
PROJECT REFERENCE NO. <i>P-5208B</i>	SHEET NO. 7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

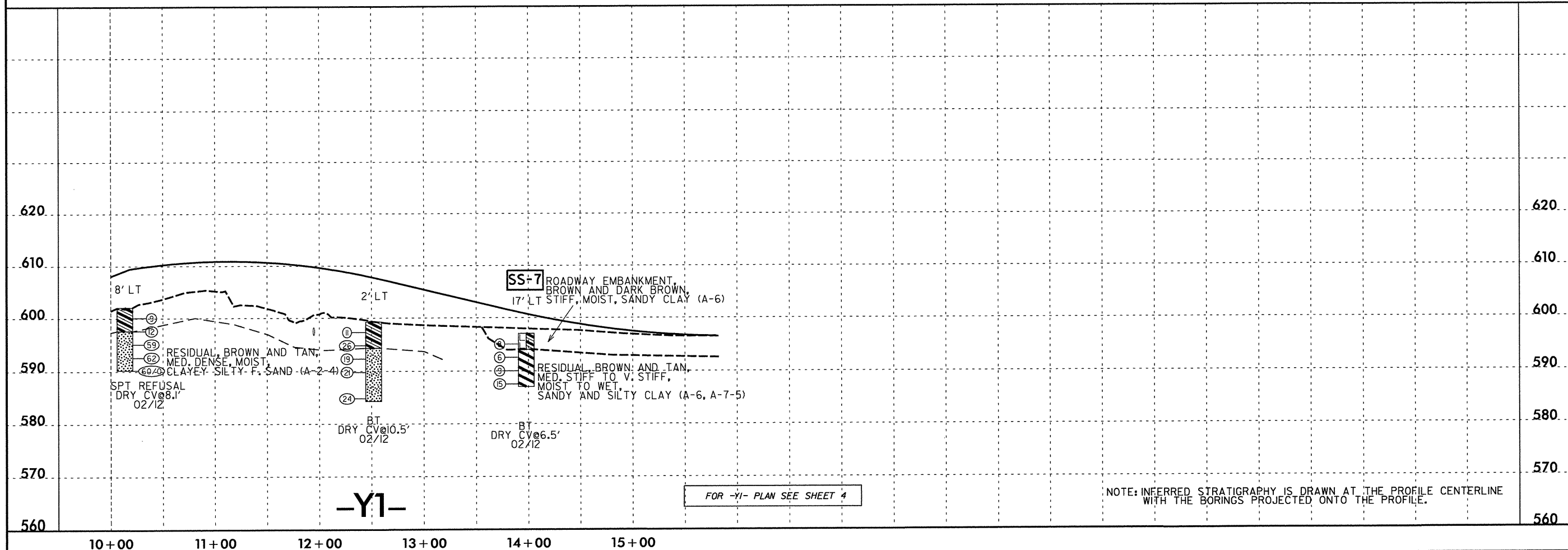
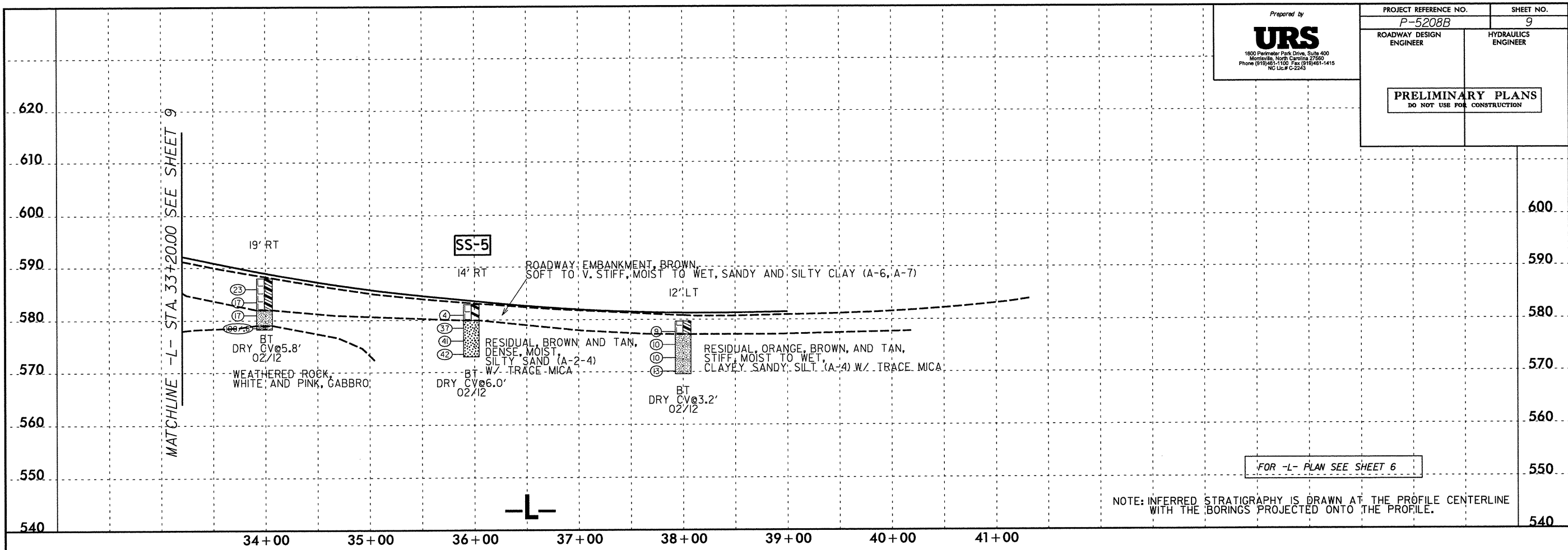
MATCHLINE -Y4- STA. 18+80.00 SEE SHEET 4

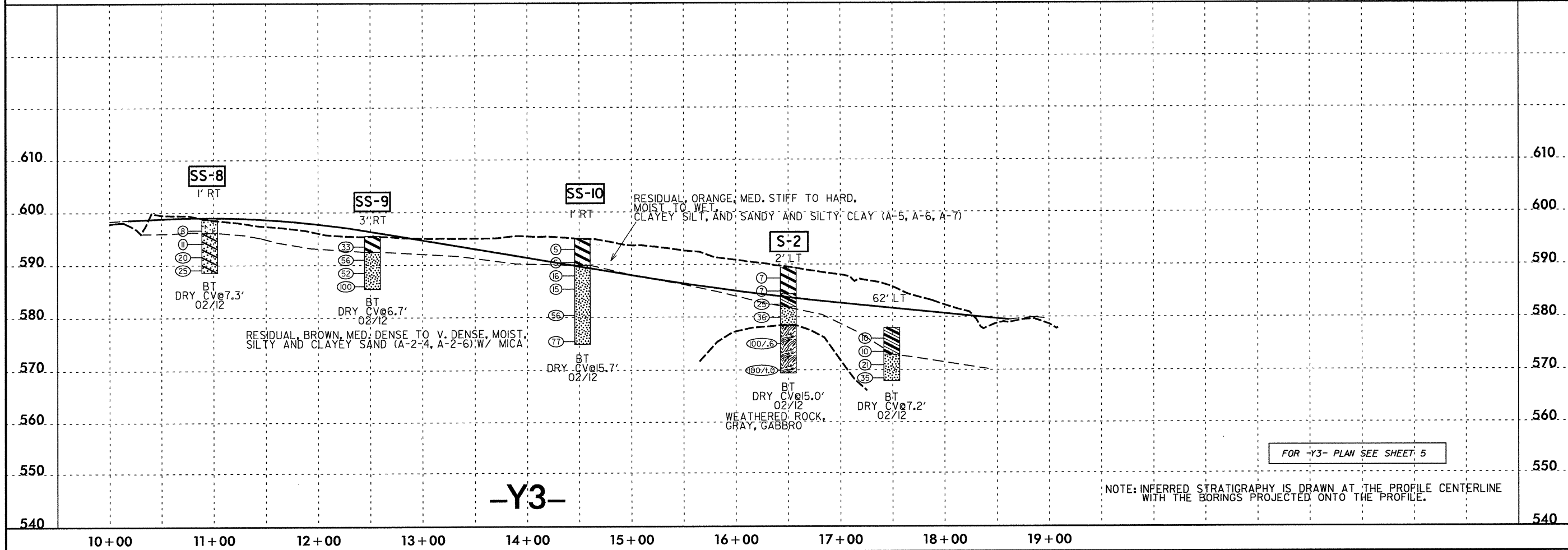
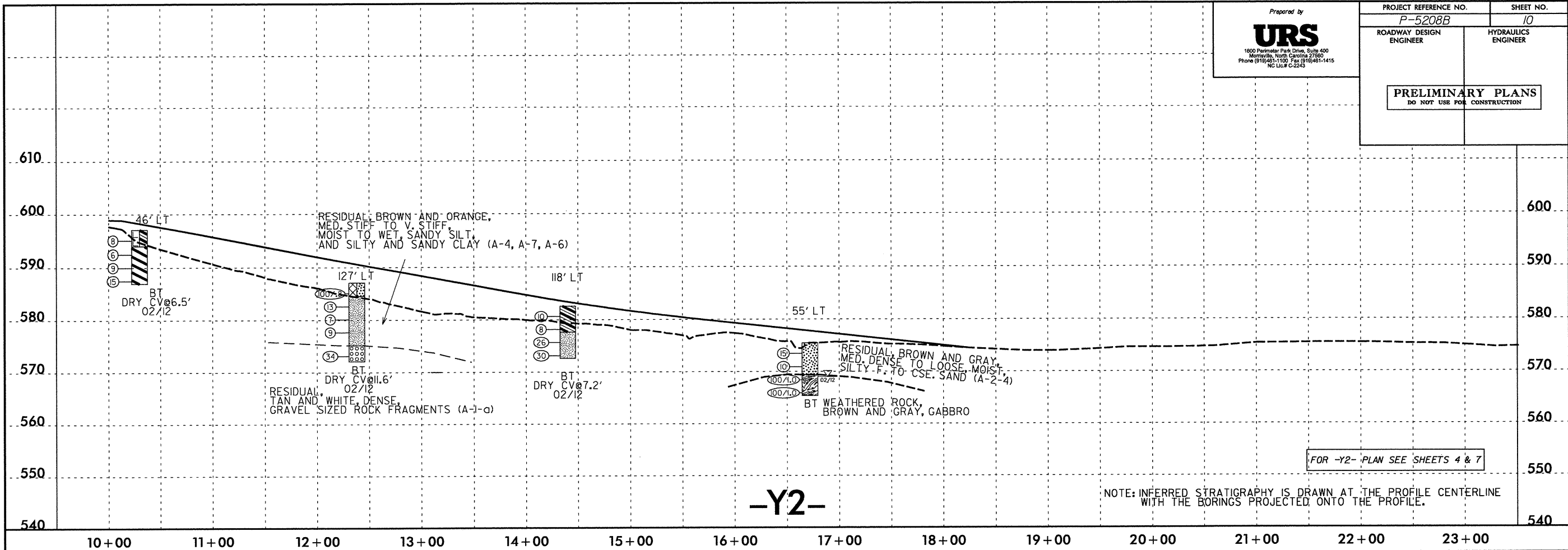
MATCHLINE -Y2- STA. 16+85.00 SEE SHEET 4



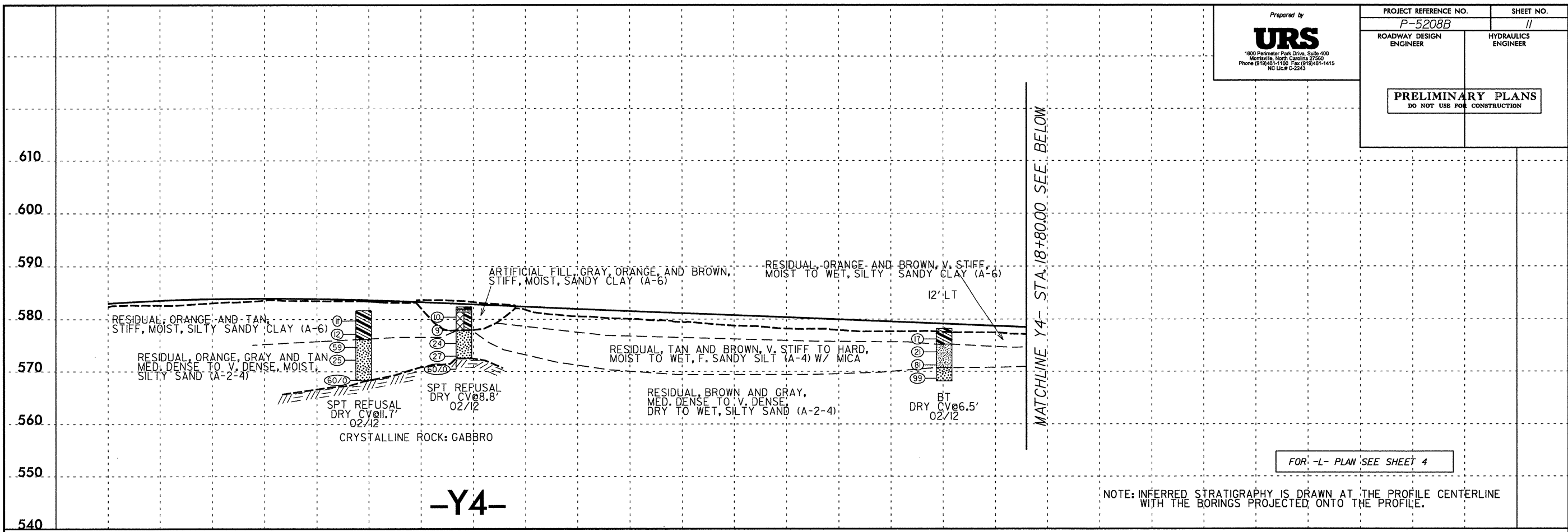
-Y4-	
PI Sta 28+73.30	$\Delta = 23^{\circ} 47' 09.8''$ (LT)
$D = 2^{\circ} 56' 17.7''$	$L = 809.53'$
$T = 410.68'$	$R = 1,950.00'$
-Y2-	
PI Sta 19+33.02	$\Delta = 2^{\circ} 45' 44.1''$ (RT)
$D = 1^{\circ} 14' 59.7''$	$L = 221.00'$
$T = 110.52'$	$R = 4,584.00'$
PI Sta 22+69.44	$\Delta = 26^{\circ} 30' 00.0''$ (LT)
$D = 11^{\circ} 01' 06.3''$	$L = 186.05'$
$T = 94.03'$	$R = 520.00'$





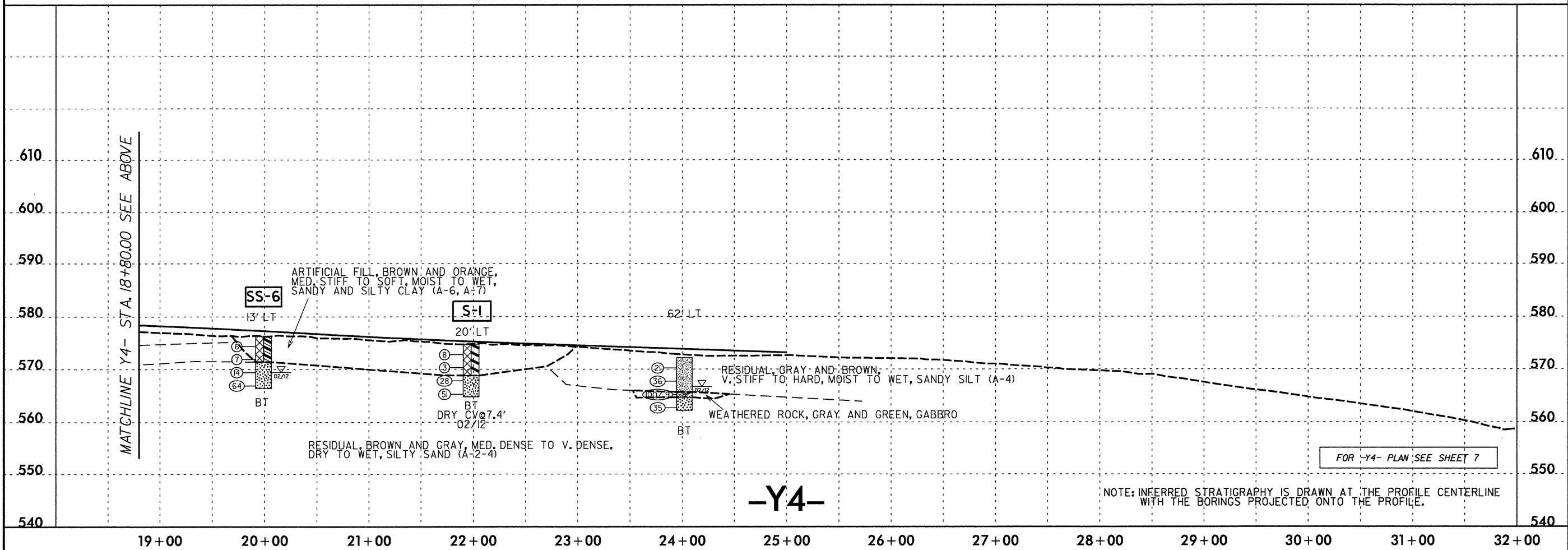


Prepared by URS <small>1800 Twoometer Park Drive, Suite 400 Morrisville, North Carolina 27560 Phone (919)451-1100 Fax (919)491-1415 NC Lic # 02-2263</small>	PROJECT REFERENCE NO.	SHEET NO.
	P-5208B	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



FOR -L- PLAN SEE SHEET 4

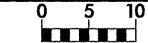
NOTE: INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE CENTERLINE WITH THE BORINGS PROJECTED ONTO THE PROFILE.



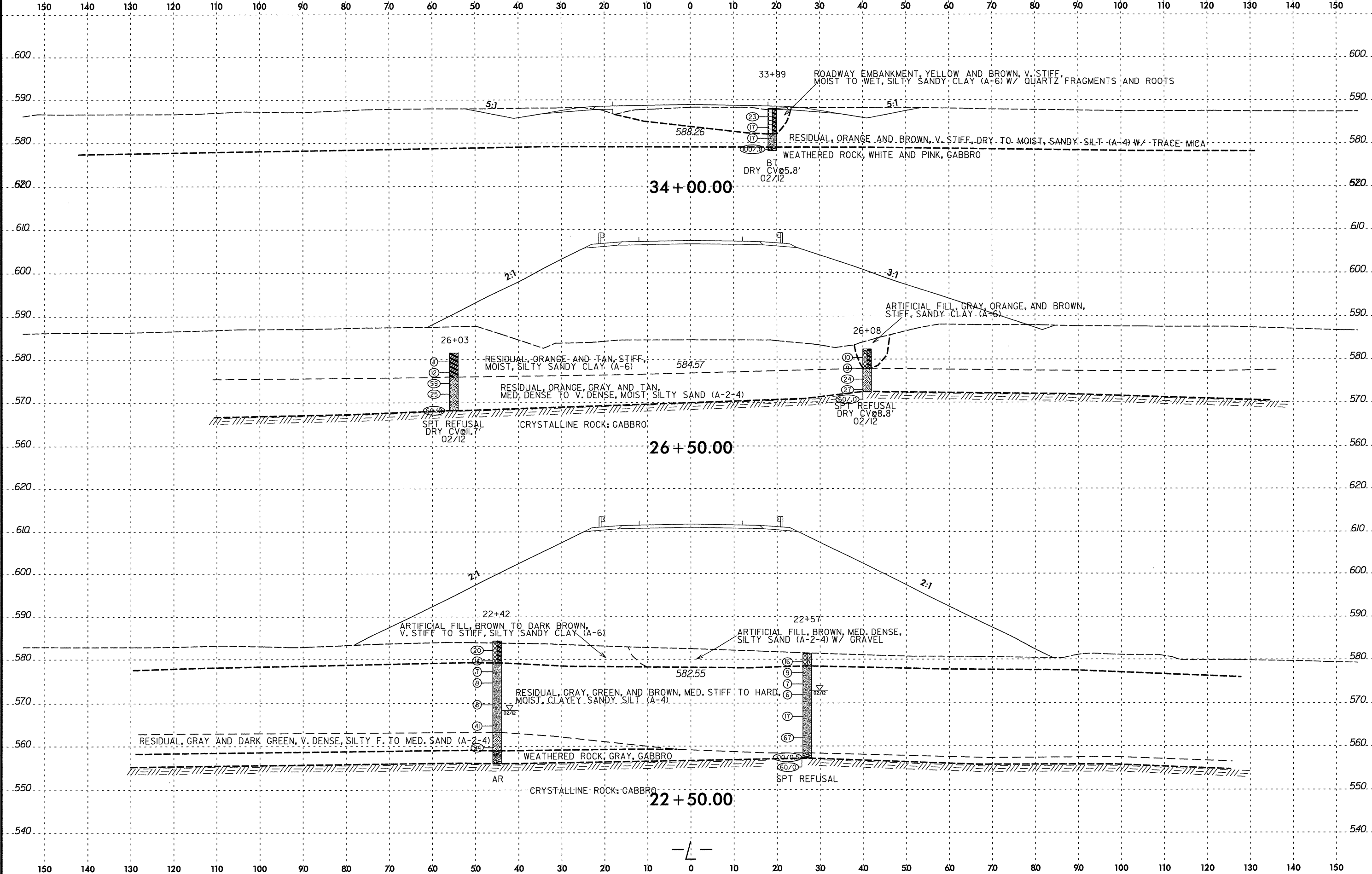
FOR -Y4- PLAN SEE SHEET 7

NOTE: INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE CENTERLINE WITH THE BORINGS PROJECTED ONTO THE PROFILE.

8/23/09

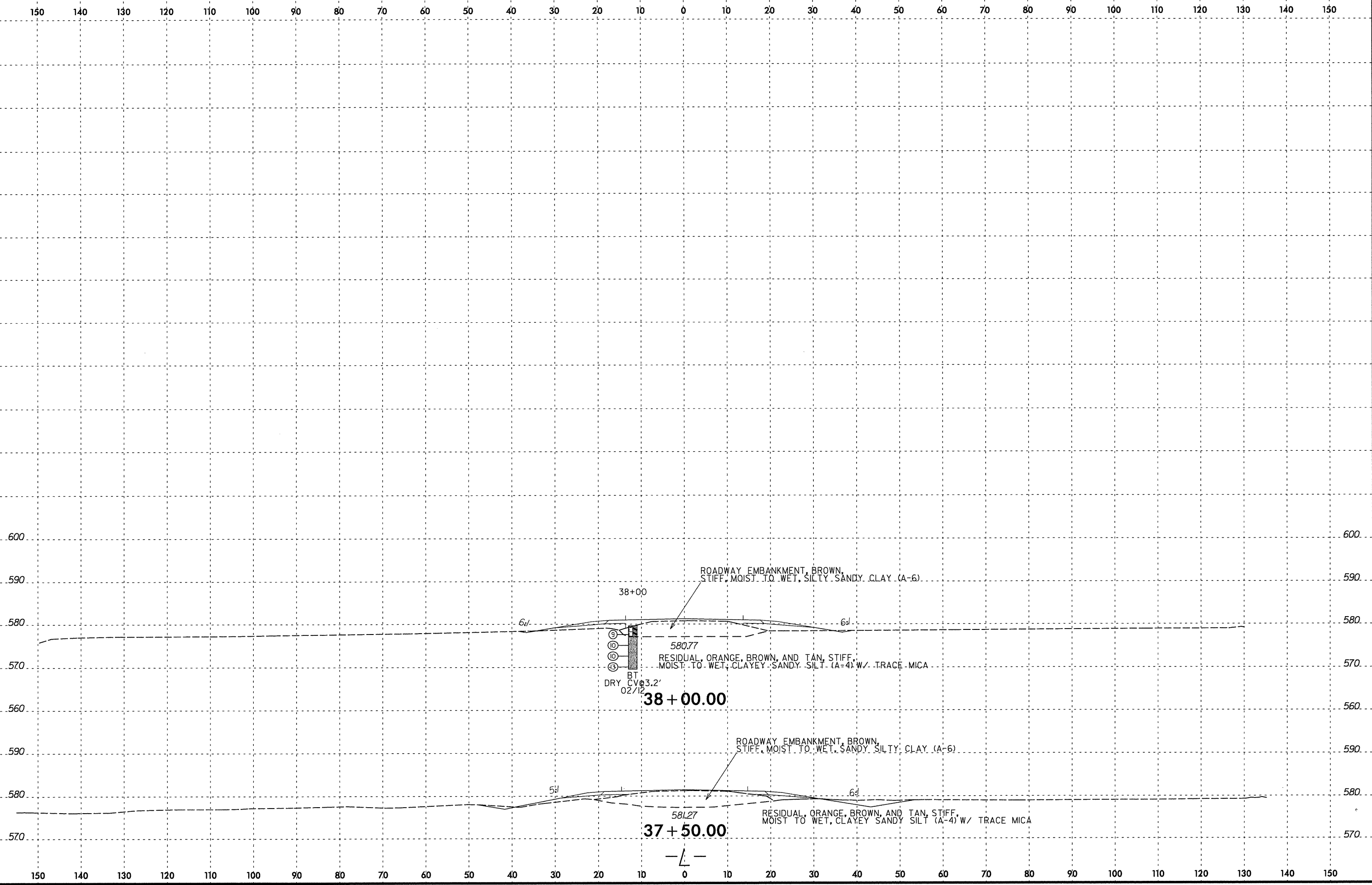


PROJ. REFERENCE NO.	SHEET NO.
P-5208B	12

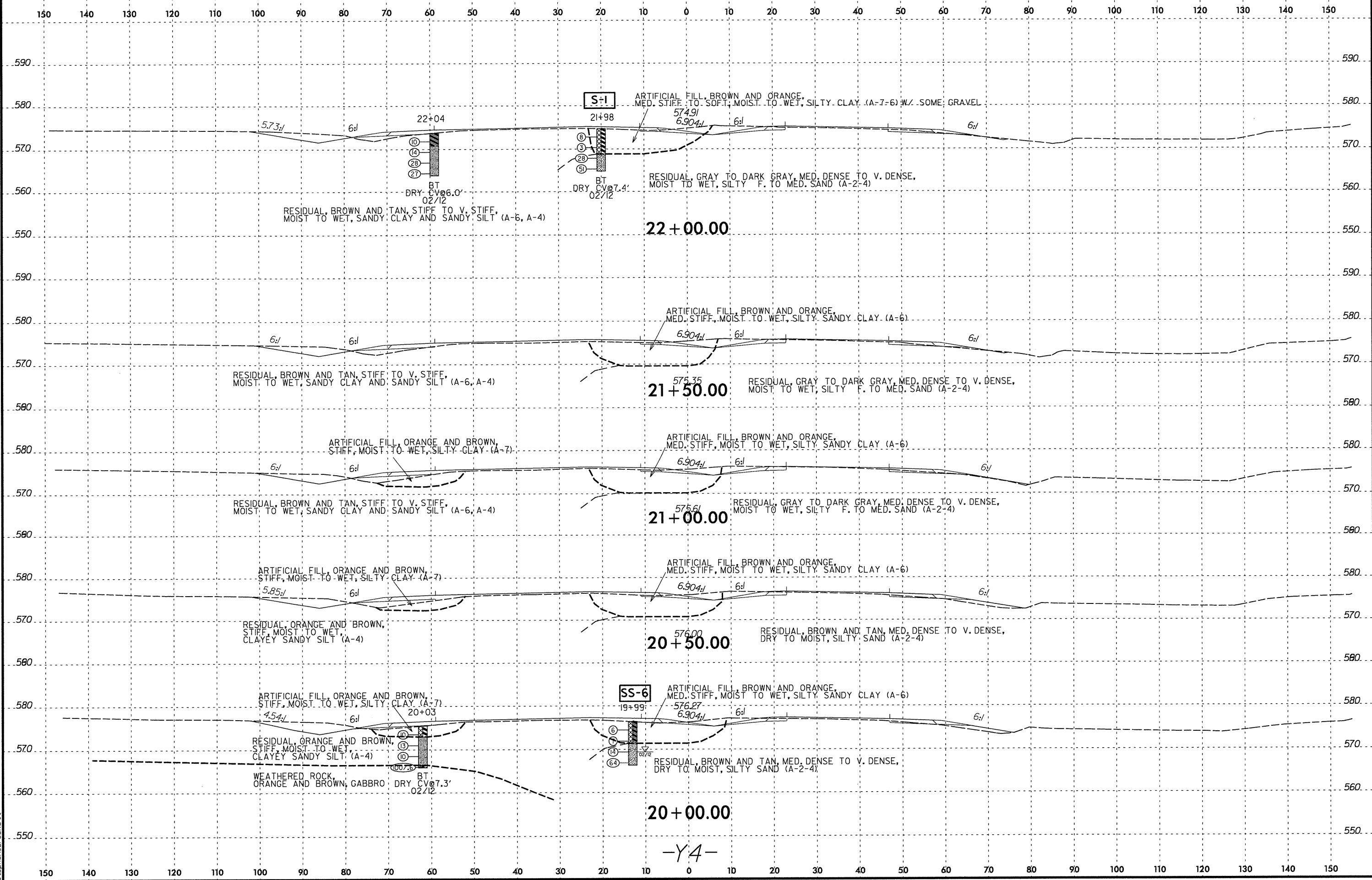


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8/23/2012
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Stephen_Crockett

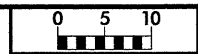


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Stephen.Crockett



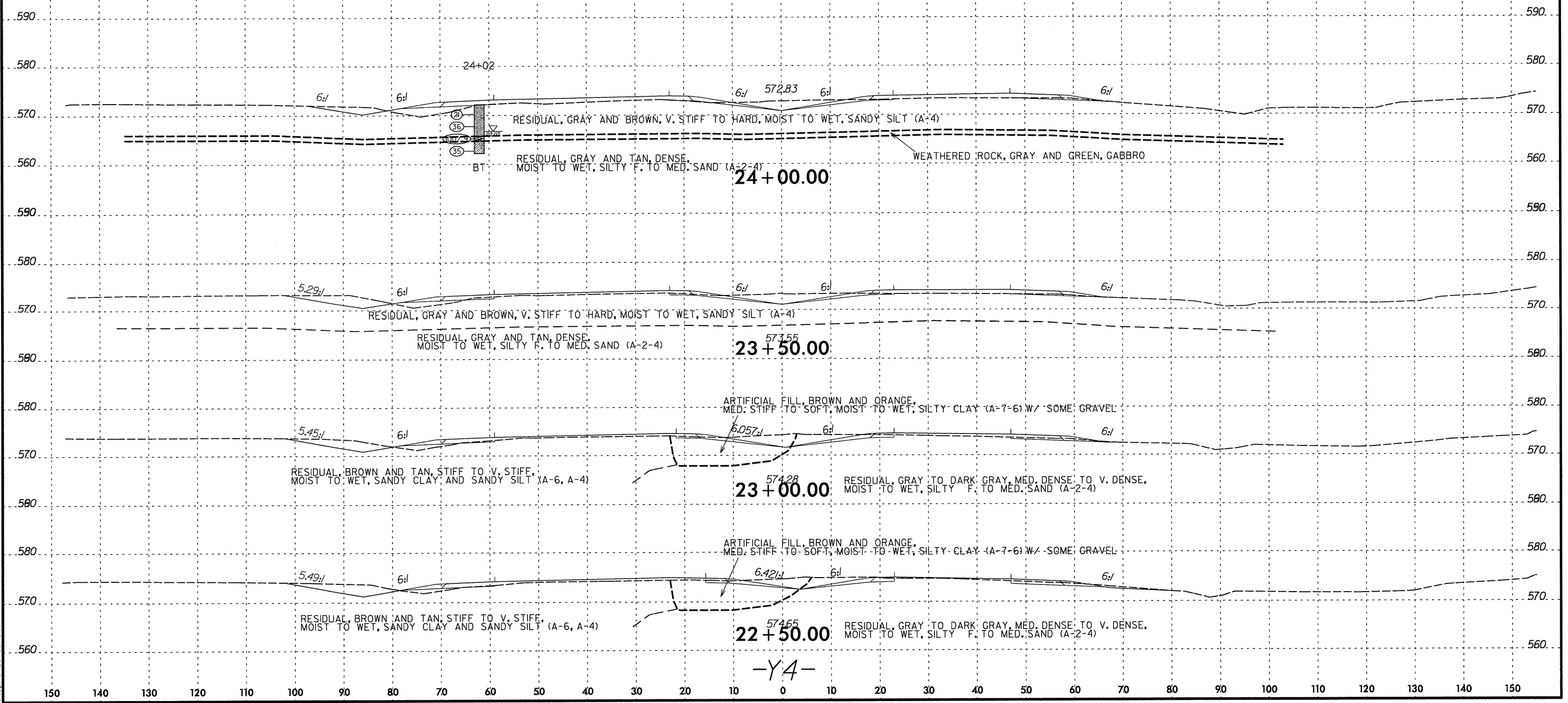
-Y4-

8/23/99



PROJ. REFERENCE NO.	SHEET NO.
P-5208B	16

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



-Y4-

8/23/2012
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Stephen Crockett

SOIL TEST RESULTS

CLASSIFICATION TEST RESULTS

SAMPLE NO.	OFFSET	STATION	ALIGNMENT	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	2' RT	17+47	-L-	1.0-2.5	A-7-5(33)	72	38	12.0	12.8	23.8	51.4	100	92.6	77.3	46.0	-
SS-2	49' RT	21+04	-L-	13.5-15.0	A-4(1)	36	4	18.7	36.7	25.2	19.4	100	89.4	50.0	39.1	-
SS-3	16' RT	28+04	-L-	1.0-2.5	A-5(4)	47	4	4.1	40.2	40.3	15.4	100	99.5	62.6	38.6	-
SS-4	17' LT	32+04	-L-	1.0-2.5	A-7-5(24)	69	24	8.3	16.7	21.1	53.9	99.9	95.6	78.0	49.6	-
SS-5	14' RT	35+97	-L-	1.0-2.5	A-7-6(14)	59	31	26.9	21.2	16.0	35.9	99.5	80.5	54.6	32.8	-
SS-6	13' LT	19+99	-Y4-	1.0-2.5	A-6(7)	38	17	16.1	31.3	24.9	27.7	95.6	86.5	55.3	26.1	-
SS-7	17' LT	13+98	-Y1-	3.5-5.0	A-7-5(23)	69	33	19.8	15.8	22.9	41.5	100	85.4	67.0	34.5	-
SS-8	1' RT	10+96	-Y3-	1.0-2.5	A-5(5)	44	9	15.6	27.5	33.6	23.3	100	93.3	61.3	48.9	-
SS-9	3' RT	12+52	-Y3-	1.0-2.5	A-7-5(2)	46	13	32.2	32.7	15.5	19.6	100	81.5	38.7	31.0	-
SS-10	1' RT	14+53	-Y3-	1.0-2.5	A-7-6(12)	45	20	9.7	26.7	31.3	32.3	100	98.3	66.9	38.1	-
S-1	20' LT	21+98	-Y4-	0-5.0	A-7-6(24)	64	40	17.7	20.6	12.4	49.3	98.5	88.2	63.3	31.8	-
S-2	2' LT	16+50	-Y3-	0-5.0	A-7-6(18)	50	23	7.5	20.3	18.8	53.4	100	97.9	74.7	34.8	-
ST-1	49' RT	21+04	-L-	6.0-8.0	A-7-5(14)	57	25	20.2	21.6	19.7	38.5	100	87.1	61.4	45.6	-

STANDARD COMPACTION AND CBR TEST RESULTS

SAMPLE NO.	OFFSET	STATION	ALIGNMENT	DEPTH INTERVAL	AASHTO CLASS.	% NATURAL MOISTURE	MAX. DRY DENSITY (pcf)	% OPTIMUM MOISTURE	% COMPACTION	CBR	% SWELL
S-1	20' LT	21+98	-Y4-	0-5.0	A-7-6(24)	31.8	101.1	22.7	94%	2	3.4
S-2	2' LT	16+50	-Y3-	0-5.0	A-7-6(18)	26.1	96.7	26.1	96%	5	0.4

CONSOLIDATION TEST RESULTS

SAMPLE NO.	OFFSET	STATION	ALIGNMENT	DEPTH INTERVAL	AASHTO CLASS.	% NATURAL MOISTURE	SPECIFIC GRAVITY (G)	VOID RATIO (e)	Pc (tsf)	Cr	Cc	Cv (ft ² /year)
ST-1	49' RT	21+04	-L-	6.0-8.0	A-7-5(14)	45.6	2.743	1.4043	1.0	0.0247	0.377	200

0053DELP10a2

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

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208B	1	8
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1.STR05T1B	FA-FR-HSR-0004-10-01-00	PE, UHIL, PE	
50000.1.STR06T3		PE, UHIL, PE	
43219.2.STR09F5208		ROW	
50000.3.STR02T4D		UTIL CONSTRUCT	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
Y6	10+00 to 31+45	4-5	6	7-8

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 50000.1.STR05T1B (P-5208B) F.A. PROJ. _____
COUNTY CABARRUS
PROJECT DESCRIPTION GRADE SEPARATION: -Y6- (SR 1160)
RELOCATION

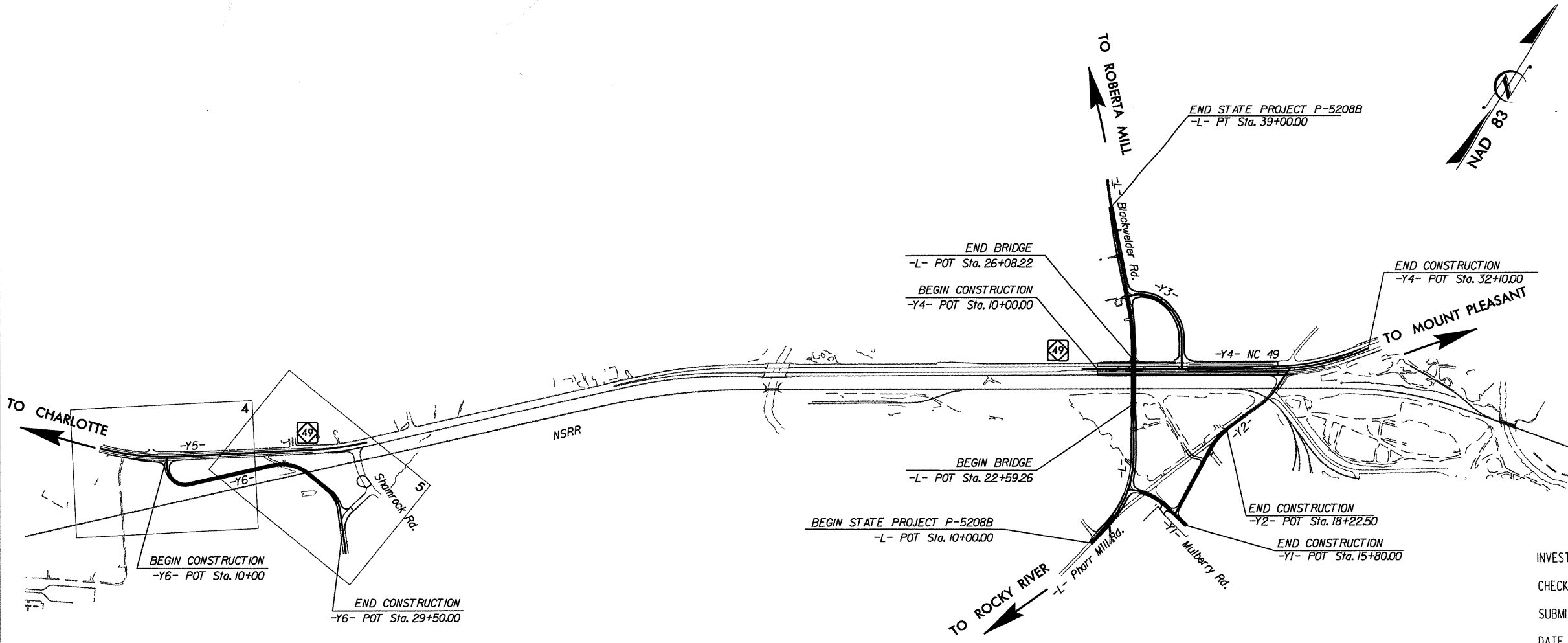
INVENTORY

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 1919 707-6850. 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-PLACED) 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.

CONTRACT: C203145 ID: P-5208B



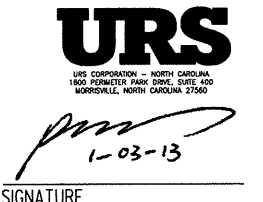
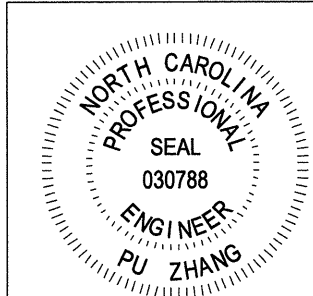
PERSONNEL
AMERIDRILL
J. HVOZDIK
S. CROCKETT

INVESTIGATED BY **D. CARR**
CHECKED BY **P. ZHANG**
SUBMITTED BY **P. ZHANG**
DATE **JANUARY, 2013**

DRAWN BY: **S. CROCKETT**

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.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 50000.J.STR05TIB (P-5208B) SHEET NO. 2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																																												
<p>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 (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</p>		<p>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.</p>		<p>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:</p>		<p>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. 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ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>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></p> <p>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></p> <p>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></p> <p>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.</p>		<p>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. 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TIP PROJECT: P-5208B

CONTRACT: C203145

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

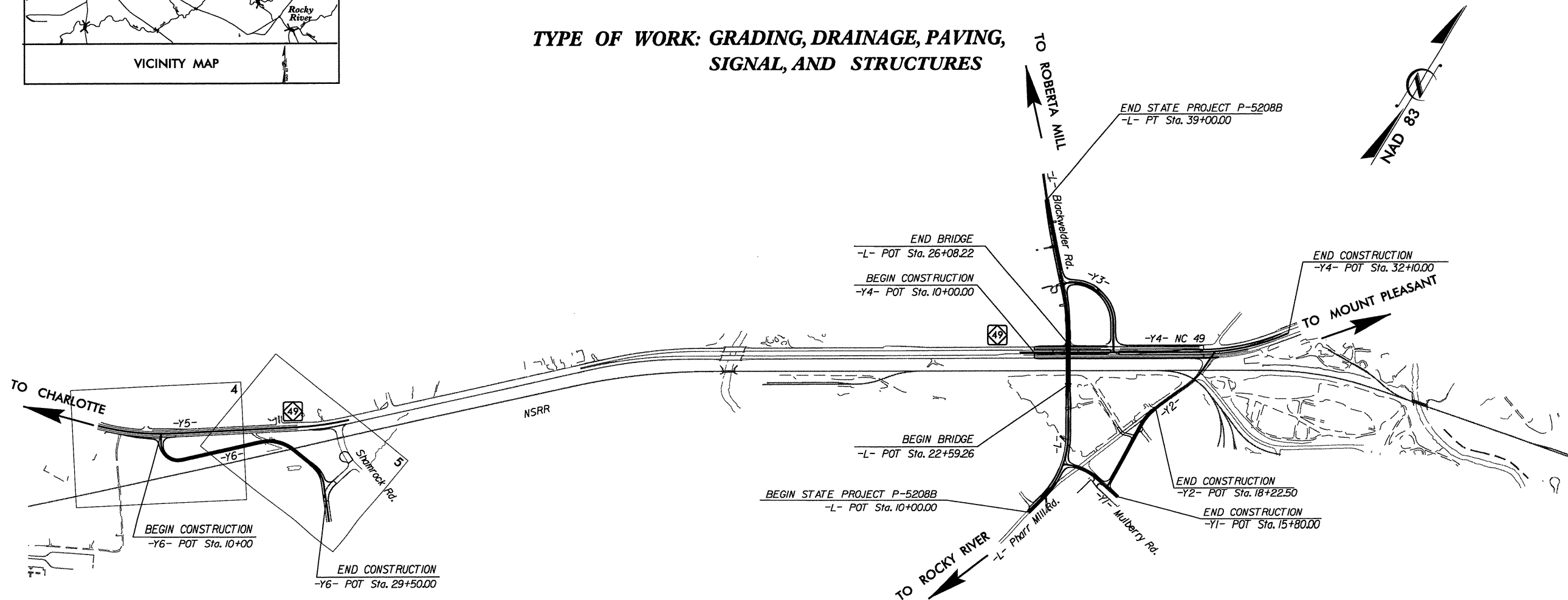
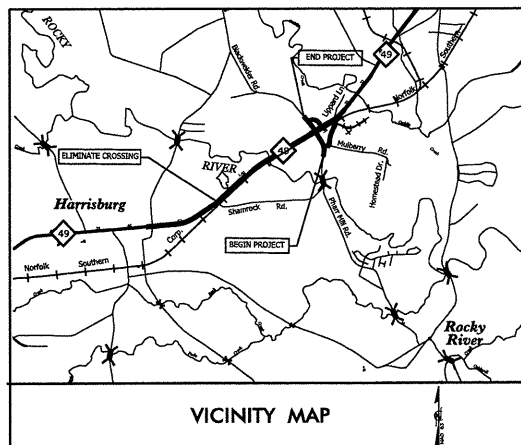
CABARRUS COUNTY

**LOCATION: PHARR MILL ROAD /BLACKWELDER
ROAD GRADE SEPARATION OVER NCRR /NS**

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



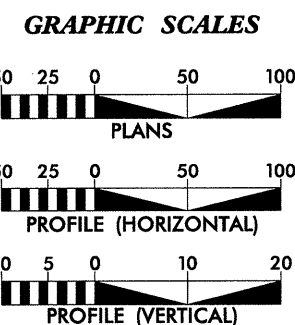
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208B	2A	8
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50000.1.STR05T1B	FRA-FR-HSR-0006-10-01-00	PE, Util. PE	
50000.1.STR06T3		PE, Util. PE	
43219.2.STR09P5208		ROW	
50000.3.STR0214D		UTIL CONSTRUCT	



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: 90% PLANS
DATE: NOVEMBER 12, 2012

CLEARING ON THIS PROJECT SHEE BE PERFORMED TO THE LIMITS ESTABLISHED BUY METHOD III.



DESIGN DATA

ADT 2010 = 2,400
ADT 2035 = 11,200
DHV = 10 %
D = 75 %
T = 1 % *
V = 50 MPH
* TTST = 2% DUAL
FUNC CL = COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY = 0.48 Miles
LENGTH BRIDGE = 0.07 Miles
TOTAL LENGTH = 0.55 Miles

Prepared In the Office of:
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

URS

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL 30, 2012

LETTING DATE:
APRIL 16, 2013

EDWARD G. EDENS, PE
PROJECT ENGINEER

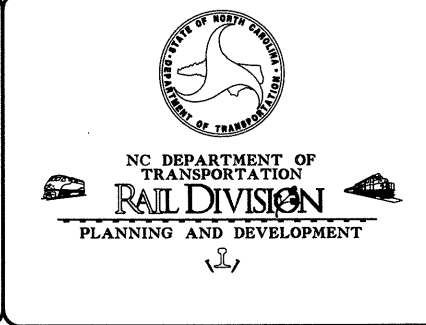
JEFFREY R. HEXT
PROJECT DESIGN ENGINEER

RAIL ENGINEER

SIGNATURE: _____ P.E.

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.





STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

November 30, 2012

STATE PROJECT: 50000.1.STR05T1B
TIP NO.: P-5208B
COUNTY: Cabarrus

DESCRIPTION: Grade Separation: -Y6- (SR 1160) Relocation

SUBJECT: Geotechnical Report –Inventory

Project Description

The project is part of the Grade Separation: -L- (SR 1158) over -Y4- (NC 49) and NCR/Norfolk Southern Railroad project, consisting of the relocation of SR 1158 (Shamrock Road) and the closure and removal of the existing public at-grade crossing for Shamrock Road.

A geotechnical investigation was conducted in October 2012. Borings were advanced utilizing an ATV mounted CME-550 drill machine with an automatic hammer. Standard Penetration Tests were performed at each boring location. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis. The following alignment was investigated.

<u>Line</u>	<u>Station(±)</u>
-Y6-	10+00 to 31+45

Areas of Special Geotechnical Interest

- 1) **Highly Plastic Clays**: Highly plastic ($PI \geq 26$) clays were encountered on the project at the following interval.

<u>Line</u>	<u>Station (±)</u>
-Y6-	15+00
-Y6-	20+00

- 2) **Artificial Fill**: Artificial fill was encountered at the following locations.

<u>Line</u>	<u>Station (±)</u>
-Y6-	20+82 to 22+17
-Y6-	23+23 to 24+09
-Y6-	25+71 to 27+48

Physiography and Geology

The project is located in the Piedmont Province. Land use along the project corridor consists of roadways, railroads, homes, commercial businesses, and woods. Geologically, the project is located within the Charlotte Belt. Gabbro of Concord Plutonic Suite intrusive rock (DOgb) was encountered at the project site. Rocky River and its branches and a few ditches drain the project.

Soil Properties

Soils encountered at the project site include artificial fill, residual, and weathered rock of Gabbro.

Artificial fill soils were encountered along -Y6-, and consist of light brown, medium stiff to stiff, sandy silt and clay (A-4, A-6). The artificial fill is underlain by residual soils.

Residual soils were encountered throughout the project. These soils consist primarily of orange, brown, and gray, medium stiff to hard, sandy silts, and sandy and silty clays (A-4, A-6, A-7-6), and medium dense to very dense, silty sand (A-2-4).

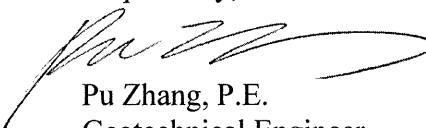
Rock Properties

Weathered rock was encountered during the roadway investigation. It originates from the underlying Gabbro.

Ground Water

Groundwater was not encountered in any of the borings. However, groundwater may fluctuate with seasonal precipitation.

Prepared by,


Pu Zhang, P.E.
Geotechnical Engineer

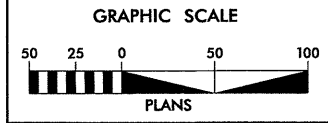
PROJECT REFERENCE NO.	SHEET NO.
50000.LSTRO5TIB (P-5208B)	3A

EARTHWORK BALANCE SHEET
(Refer to the Inventory Report for Grade Separation:
-L- (SR 1158) over -Y4- (NC 49) and NCR/Norfolk Southern Railroad)

8/17/99

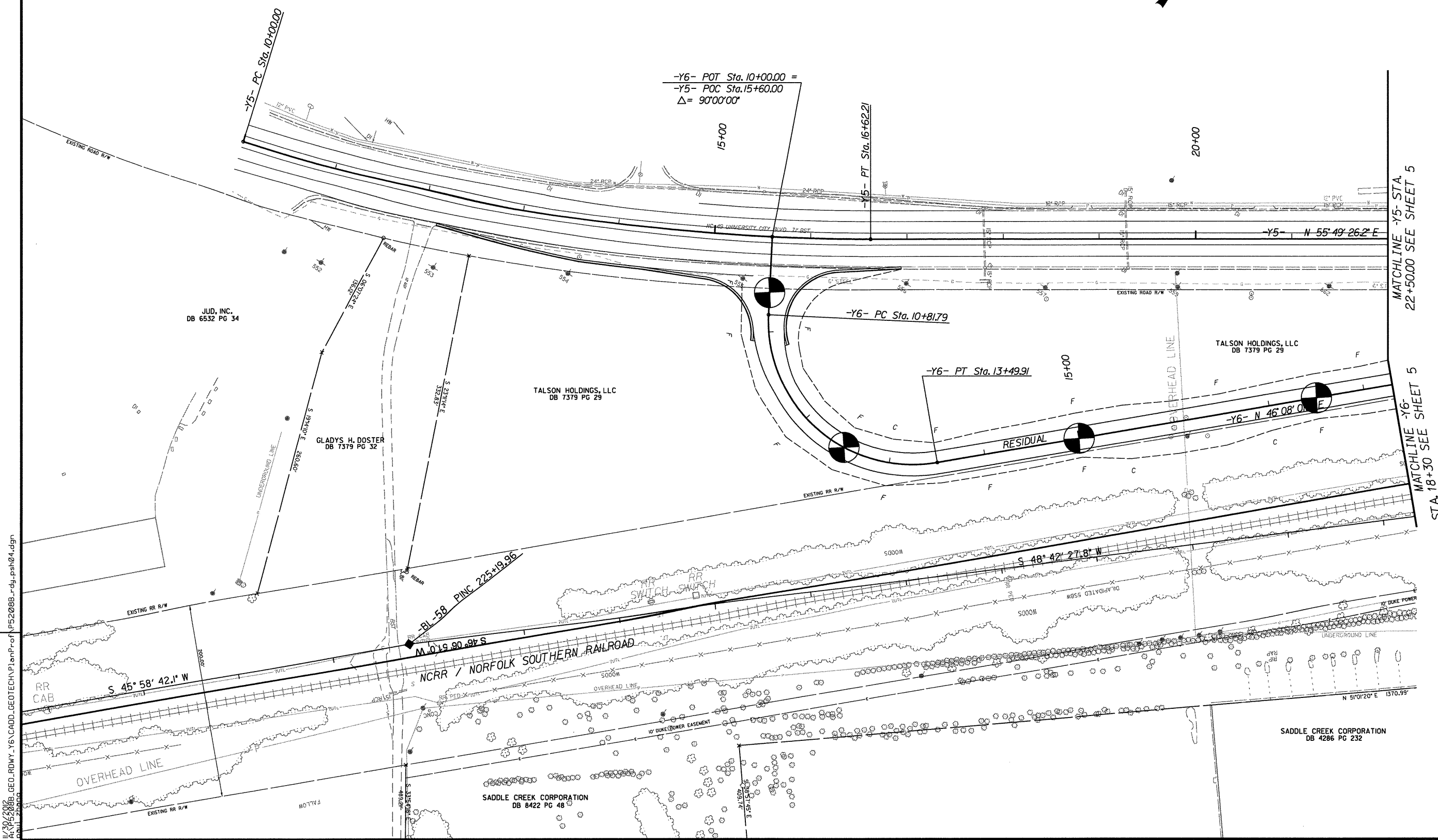
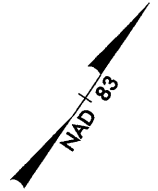
REVISIONS

11/30/2018
As: P52088b.GEO_RDWY_Y6_CADD_GEO TECH Plan of NPS2088b_rdy_pah04.dgn
Paul Zhang



Prepared by
URS
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TEL: 919-461-1100 FAX: 919-461-1415
NC LICENSE # C-28243

PROJECT REFERENCE NO. <i>P-52088</i>	SHEET NO. 4
RAW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCHLINE -Y5- STA. 22+50.00 SEE SHEET 5

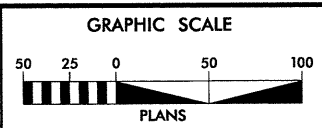
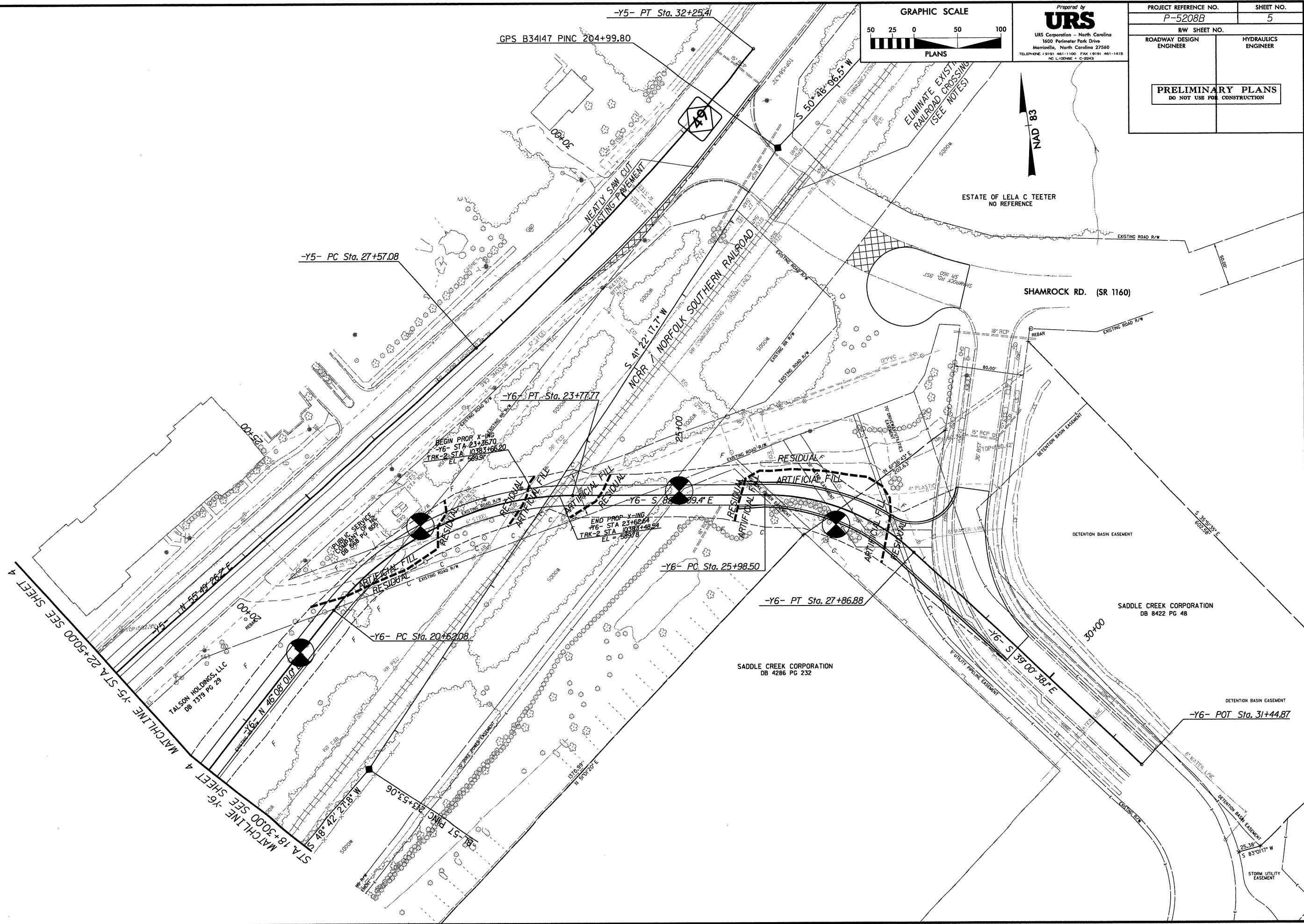
MATCHLINE -Y6- STA. 18+30 SEE SHEET 5

SADDLE CREEK CORPORATION
DB 4286 PG 232

8/17/99

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1/30/2008 10:53:58 AM
caul zibad

REVISIONS



Prepared by
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PROJECT REFERENCE NO. <i>P-5208B</i>	SHEET NO. 5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



ESTATE OF LELA C TEETER
 NO REFERENCE

SHAMROCK RD. (SR 1160)

SADDLE CREEK CORPORATION
 DB 8422 PG 48

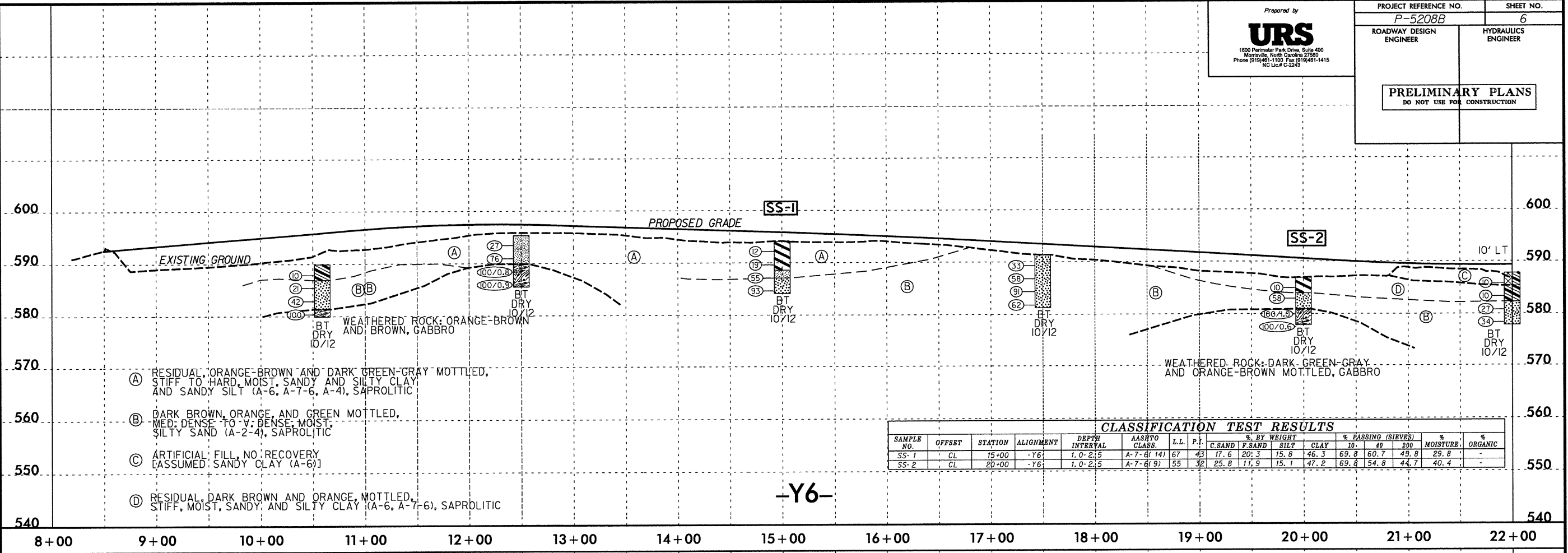
SADDLE CREEK CORPORATION
 DB 4286 PG 232

STORM UTILITY EASEMENT

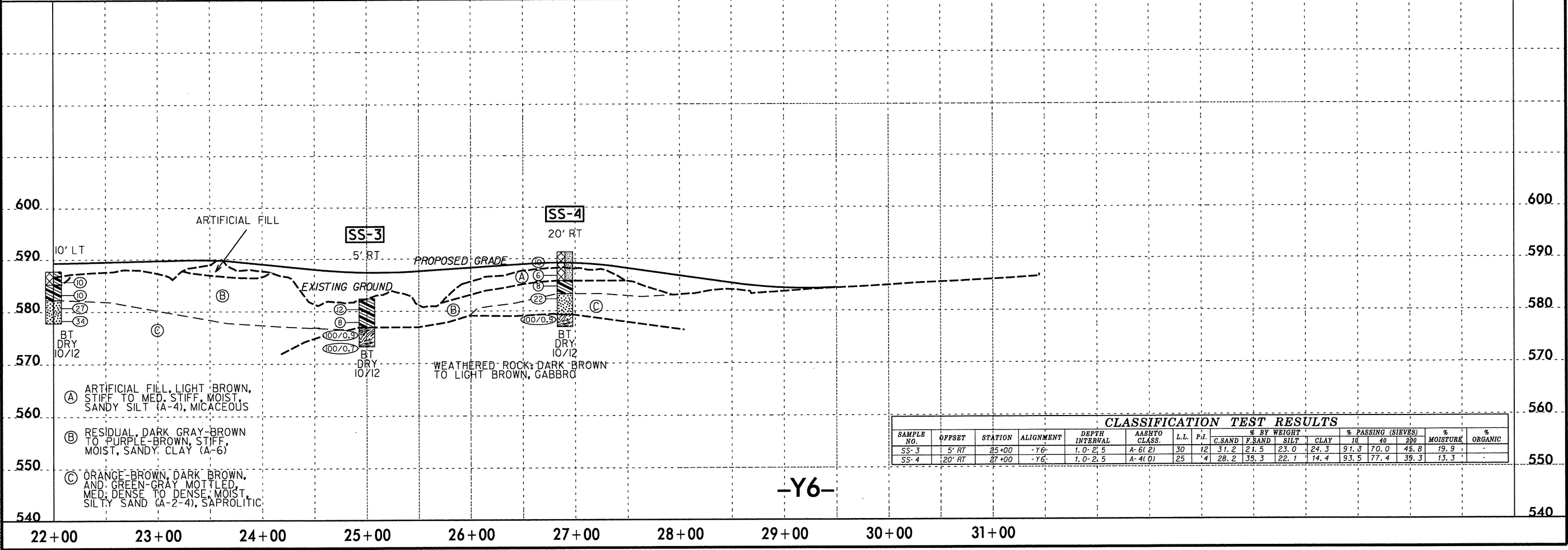
5/28/99

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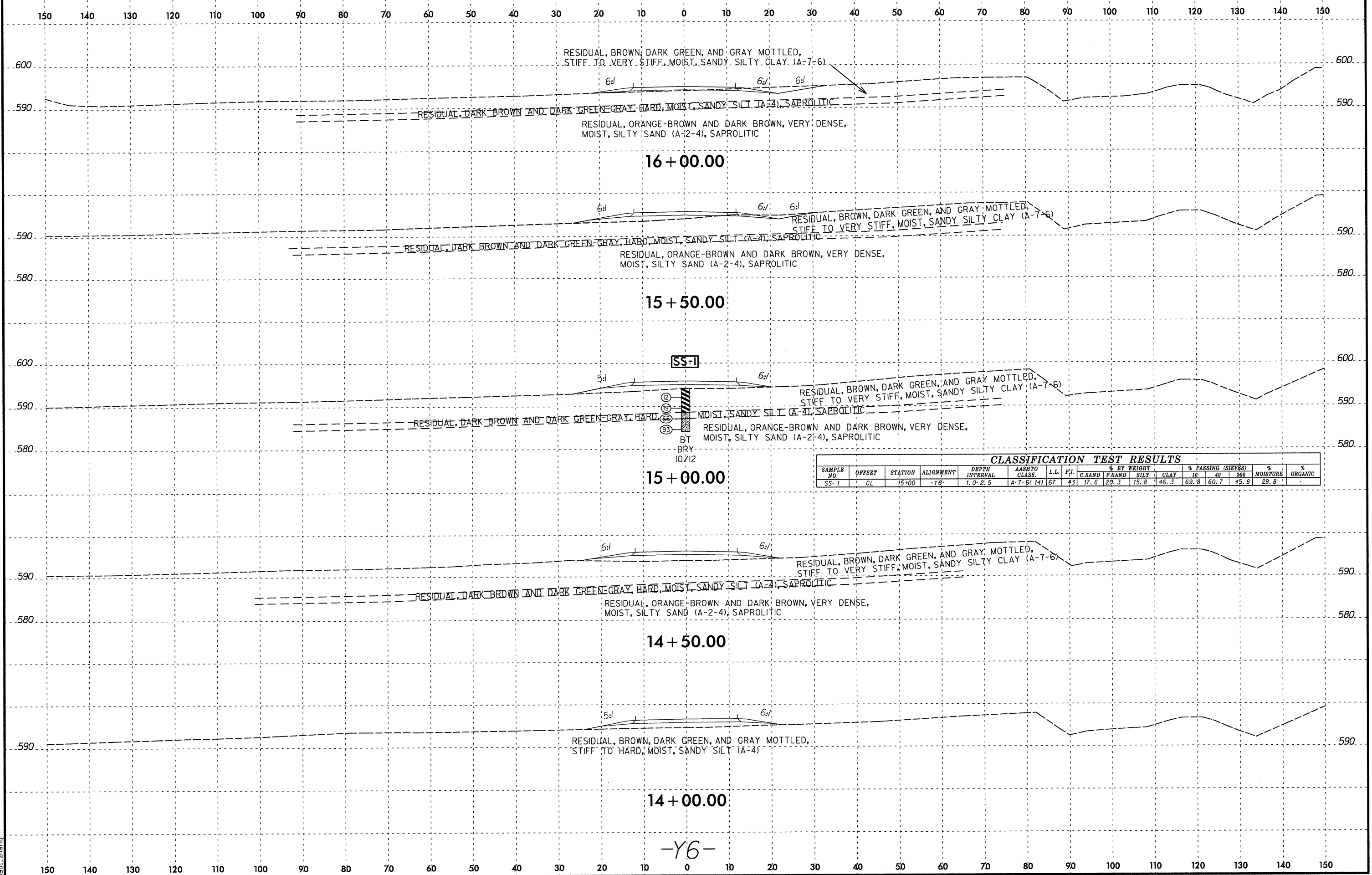
PROJECT REFERENCE NO. P-5208B	SHEET NO. 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



11/30/2008 At:\P5208B_GEO_RDWY_Y6\CADD_GEOTECH\Plan\Prof\P5208B_rdy_PFI(SHT6).dgn



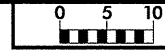
8/23/99
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 paul.zhang



CLASSIFICATION TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	ALIGNMENT	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)		% MOISTURE	% ORGANIC	
								C.SAND	F.SAND	SILT	CLAY	10	200			
SS-1	CL	15+00	-Y6-	1.0-2.5	A-7-6(14)	67	43	17.6	20.3	15.8	46.3	69.8	60.7	45.8	29.8	-

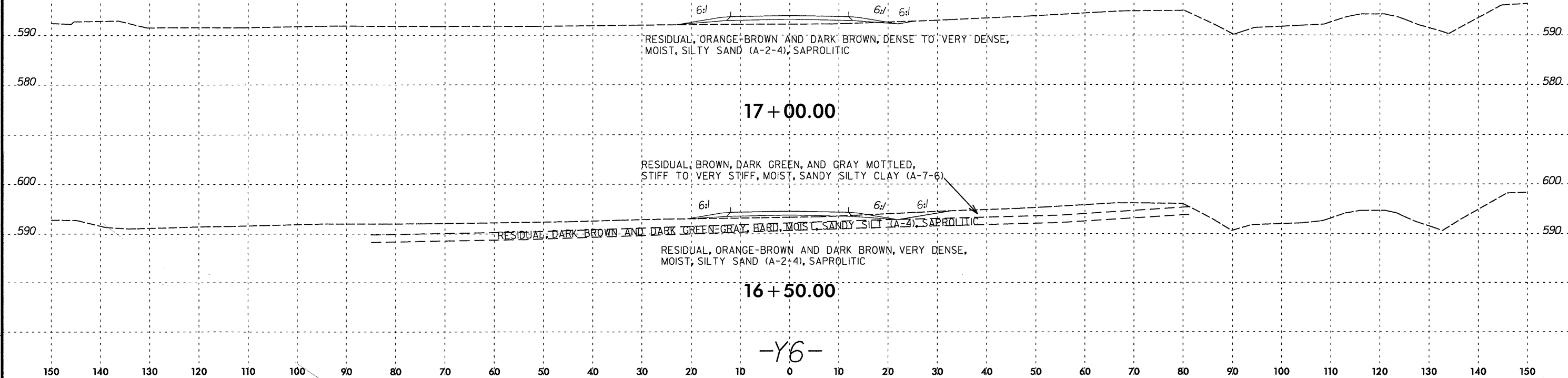
-Y6-

8/23/99



PROJ. REFERENCE NO. P-5208B	SHEET NO. 8
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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



6:1
RESIDUAL, ORANGE-BROWN AND DARK BROWN, DENSE TO VERY DENSE,
MOIST, SILTY SAND (A-2-4), SAPROLITIC

17 + 00.00

6:1
RESIDUAL, BROWN, DARK GREEN, AND GRAY MOTTLED,
STIFF TO VERY STIFF, MOIST, SANDY SILTY CLAY (A-7-6)

6:1
RESIDUAL, DARK BROWN AND DARK GREEN-GRAY, HARD, MOIST, SANDY SILT (A-4), SAPROLITIC

6:1
RESIDUAL, ORANGE-BROWN AND DARK BROWN, VERY DENSE,
MOIST, SILTY SAND (A-2-4), SAPROLITIC

16 + 50.00

-Y6-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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paul.zheng