

CONTRACT: C201371 ID. R-2502B

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2502B	1	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34438.1.1		PE	
34438.2.4		ROW & UTIL	
34438.3.4		CONST	

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

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

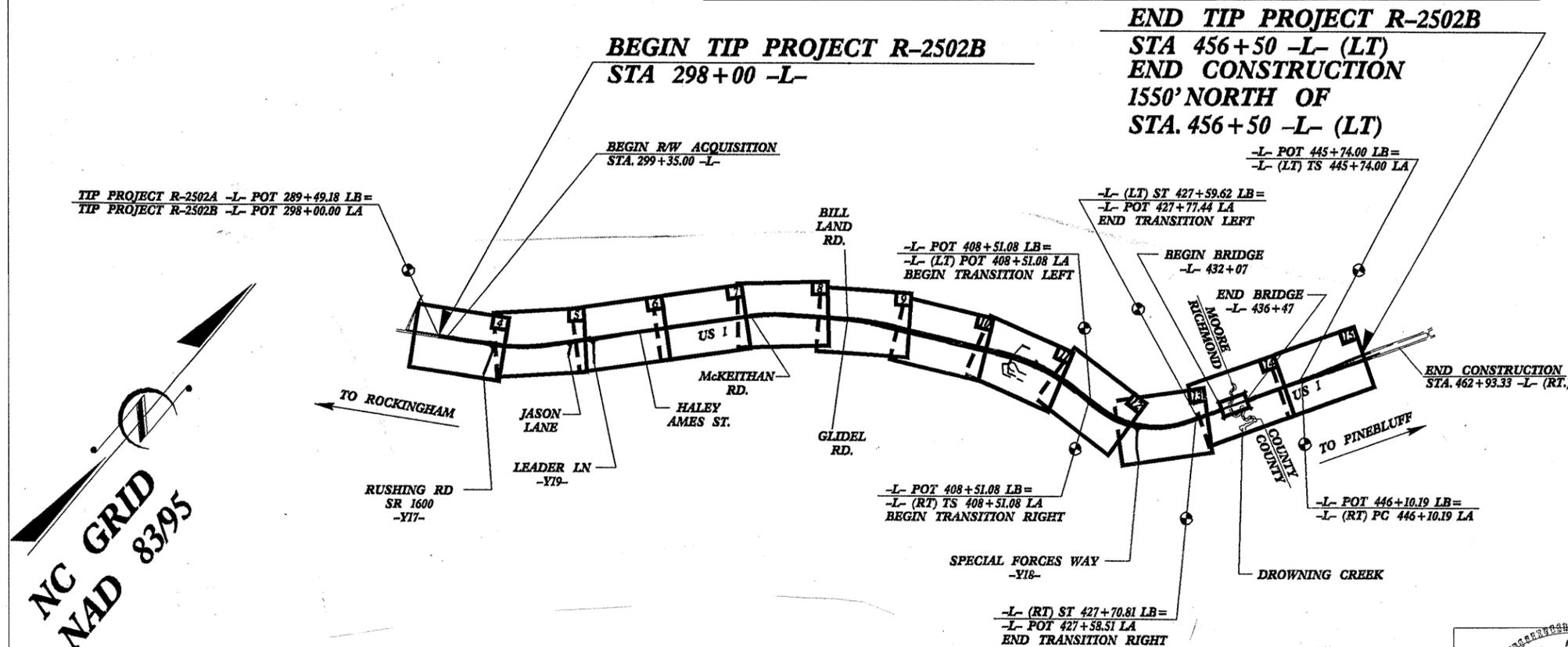
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

CONTENTS:

LINE	STATION	SHEET NUMBERS		
		PLAN	PROFILE	X-SECTS.
-L-	298+00 to 456+50	4-15	16-21	
-Y17-	10+00 to 15+29	4	22	
-Y18-	10+00 to 15+94	13	22	
-Y19-	10+00 to 14+14	6	23	

SUBSURFACE INVESTIGATION

STATE PROJECT 34438.1.1 I.D. NO. R-2502B
F.A. PROJECT _____
COUNTY RICHMOND /MOORE
DESCRIPTION US 1 NORTH OF SR 1528 JUST NORTH OF HOFFMAN TO THE EXISTING DIVIDED FACILITY NORTH OF THE RICHMOND COUNTY LINE

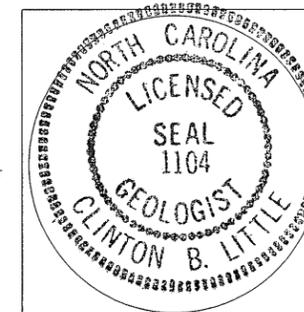


INVESTIGATED BY R.Q. CALLAWAY PERSONNEL C.C. MURRAY
CHECKED BY C.B. LITTLE J.E. ESTEP
SUBMITTED BY C.B. LITTLE D.K. BRATTON
DATE APRIL 2004 J.W. VANDERBURG

DRAWN BY: J.K. McCLURE /R.Q. CALLAWAY

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.



SEAL

4-8-04

C.B. Little
SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2502B	34438.1.1	2	21

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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 WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:		ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLED IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
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.		WEATHERED ROCK (WR)			
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7		COMPRESSIBILITY		CRYSTALLINE ROCK (CR)			
SYMBOL		SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		NON-CRYSTALLINE ROCK (NCR)			
% PASSING #10, #40, #200		PERCENTAGE OF MATERIAL		COASTAL PLAIN SEDIMENTARY ROCK (CP)			
LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX		ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, OTHER MATERIAL					
USUAL TYPES OF MAJOR MATERIALS		GROUND WATER					
GEN. RATING AS A SUBGRADE		MISCELLANEOUS SYMBOLS					
P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30		ROADWAY EMBANKMENT WITH SOIL DESCRIPTION, SOIL SYMBOL, ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS, INFERRED SOIL BOUNDARIES, INFERRED ROCK LINE, ALLUVIAL SOIL BOUNDARY, DIP/DIP DIRECTION OF ROCK STRUCTURES		SPT TEST BORING, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, SPT N-VALUE, SPT REFUSAL			
CONSISTENCY OR DENSENESS		ROCK HARDNESS		ABBREVIATIONS			
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (IN-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT		AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS - FOSSILIFEROUS, FRAC. - FRACTURED, FRAGS. - FRAGMENTS, HI. - HIGHLY, MED. - MEDIUM, MICA - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILTY, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, W - MOISTURE CONTENT, V. - VERY, VST - VANE SHEAR TEST, γ - UNIT WEIGHT, γ _d - DRY UNIT WEIGHT			
TEXTURE OR GRAIN SIZE		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING	
U.S. STD. SIEVE SIZE OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)		DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS		TERM, SPACING, TERM, THICKNESS			
SOIL MOISTURE - CORRELATION OF TERMS		INDURATION					
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE SHRINKAGE LIMIT		FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED					
PLASTICITY							
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY							
COLOR							
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.							



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
P.O. BOX 25201, RALEIGH, N.C. 27611-5201

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 23, 2004

State Project: 34438.1.1 (R-2502ba)
Federal Project:
County: Richmond
Description: US 1 From North of SR 1528 (Vincent Gibson Ave.) Just North of Hoffman, to the Existing Divided Facility North of the Richmond County Line. Grading, Drainage Paving and Structures.
Subject: Geotechnical Report - Inventory

Project Description

This is a report of an English-units geotechnical investigation for a project that will upgrade a 3 mile section of Highway US 1 just east of Hoffman in Richmond County, to just past the Moore county line. The inclusion of 3 Y lines, mostly paving, adds 1537 feet to the project for a total length of 17,287, or 3.30 miles. US-1 will be widened to four lanes divided and the intersections with adjacent roads will be improved. It should be noticed that station -L-289+49, the end of the "A" part of the project is -L-298+00 of the "B" project.

The following lines were investigated:

- L- Line:298+00 to 456+50..... 15,800ft
- Y-17:10+00 to 15+29..... 529ft
- Y18-:10+00 to 15+94..... 594ft
- Y19-10+00 to 14+14..... 414ft

Areas of Special Geotechnical Interest

Highly Plastic Soil

Clayey sandy soil, A-2-6, A-2-7, or A-7-6, with PI, (Plasticity Index), values of 20 and above, occurs as medium stiff to stiff soil in three places within 5' of finished grade, on the project. The first, listed in the table below, is a sandy clay, largely impermeable, that supports a perched aquifer. The plasticity index of the soil is around 20 with one "flyer" up to 36. The second interval is at the beginning of the Drowning Creek floodplain, and also supports high groundwater. The third is just beyond the floodplain in weathered clayey sandy soil.

Intervals of Highly Plastic Soil Within 5' of Finished Grade

Interval	PI of Samples	Average PI
336+00 to 350+00	24,36,23,20,12,23,19,23,16,21,30,32	23
398+00 to 406+00	17,29,17,29,19,	22
447+00 to 453+50	13,20,21,15,14,22	17.5

High Groundwater

Shallow groundwater was measured in the bore holes in the intervals listed below within the soil type noted in the table.

Groundwater Within 5' of Finished Grade

327+00 to 336+50 Alluvial Soil, (Coastal Plain Section)

391+00 to 395+00 Alluvial Soil, (Coastal Plain Section)
402+00 to 404+00 Roadway Fill

Wetlands

Wetlands identified on National Wetland Inventory are listed below.

NWI Wetlands Near Roadway

301+00 to 303+00 Left Side
336+00 to 340+00 Left Side
394+00 to 397+00 Right Side
402+00 to 448+00 Left and Right Side, (Drowning Creek Valley Bottom)

Physiography and Geology

The project is within the Piedmont physiographic province in the Carolina Slate Belt litho-tectonic province. Coastal plain sediments cover the area.

Topographic Setting

The path of the roadway is east-northeast, then northeast as it crosses Drowning Creek bottomland. The road starts at 410' elevation, drops to 277' at Drowning Creek, and ends at 320' as the road begins the climb back out of the valley. The topography traversed by the project is a stair-step that descends 40' on a 500' to 800' long slope, then traverses a 2500' long flat terrace to the next slope. Three slopes and three benches are traversed.

Drainage and Geomorphology

This region of North Carolina is at the edge of the Piedmont. Flat-topped irregularly shaped Mesas at about 500' elevation connected by narrow ridges distinguish the topography. The mesas are thought to be a remnant of an extensive plain, now dissected by large and small streams. Drowning Creek, at the north of the project is the major drainage of the area. All of the project drains into Drowning Creek, and the project consists of a long descent into Drowning Creek.

Surface Drainage

Inspection of a topographic map of the project area shows the major streams such as Drowning Creek to have a north-northwest alignment, but the smaller first and second order streams form a dendritic drainage pattern. I think that when uplift and rejuvenation occurred, head-ward erosion from existing streams pushed valleys up from an established Trellis Drainage Pattern. The drainage pattern has certainly been affected by the perched water tables that we saw during this investigation. Groundwater reappearing as springs is often the head of the small first order streams of the area.

Geology

On this project Geology is the Geology of soils. Rock was encountered in Drowning creek, 60' below land surface, and duly noted.

Soil Properties

Soil sample results were examined for construction suitability and also for geological relationships that would allow us to project soil properties beyond the sample location to a more general case on the project.

Engineering Properties

The quality analysis assigns each of the soils to an engineering classification. This project is underlain by sands, A-1-A, A-1-B, A-2-4, A-3, sandy clays, A-2-6, A-2-7, silt, A-4, and clayey sands, A-6, A-7-6.

Geological Properties

Almost all of the samples contain at least 50% coarse sand, so in addition to the engineering classification, the grain size distribution of the finest and coarsest parts of the samples was used to divide the sample population into 6 smaller groups. Sand with more or less than 10% clay,

Sand with more or less than 10% silt, and Sand with more or less than 1% gravel, (retained on # 10 sieve).

Interpretation

When these 6 groups of samples were plotted according to elevation, they created homogenous sample areas on the project. This result indicates that Drowning Creek exposed different layers of sediment as it cut down to its present level. The layers will be described below from youngest to oldest, (generally top to bottom).

Soil Descriptions

Gravel, Sand, Silt, and Clay Deposits of Drowning Creek 295' to 260'

Drowning Creek cut the 5400' wide valley-floor that it occupies, so the sediment deposited by Drowning Creek must be younger than what is left in the valley walls. Sand, gravel, and clayey sand beds, about 25' thick and consistent with meander belt stream deposits on a floodplain, were found on the valley floor. The deepest level of this package is marked by gravelly sand, continuous across the valley. It continues to the surface in places, and in places is overlain by sand, clayey sand, silt, or sandy clay. A silt bed occurs at the very top of the Drowning Creek alluvium, but otherwise, the soil above the gravel has almost no silt. Where drilling was carried deep enough, the lower contact of the gravel was found uniformly at an elevation of about 260'. Apparently, once Drowning Creek eroded to about the 260 elevation, conditions changed and deposition backfilled the area to the current contours, 278' to 288'. This is an erosional unconformity.

Pinehurst Formation:

The Pinehurst Formation is a named formation mapped on ridge tops in Richmond, Hoke, Scotland and Moore Counties. It is white or red unconsolidated highly porous sand usually with more than 50% coarse grains, almost no silt, and very little clay content. The accepted interpretation is that the unit was deposited as windblown sand, in dunes during the Eocene Epoch of the Tertiary Period, (50 to 30 million years ago). White sand is commonly seen on bare ground and assigned to the Pinehurst Formation. Tan, loose, clean sand occurs at the surface everywhere on the project except perhaps on the Drowning Creek bottomland.

Tan-Orange Coarse Sand: 405'-375'

Very loose to loose sand, tan to orange in color, with less than 10% clay, and less than 10% silt, with 99% to 100% passing the #10 screen was found below the Pinehurst, no deeper than the first drive, (about 5'), in the first 3000' of the project. Assuming it is a horizontal layer, the top of this unit is at 405', possibly above, and the base is at 375' elevation. Physically, this sand is almost identical to the Pinehurst.

Tan-White-Orange-Mottled Clayey Coarse Sand 375'- 360'

Medium dense, clayey sand, tan, white, orange, greater than 10% clay, most samples with 2% or more retained on # 10 sieve occurs under 2300' of roadway after the unit above. The base of the unit was not sampled. The "break" for the unit was 10% clay, but the average clay value was 22% clay. Water was found in many but not all of the borings terminated in this unit. The continuity of this unit directly contradicts the assignment of this unit to Middendorf in the 1985 Geologic Map of North Carolina.

Gray Tan and Orange Coarse Loose Sand with Thin Clay Interbeds 360'- 290',

South Side of Drowning Creek

For the next 4100' of the project, loose to very loose orange, tan, or gray sand, mostly coarse, with less than 10% clay and less than 10% silt, 1% or less retained on a # 10 sieve is traversed. Thin discontinuous beds of sandy clay may account for the flatter sections of topography. Perched water was not seen. This sand is also similar to the Pinehurst fm.

Loose, to Very Dense, Wet, Tan Orange and Purple Clayey Sand 295' – 275', North Side of Drowning Creek

Beyond Drowning Creek the last 1000' is underlain by medium stiff A-2-6 gravelly clayey sand. It contains greater than 10% clay, (measured at 20%), with 2% or more of the sample retained on a # 10 sieve. This unit was drilled on the north side of Drowning Creek, but the elevation interval falls in a gap on the south side. The purple oxidation colors of this unit link it to the deeper sediments described below and it is probably part of the Cape Fear Formation

Unconformity

Below a surface elevation of 295', the exposed sediments of the bottomland are related to deposition by the ancient Drowning Creek rather than the Cretaceous sea. Since they are possibly the youngest sediments they were described at the top of this section.

Lower Drowning Creek Sediments

The sediments below the gravel are beds of sandy clay, clayey sand and silty clayey sand. Below a transition zone interpreted to be a paleo weathering zone, (paleosol), we find hard A-6 or A-7-6 clay, usually with 20% silt. In the sediments below the gravel, silt values as high as 37% occur. From residual soil up to the transition zone we found a hard, gray and purple silty sandy clay. The top of this hard clay is not level, but the unconformity above it is. This unit is probably part of the Cape Fear Formation of the Cretaceous coastal plain sediments.

Rock Properties

Weathered rock was drilled to refusal in the two preliminary bridge borings and in two additional borings. Three of the borings found refusal and crystalline rock at 220' elevation below a 10 to 15 foot thick interval of weathered rock. Biotite found in the rock suggests that it was biotite gneiss.

Groundwater Properties

On this project, groundwater was found in two environments: 1.) The permeable beds around Drowning creek, and 2.) Over a persistent clay layer that forms a terrace at elevation 365. In a perched aquifer, as in 2.), above, the actual aquifer is the permeable sand above the clay, but the controlling element is the clay. Areas of shallow groundwater are listed in the Areas of Special Geotechnical Interest section above, this report.

Geotechnical Descriptive Analysis of the Project

The project was divided into 5 segments based on subsurface geology. **Segment 1** is the -L- line from the beginning of the project at -L-298+00 to -L- 328+00. **Segment 2** is the interval from -L- 328+00 to -L-351+00. **Segment 3** runs from -L-351+00 to -L-392+00. **Segment 4** runs from -L- 392+00 to -L-446+00. **Segment 5** runs from -L-446+00 to -L-456+50.

Segment 1. Station -L-289+00 to -L- 328+00, (Including -Y- Lines).

This segment begins just north of the community of Hoffman, on US-1, and ends 3000 feet up the road. This segment has loose non-plastic unconsolidated Pinehurst sand, less than 5' thick, over loose non-plastic tan orange coarse sand.

Physical Description

The road begins at the bottom of a slope, traveling at N68E and then bends slightly to the north through a broad curve to travel across a broad bench and end at the base of the next slope traveling N43E at the end. The road is built on grade, starting at 418' and dropping to 384'. At -L- 307+25, Y-17, (Rushing Road) intersects the main road from the right side. About 3' of fill will be added to the Y line, but most of the work will be repaving. At -L- 323+77, Y-19, (Lender Lane), a gravel road, will be paved at the intersection. The table below identifies the slope and bench intervals of the segment.

30/21

Bench				Slope			
From		To		From		To	
Station	Elev	Station	Elev	Station	Elev	Station	Elev
302+00	410'	316+00	403'	298+00	418'	302+00	410'
				316+00	403'	326+00	392'
				326+00	392'	328+00	384'

Cuts and Fills

The significant (more than 5' thick) cuts and fills of this segment, are listed in the table below. Most of the segment will be built on or near existing grade with little fill or cut. Most of the cut is in the borrow ditches.

Cut		Fill	
From	To	From	To
		300+00	301+50 Left
		311+00	313+00 Right

Soil

Two different and identifiable sand formations are found: The upper tan, loose sand was identified as Pinehurst. The lower unit is designated the Tan-Orange Coarse Sand in this report.

Pinehurst Formation

The surface sand was not sampled much but is described as 3' to 7' thick. Where it is bare at the surface it is white, but immediately below undisturbed areas are dark gray from contained organic material. This sand is non-plastic and very loose to loose. This material would be expected to be stable at slopes no steeper than the angle of repose for sand: 32 to 34 degrees, (about 2:1 horiz:vert). Coarse sand accounts for about 65% of this material, with clay usually around 5%.

Tan-Orange Coarse Sand

This field unit was broken out for this report and is part of the Middendorf as mapped on the Geology of North Carolina. Samples from this interval were dominantly A-3 with A-2-4 and an A-1-B at the start of the segment. In composition it is very similar to the Pinehurst and may be the source for it. In a large sandpit in Hoffman exposures of this sand have 1" to 2" repeating beds of loose sand alternating with slightly clayey sand, that when combined yield about 5% clay. This material holds a vertical face in the pit, but the walls are failing by movement of large blocks. No explanation for the creation of a flat bench at this location was found.

Soil Plasticity

All samples from this segment were non plastic.

Pre-existing Fill Soil

No old fill soil was identified on this segment.

Groundwater

No groundwater was identified on this segment.

Wetlands

On the National Wetland Inventory, a wetland is identified on the left side of the road.

Location

300+50 to 301+50

Segment2: -L-328+00 to -L-351+00.

This segment traverses a bench with loose sand at the surface and clayey sand within 5'.

Physical Description

This segment begins at elevation 384', travels straight at N42E for 2300 feet and ends at elevation 370' elevation.

Bench				Slope			
From		To		From		To	
Station	Elev	Station	Elev	Station	Elev	Station	Elev
333+00	370'	351+00	370'	328+00	384'	333+00	370'

Cuts and Fills

A cut begins -L-351+00, at the end of the project at the right side ditch location.

Soil

Pinehurst Fm.

The Pinehurst formation is continuous on the surface of this segment.

Tan-White-Orange-Mottled Clayey Coarse Sand

Below a depth of no greater than 5' clayey sand was found throughout this segment. The soil samples are A-2-4, A-2-6, A-2-7, and one each of A-5 and A-7-6. The clay content is greater than 10% in all of the samples and increases up line. From projecting across the profile, it is no more than 20' thick. (elevation 360' to 375') I suggest that the bench that characterizes this segment exists because of this continuous low permeable clayey unit.

Soil Plasticity

The borings with PI values above 20 that are within 10' of finished grade, are listed below

Location	Depth +or -	Soil Class	Thickness	Consistency	PI
-L-336+00	-1'	A-7,A-2-7	7'+	Stiff to V. Stiff	24 to 36
-L-337+00, to 347+00	-2' to -5'	A-7, A-6	7'+	Stiff to V. Stiff	12 to 25
-L-349+50,	-3'	A-2-7	7.0+	Stiff to Hard	30 to 32

Fill Soil

No fill soil was identified on this segment.

Groundwater

The borings on this segment where groundwater was measured in the borings are listed below.

Location	Depth	elevation
328+00	4'	381'
331+00	2'	373'
333+00	4'	365'
336+00	7'	365'
342+50	6'	364'

Wetlands

On the National Wetland Inventory, a wetland is identified on the left side of the road. The cross sections show a drop in that direction but it is outside the limit of activities.

Location

-L-337+00 to -L-339+00

3/21

Segment 3: -L-351+00 to -L-392+00.

This segment begins just before a break in slope, at a change in the subsurface from clayey sand to sand with no clay. This segment is defined on the basis of the sandy rather than clayey subsurface.

Physical Description

This segment begins at elevation 370', travelling at N52E and bends to the east through a gradual curve for the entire segment, ending with a bearing of N64E, at elevation of 295'. It begins on the bench of the previous segment, descends a slope to a bench, travels to the next slope, descends, and ends the segment at the Drowning Creek bottomland.

Bench				Slope			
From		To		From		To	
Station	Elev	Station	Elev	Station	Elev	Station	Elev
351+00	370'	355+00	370'	355+00	370'	367+00	335
367+00	335'	376+00	335'	376+00	335'	392+00	295

Cuts and Fills

The significant (more than 5' thick) cuts and fills of this segment, are listed in the table below. Most of the segment will be built on or near existing grade with little fill or cut. Most of the cut is in the borrow ditches.

Cut			Fill		
From	To		From	To	
351	356	Right	357+00	360+00	Right

Soil

Pinehurst Fm.

The Pinehurst formation is again continuous on the surface of this segment.

Gray Tan and Orange Coarse Loose Sand with Thin Clay Interbeds 360'- 290',

From roughly 5' and deeper, orange sand with less than 10% contained clay, and less than 5% contained silt, was found throughout this segment. An occurrence of A-1-B is followed by 1300' of line with nothing but A-2-4, then after another short interval of A-1-b, another 1300' of nothing but A-3. If this is a horizontal unit that is exposed by the slope, the top is at elevation 365', and the base is at elevation 285' for a total thickness of 80'. I suggest that the A-1-B intervals at elevation 360 and 325 could be terrace deposits.

Soil Plasticity

The borings with PI values above 20 that are within 10' of finished grade, are listed below

Location	Depth +or -	Soil Class	Thickness	Consistency	PI
-L-362+25	-9'	A-2-6	1.5'+	Stiff	21

Fill Soil

No fill soil sections greater than 5' thick were identified on this segment.

Groundwater

The borings on this segment where groundwater was measured in the borings are listed below. This is the last station of this segment and the groundwater is more typical of the next segment.

Location	Depth	elevation
392+00	3'	290'

Wetlands

On the National Wetland Inventory, No wetlands were identified on this segment.

Segment 4: -L-392+00 to -L-446+00.

This segment covers the limits of the Drowning Creek bottomland.

Physical Description

This segment begins at elevation 295', travelling at N64E and bends to the east through a gradual curve, ending with a bearing of N86E, elevation 290 at about -L- 405. It then executes a broad turn to the north ending at -L-425, elevation 280 on a bearing of N30E which continues to the end of the segment traveling across the bottomland at elevation 275. The road descends on a low peninsula to the floodplain, then hops across two islands rising above the floodplain, (at -L-408+00 and 410+00) before crossing the main floodplain. The intersection of Y-18, (Special Forces Way) will be moved slightly to -L- at station 417+74 improving the intersection and directing runoff from Y-18 away from -L. Subsurface conditions are identical to those encountered at nearby -L-. The relocation will require up to 5' of fill.

Cuts and Fills

The significant cuts and fills, (more than 5' thick), of this segment, are listed in the table below. Most of the segment will be built on fill, elevating the roadway up to 10' above the existing ground elevation.

Cut		Fill	
From	To	From	To
		401+50	404+00 Left and Right
		417+00	424+00 Left and Right
		427+00	447+00 Left and Right

Soil

Pinehurst Fm.

The Pinehurst formation was not identified on this segment.

Gravel, Sand, Silt, and Clay Deposits of Drowning Creek 295' to 260'

From the surface of the Drowning Creek valley bottom to no deeper than 260', a variable stratigraphy consistent with a meandering stream on a floodplain, was sampled. The borings from the beginning of the segment to Station -L-405+00 did not penetrate beyond these upper beds associated with Drowning Creek and found gravel or coarse sand at the base, (A-1-B, A-2-4), overlain in places by clayey sand, (A-2-6, A-2-7), or clay, (A-6, A-7-6). A silt and clay island of the lower stratigraphy, (sta -L- 408 +00 to -L- 410+00) appears to separate the sediments on the Richmond County side of the valley from the main channel. At -L-421+00 the upper unit consists of about 30' of gravel with a base at 260', over clay. Another silt and clay island of the lower beds was found from Sta. -L-423+00 to -L- 427+00. From -L-428+00 to -L-442+00, the upper unit is sand, sand, (A-1-B, A-2-4) or silt, (A-4), with a base at 260' elevation. From -L-442+00 to the end of the segment at 446+00 the lower boundary of the upper unit climbs to the surface at elevation 275'.

Lower Drowning Creek Sediments

This unit is probably the Cape Fear Formation. The upper boundary of this unit is the lower boundary of the basal gravel of the overlying unit. This boundary is consistently near elevation 260' in the main channel. Below the gravel there is an interval of clay and clayey sand sediments, (A-2-6, A-2-7, A-6, A-7), of variable thickness, (10' to 15') that is medium stiff to hard. Below this transition, usually at about elevation 345' there is a hard clay, (N=100+), (A-6, A-7-6). Many of the samples from these lower sections are white, gray and purple, possibly from weathering at the surface, before the Drowning Creek gravel was deposited. These clayey sediments are part of the Cretaceous section, and are continuous with the stratigraphy on the slopes descending to Drowning Creek discussed in the previous segments.

Soil Plasticity

The borings with PI values above 20 that are within 10' of finished grade, are listed below

Location	Depth +or -	Soil Class	Thickness	Consistency	PI
-L-398+00	-1	A-7-6	3'+	Stiff	28
-L-398+00	-4	A-2-6	8'+	V.Stiff	17
-L-401+00	-1	A-6	5'+	M.Stiff	19
-L-402+00	-6	A-7-6	2'+	Stiff	23
-L-404+50	-1	A-7-6	4'+	M.Stiff	28
-L-404+50	-5	A-7-6	3'+	Stiff	14

Fill Soil

The existing road is on a fill causeway in the sections identified below.

From	To	Existing Thickness	Proposed Thickness
402+00	404+00	3'	3'
417+00	424+00	4'	8' to 12'
424+00	427+00	0	8' to 12'
427+00	446+00	6' to 9'	10' to 12'

Groundwater

Nearly all of the borings in this segment found groundwater within the gravel unit mentioned above. Fourteen borings were completed on this segment, twelve of them had water. From -L-412+00 to 443+00 water was within the existing fill or within 2 feet of land surface.

Wetlands

On the National Wetland Inventory, the wetlands identified on this segment are listed below.

Location	Offset	Left or Right	On The Project?
-L- 394+00 to -L-396+00	100'	Right	No
-L- 403+00 to -L-410+00	100'	Left	No
-L- 405+00 to -L-414+00	50 to 80'	Right	Yes
-L- 416+00 to -L-420+00	0 to 80'	Left	Yes
-L- 425+00 to -L-447+00	50'	Left and Right	Yes

Groundwater

The borings on this segment where groundwater was measured in the borings are listed below.

The elevation decreases with proximity to Drowning Creek.

Location	Depth	elevation
449+35	5'	280'
452+50	3'	295'

Wetlands

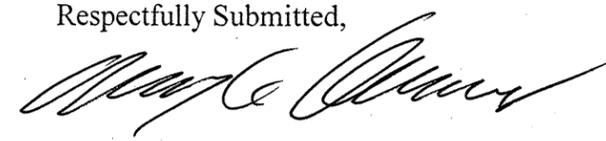
On the National Wetland Inventory, a wetland is identified on the left and right side of the road.

Location

-L-446+00 to -L-447+00 Left and Right side, within construction limits.

If any significant changes are made in the design or location of the proposed roadway, the subsurface information and interpretations will have to be reviewed and modified as necessary.

Respectfully Submitted,



R.Q. Callaway

Project Geologist

Segment5:-L-446+00 to -L-456+50.

This segment traverses a slope with loose sand at the surface and clayey sand within 5'.

Physical Description

The segment begins at elevation 275', travels straight at N26E for 1050 feet and ends at elevation 320' elevation.

Cuts and Fills

From -L-446+00 to -L-453+00, the fill will taper from 10' to zero.

Soil

Pinehurst Fm.

The Pinehurst formation is continuous on the surface of this segment.

Loose, to Very Dense, Wet, Tan Orange and Purple Clayey Sand 295' - 275'

This layer, below the Pinehurst Fm, is probably part of the Cape Fear Formation consisting of loose clayey A-2-6 gravelly sand. The soil contains greater than 10% clay, and up to 26%, with more than 2% and up to 18% of the sample retained on a # 10 sieve.

Soil Plasticity

The main continuous unit in this segment is the A-2-6 clayey sand that is found in every boring. Soil Plasticity, PI, varies from 14 to 22.

Fill Soil

No preexisting fill soil was identified on this segment.

EARTHWORK BALANCE SHEET

Volumes in Cubic _____

PROJECT: **R-2502B**

COUNTY: **RICHMOND/MOORE**

DATE: **10/10/2007** COMPILED BY: **BAM**

SHEET **3F** OF **21** SHEETS

RD10S01C

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. (+) 20%		ROCK	SUITABLE	UNSUIT.	TOTAL
BEGIN SUMMARY #1															
L LT. (TEMP) 315+62 TO 323+42		65				65	4		4	5			60		60
L RT. (TEMP) 410+00 TO 415+61		145				145	194		194	233	88				
L LT. 298+00 TO 314+50		2354				2354	3224		3224	3869	1515				
L RT. 309+38 TO 339+40		5492				5492	3936		3936	4723			769		769
L RT. 339+40 TO 369+40		14339				14339	4672		4672	5606			8733		8733
L RT. 369+40 TO 399+40		34571				34571	1091		1091	1309			33262		33262
L RT. 399+40 TO 411+00		2874				2874	1857		1857	2228			646		646
Y19 11+00 TO 13+81.27		1446				1446							1446		1446
END SUMMARY #1		61286				61286	14978		14978	17973	1603		44916		44916
BEGIN SUMMARY #2															
L LT. 408+81 TO 412+23		301				301	503		503	604	303				
L LT. 412+23 TO 420+00		1049				1049	6565		6565	7878	6829				
L LT. 420+00 TO 432+07							21364		21364	25637	25637				
L LT. 436+47 TO 446+00							19474		19474	23369	23369				
L LT. 446+00 TO 456+50		1763				1763	4468		4468	5362	3599				
SBXOVER 451+50.00 TO 457+42.976		157				157	60		60	72			85		85
NBXOVER 451+50.00 TO 456+95.89		51				51	240		240	288	237				
END SUMMARY #2		3321				3321	52674		52674	63210	59974		85		85
BEGIN SUMMARY #3															
L RT. 298+00 TO 306+47		982				982	32		32	38			944		944
L RT. 306+47 TO 309+38		28				28	204		204	245	217				
L RT. 411+00 TO 418+39		383				383	4880		4880	5856	5473				
L RT. 418+39 TO 432+07							18288		18288	21946	21946				
L RT. 436+47 TO 453+00		62				62	11687		11687	14024	13962				
Y17 12+00 TO 14+96.50		54				54	935		935	1122	1068				
Y18 10+00 TO 15+47.88		157				157	4253		4253	5104	4947				
END SUMMARY #3		1666				1666	40279		40279	48335	47613		944		944

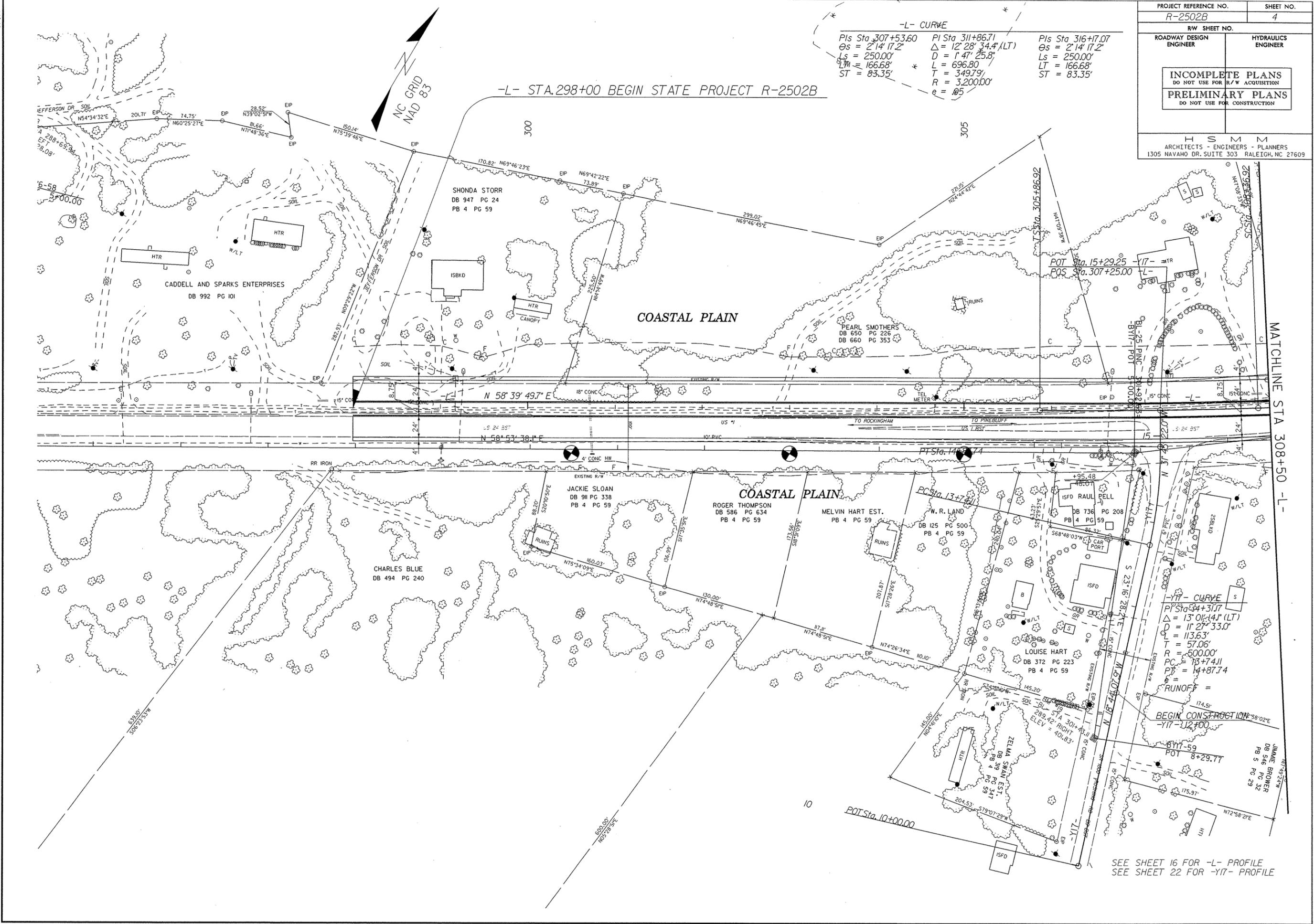
EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PROJECT REFERENCE NO. R-2502B	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	

-L- CURVE

Pls Sta 307+53.60 Δs = 2'14"17.2" Ls = 250.00' LM = 166.68' ST = 83.35'	Pl Sta 311+86.71 Δ = 12'28"34.4" (LT) D = 1'47"25.8" L = 696.80 T = 349.79' R = 3,200.00' e = .05	Pls Sta 316+17.07 Δs = 2'14"17.2" Ls = 250.00' LT = 166.68' ST = 83.35'
---	---	---

-L- STA.298+00 BEGIN STATE PROJECT R-2502B



-Y17- CURVE

Pls Sta 314+31.77 Δ = 13'01"14.1" (LT) D = 11'27"33.0" L = 113.63' T = 57.06' R = 500.00' PC = 13+74.11 PT = 14+87.74
--

RUNOFF =

BEGIN CONSTRUCTION STA 308+00
-Y17-112+00

SEE SHEET 16 FOR -L- PROFILE
SEE SHEET 22 FOR -Y17- PROFILE

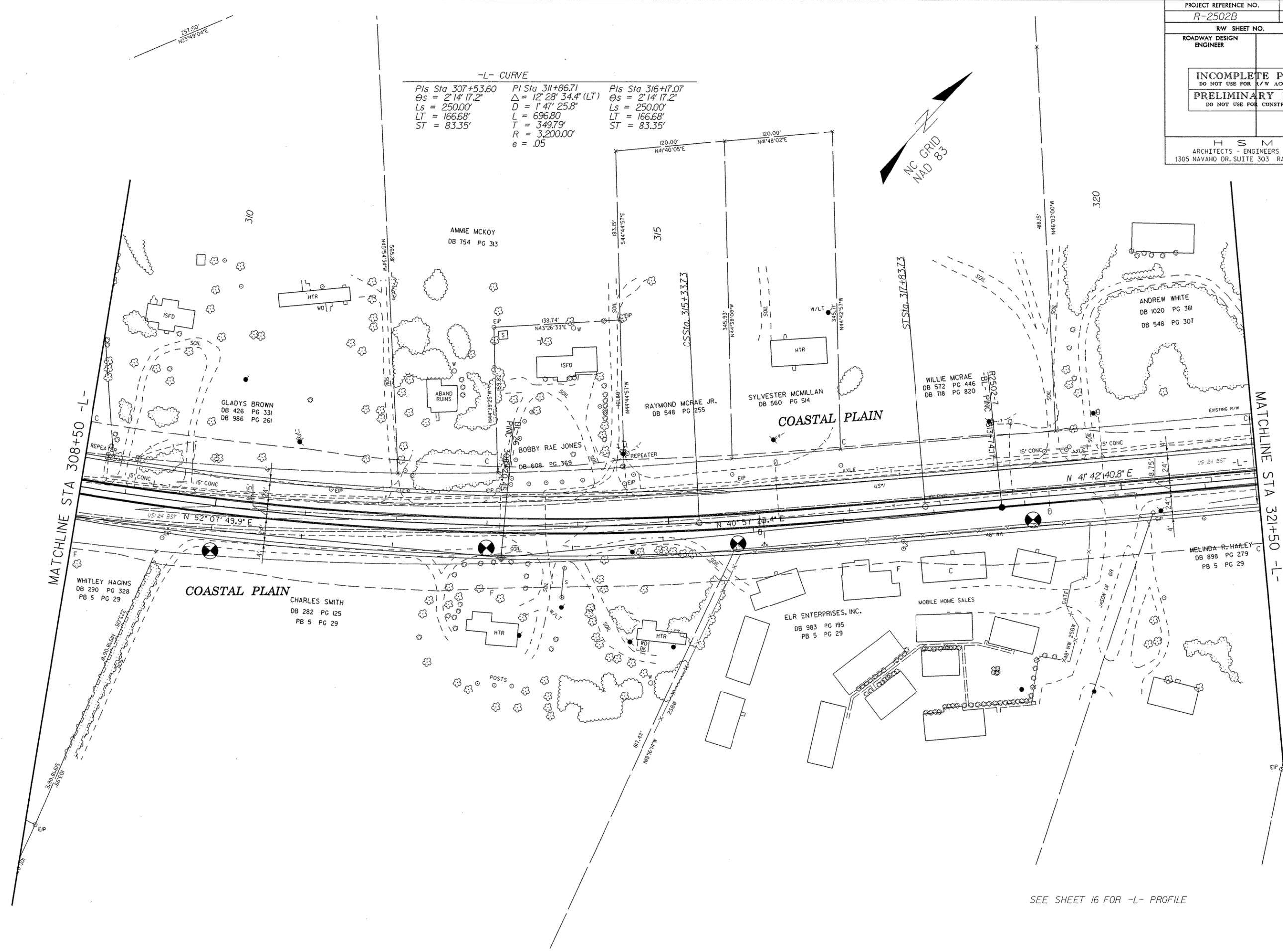
MATCHLINE STA 308+50 -L-

8/17/11
FILES SCOMMA FOALTEI STIMES NOTERIS

PROJECT REFERENCE NO. R-2502B	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	

-L- CURVE

PIs Sta 307+53.60	PI Sta 311+86.71	PIs Sta 316+17.07
$\Theta_s = 2'14'17.2"$	$\Delta = 12'28'34.4" (LT)$	$\Theta_s = 2'14'17.2"$
$L_s = 250.00'$	$D = 1'47'25.8"$	$L_s = 250.00'$
$LT = 166.68'$	$L = 696.80'$	$LT = 166.68'$
$ST = 83.35'$	$T = 349.79'$	$ST = 83.35'$
	$R = 3,200.00'$	
	$e = .05$	



MATCHLINE STA 308+50 -L-

MATCHLINE STA 321+50 -L-

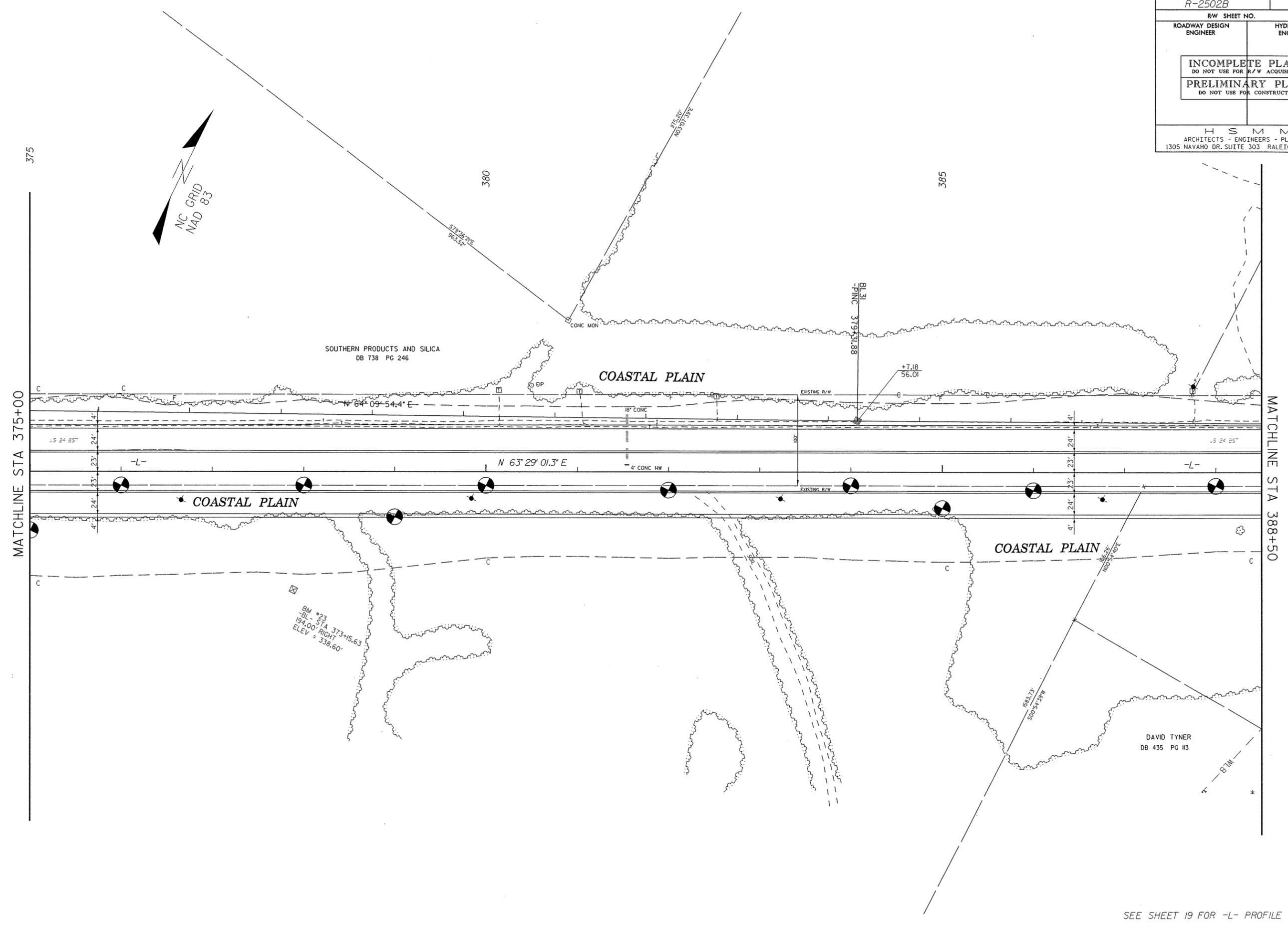
SEE SHEET 16 FOR -L- PROFILE

8/17/71
#FILES #COMMA #DATE #TIME #USERS

PROJECT REFERENCE NO. R-2502B	SHEET NO. 10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	

MATCHLINE STA 375+00

MATCHLINE STA 388+50



SOUTHERN PRODUCTS AND SILICA
DB 738 PG 246

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

BM #23
-BL- STA 373+15.63
194.00' RIGHT
ELEV = 338.60'

DAVID TYNER
DB 435 PG #3

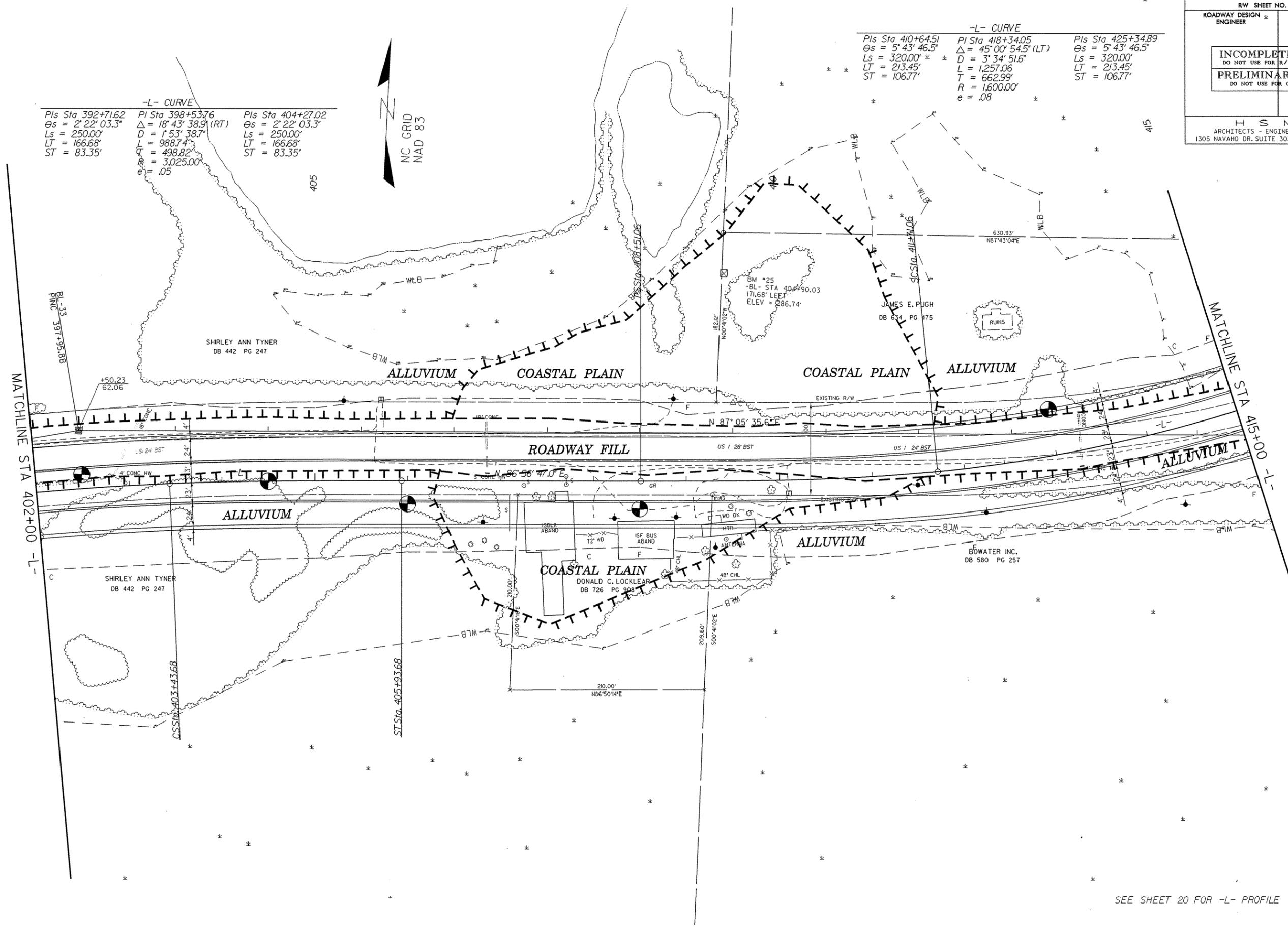
SEE SHEET 19 FOR -L- PROFILE

8/17/11 FILED SCOMM HOATE STINEB AUJERE 308

PROJECT REFERENCE NO. R-2502B	SHEET NO. 12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR, SUITE 303 RALEIGH, NC 27609	

-L- CURVE
 PIs Sta 392+71.62 PIs Sta 398+53.76 PIs Sta 404+27.02
 $\theta_s = 2^\circ 22' 03.3''$ $\Delta = 18^\circ 43' 38.9''$ (RT) $\theta_s = 2^\circ 22' 03.3''$
 Ls = 250.00' D = 1' 53' 38.7" Ls = 250.00'
 LT = 166.68' L = 988.74' LT = 166.68'
 ST = 83.35' e = 498.82' ST = 83.35'
 e = 3,025.00'
 e = .05

-L- CURVE
 PIs Sta 410+64.51 PIs Sta 418+34.05 PIs Sta 425+34.89
 $\theta_s = 5^\circ 43' 46.5''$ $\Delta = 45^\circ 00' 54.5''$ (LT) $\theta_s = 5^\circ 43' 46.5''$
 Ls = 320.00' D = 3' 34' 51.6" Ls = 320.00'
 LT = 213.45' L = 1,257.06' LT = 213.45'
 ST = 106.77' T = 662.99' ST = 106.77'
 R = 1,600.00'
 e = .08



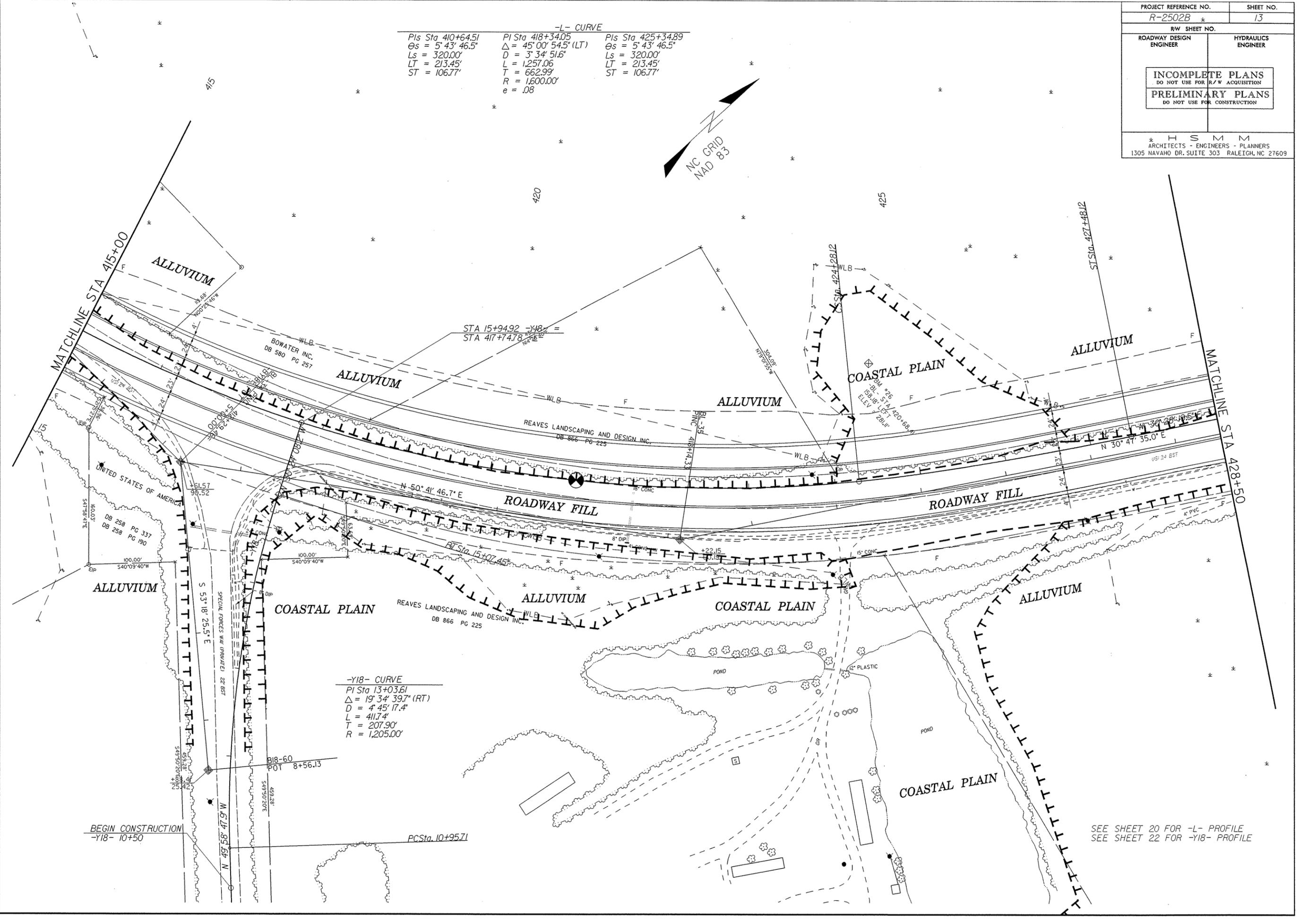
SEE SHEET 20 FOR -L- PROFILE

8/17/17
 FILES: SCOMM1, SCOMM2, SCOMM3, SCOMM4, SCOMM5, SCOMM6, SCOMM7, SCOMM8, SCOMM9, SCOMM10, SCOMM11, SCOMM12, SCOMM13, SCOMM14, SCOMM15, SCOMM16, SCOMM17, SCOMM18, SCOMM19, SCOMM20, SCOMM21, SCOMM22, SCOMM23, SCOMM24, SCOMM25, SCOMM26, SCOMM27, SCOMM28, SCOMM29, SCOMM30, SCOMM31, SCOMM32, SCOMM33, SCOMM34, SCOMM35, SCOMM36, SCOMM37, SCOMM38, SCOMM39, SCOMM40, SCOMM41, SCOMM42, SCOMM43, SCOMM44, SCOMM45, SCOMM46, SCOMM47, SCOMM48, SCOMM49, SCOMM50, SCOMM51, SCOMM52, SCOMM53, SCOMM54, SCOMM55, SCOMM56, SCOMM57, SCOMM58, SCOMM59, SCOMM60, SCOMM61, SCOMM62, SCOMM63, SCOMM64, SCOMM65, SCOMM66, SCOMM67, SCOMM68, SCOMM69, SCOMM70, SCOMM71, SCOMM72, SCOMM73, SCOMM74, SCOMM75, SCOMM76, SCOMM77, SCOMM78, SCOMM79, SCOMM80, SCOMM81, SCOMM82, SCOMM83, SCOMM84, SCOMM85, SCOMM86, SCOMM87, SCOMM88, SCOMM89, SCOMM90, SCOMM91, SCOMM92, SCOMM93, SCOMM94, SCOMM95, SCOMM96, SCOMM97, SCOMM98, SCOMM99, SCOMM100

PROJECT REFERENCE NO. R-2502B	SHEET NO. 13
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
* H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	

-L- CURVE

PIs Sta 410+64.51 θs = 5° 43' 46.5" Ls = 320.00' LT = 213.45' ST = 106.77'	PI Sta 418+34.05 Δ = 45° 00' 54.5" (LT) D = 3° 34' 51.6" L = 1,257.06' T = 662.99' R = 1,600.00' e = .08	PIs Sta 425+34.89 θs = 5° 43' 46.5" Ls = 320.00' LT = 213.45' ST = 106.77'
--	--	--



-Y18- CURVE

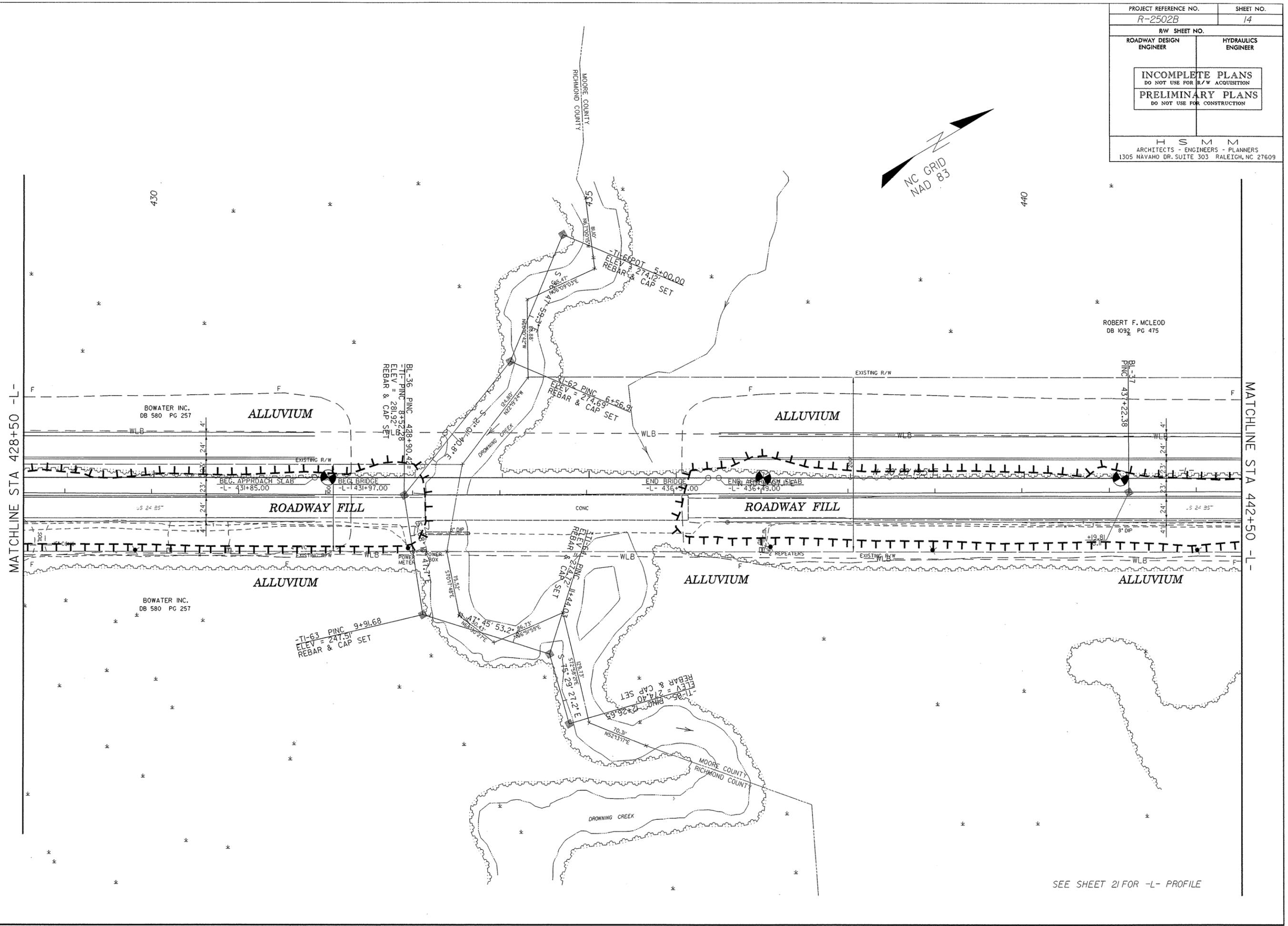
PI Sta 13+03.61 Δ = 19° 34' 39.7" (RT) D = 4° 45' 17.4" L = 411.74' T = 207.90' R = 1,205.00'
--

BEGIN CONSTRUCTION
-Y18- 10+50

SEE SHEET 20 FOR -L- PROFILE
SEE SHEET 22 FOR -Y18- PROFILE

8/17/11
 FILED
 RECORDS
 DATE
 TIME
 SHEETS
 818

PROJECT REFERENCE NO. R-2502B	SHEET NO. 14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	



ROBERT F. MCLEOD
DB 1092 PG 475

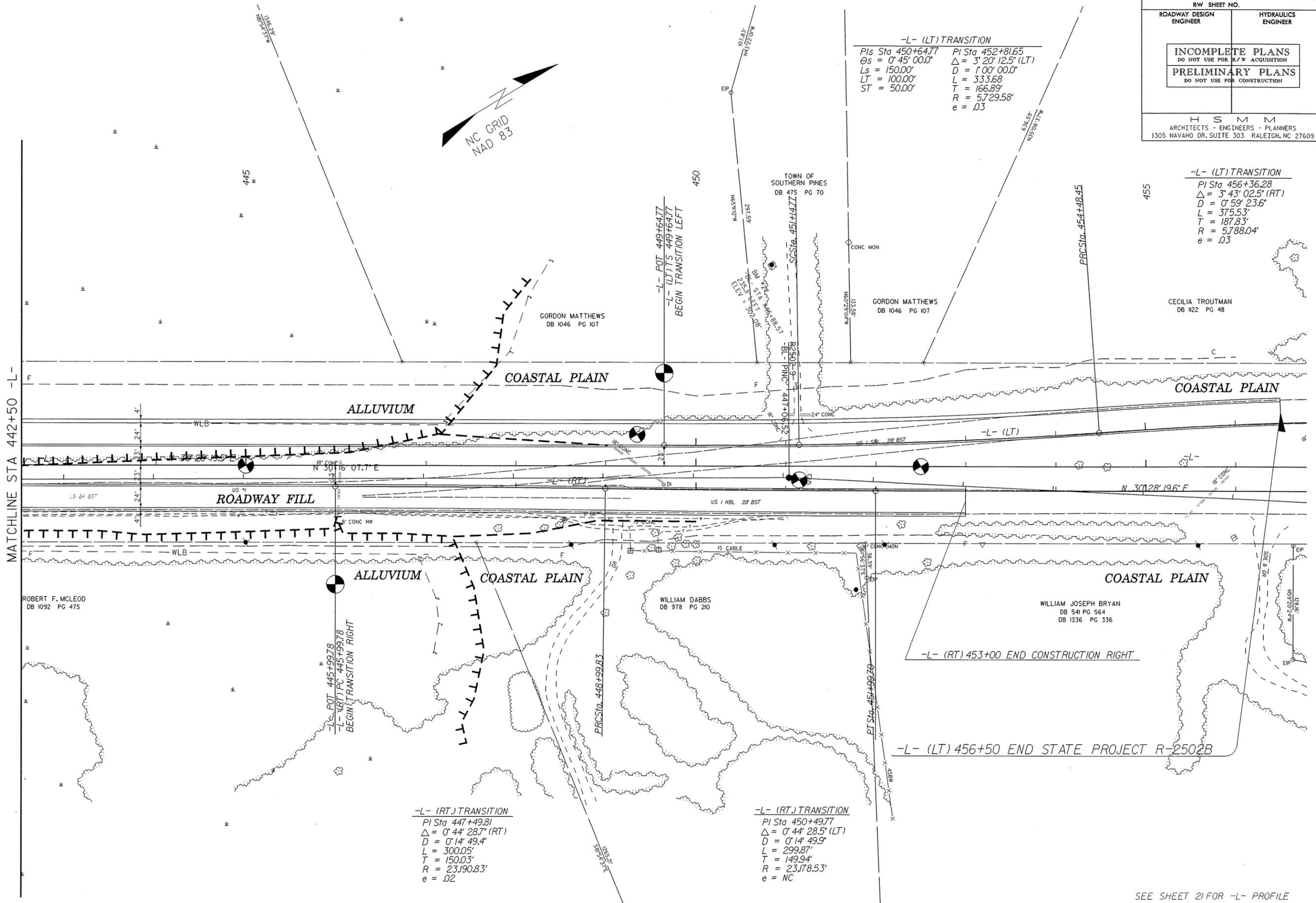
MATCHLINE STA 428+50 -L-

MATCHLINE STA 442+50 -L-

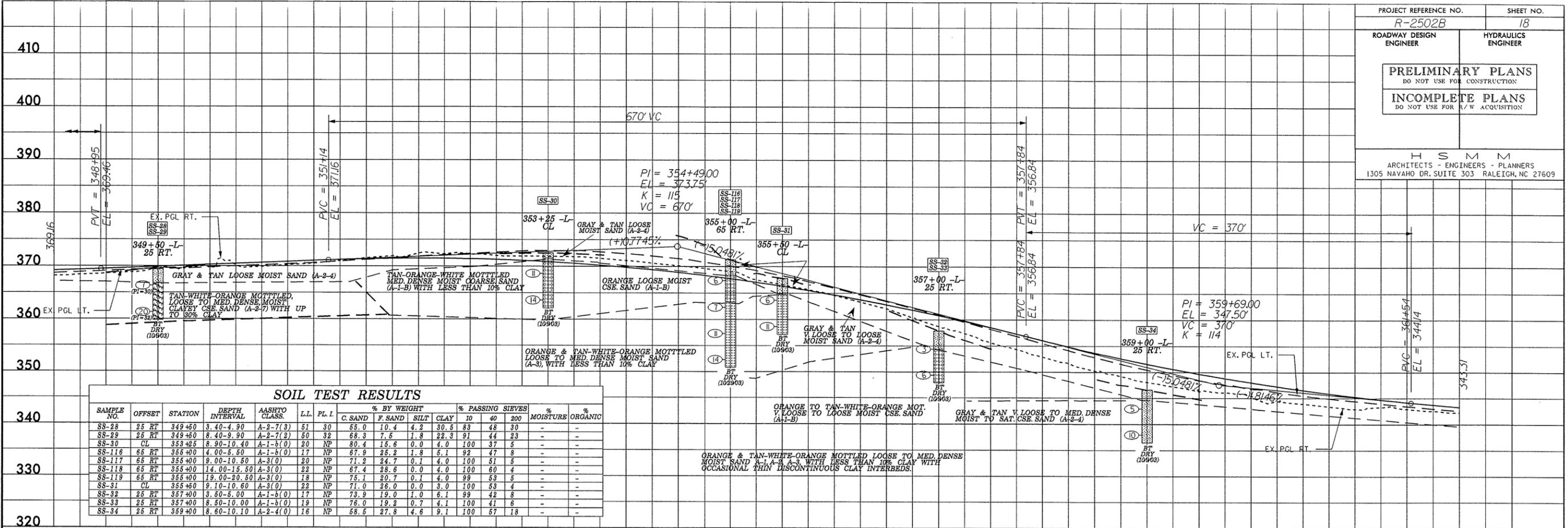
SEE SHEET 21 FOR -L- PROFILE

8/17/17
FILED ECONOMIC EQUATED STIMES FUTURE

PROJECT REFERENCE NO. R-2502B	SHEET NO. 15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
H S M M ARCHITECTS - ENGINEERS - PLANNERS 1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609	

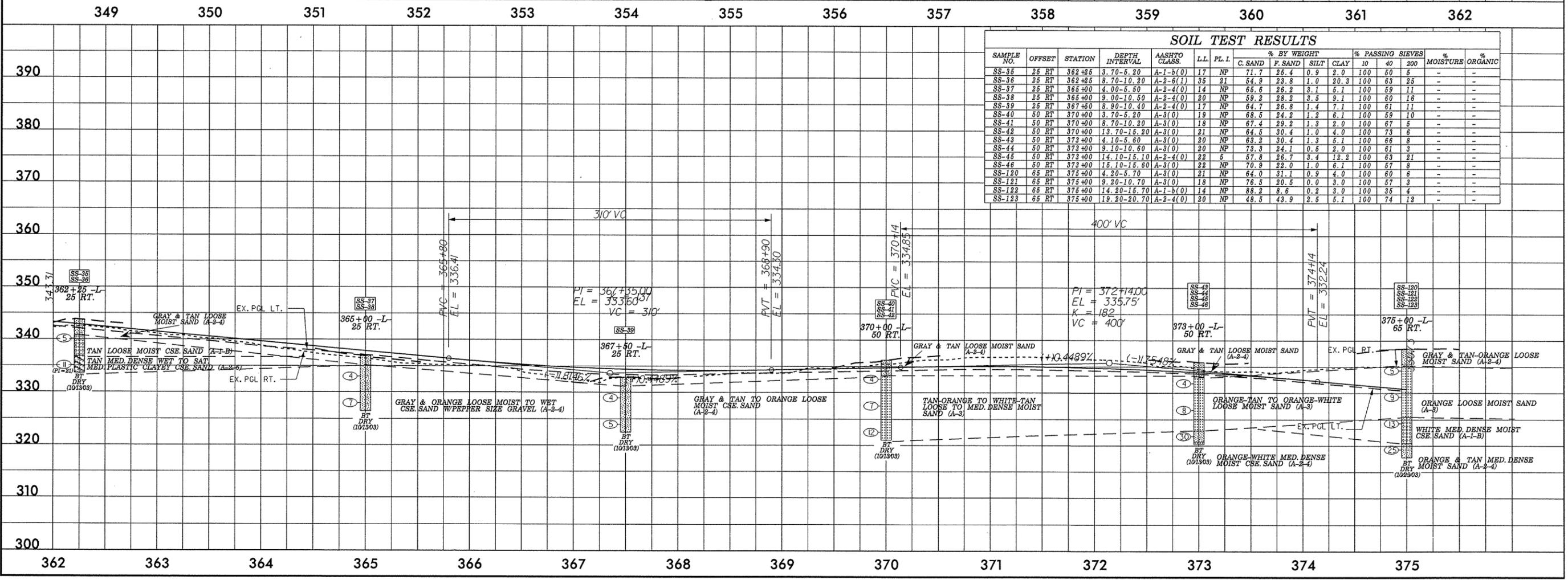


SEE SHEET 21 FOR -L- PROFILE



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-28	25 RT	349+50	3.40-4.90	A-2-7(3)	51	30	55.0	10.4	4.2	30.5	83	48	30	-	-
SS-29	25 RT	349+50	8.40-9.90	A-2-7(3)	50	32	68.3	7.5	1.8	22.3	91	44	23	-	-
SS-30	CL	353+25	8.90-10.40	A-1-b(0)	20	NP	80.4	15.6	0.0	4.0	100	37	5	-	-
SS-116	65 RT	355+00	4.00-5.50	A-1-b(0)	17	NP	67.9	25.2	1.8	5.1	92	47	8	-	-
SS-117	65 RT	355+00	9.00-10.50	A-3(0)	20	NP	71.2	24.7	0.1	4.0	100	51	5	-	-
SS-118	65 RT	355+00	14.00-15.50	A-3(0)	22	NP	67.4	28.6	0.0	4.0	100	60	4	-	-
SS-119	65 RT	355+00	19.00-20.50	A-3(0)	18	NP	75.1	20.7	0.1	4.0	99	53	5	-	-
SS-31	CL	355+50	9.10-10.60	A-3(0)	22	NP	71.0	26.0	0.0	3.0	100	53	4	-	-
SS-32	25 RT	357+00	3.50-5.00	A-1-b(0)	17	NP	73.9	19.0	1.0	6.1	99	42	8	-	-
SS-33	25 RT	357+00	8.50-10.00	A-1-b(0)	19	NP	76.0	19.2	0.7	4.1	100	41	6	-	-
SS-34	25 RT	359+00	8.80-10.10	A-2-4(0)	16	NP	68.5	27.8	4.6	9.1	100	67	18	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-35	25 RT	362+25	3.70-5.20	A-1-b(0)	17	NP	71.7	25.4	0.9	2.0	100	50	5	-	-
SS-36	25 RT	362+25	8.70-10.20	A-2-6(1)	35	21	54.9	23.8	1.0	20.3	100	63	25	-	-
SS-37	25 RT	365+00	4.00-5.50	A-2-4(0)	14	NP	65.6	28.2	3.1	5.1	100	59	11	-	-
SS-38	25 RT	365+00	9.00-10.50	A-2-4(0)	20	NP	59.2	28.2	3.5	9.1	100	60	16	-	-
SS-39	25 RT	367+50	8.90-10.40	A-2-4(0)	17	NP	64.7	26.8	1.4	7.1	100	61	11	-	-
SS-40	50 RT	370+00	3.70-5.20	A-3(0)	19	NP	68.5	24.2	1.2	6.1	100	59	10	-	-
SS-41	50 RT	370+00	8.70-10.20	A-3(0)	18	NP	67.4	29.2	1.3	2.0	100	67	5	-	-
SS-42	50 RT	370+00	13.70-15.20	A-3(0)	21	NP	64.5	30.4	1.0	4.0	100	73	6	-	-
SS-43	50 RT	373+00	4.10-5.60	A-3(0)	20	NP	63.2	30.4	1.3	5.1	100	66	8	-	-
SS-44	50 RT	373+00	9.10-10.60	A-3(0)	20	NP	73.3	24.1	0.6	2.0	100	61	3	-	-
SS-45	50 RT	373+00	14.10-15.10	A-2-4(0)	22	6	57.8	26.7	3.4	12.2	100	63	21	-	-
SS-46	50 RT	373+00	15.10-15.60	A-3(0)	22	NP	70.9	22.0	1.0	6.1	100	67	8	-	-
SS-120	65 RT	375+00	4.20-5.70	A-3(0)	21	NP	64.0	31.1	0.9	4.0	100	60	6	-	-
SS-121	65 RT	375+00	9.20-10.70	A-3(0)	18	NP	76.5	20.5	0.0	3.0	100	57	3	-	-
SS-122	65 RT	375+00	14.20-15.70	A-1-b(0)	14	NP	88.2	8.6	0.2	3.0	100	36	4	-	-
SS-123	65 RT	375+00	19.20-20.70	A-2-4(0)	20	NP	48.5	43.9	2.5	5.1	100	74	12	-	-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-120	65 RT	375+00	4.20-5.70	A-3(0)	21	NP	64.0	31.1	0.9	4.0	100	60	6	-	-
SS-121	65 RT	375+00	9.20-10.70	A-3(0)	18	NP	76.5	20.5	0.0	3.0	100	57	3	-	-
SS-122	65 RT	375+00	14.20-15.70	A-1-b(0)	14	NP	88.2	8.6	0.2	3.0	100	35	4	-	-
SS-123	65 RT	375+00	19.20-20.70	A-2-4(0)	20	NP	48.5	43.9	2.5	5.1	100	74	12	-	-
SS-47	15 RT	376+00	4.10-5.60	A-3(0)	24	NP	69.0	27.0	1.0	3.0	100	56	4	-	-
SS-48	15 RT	376+00	9.10-10.60	A-1-b(0)	20	NP	93.8	3.1	1.0	2.0	100	15	3	-	-
SS-49	15 RT	376+00	14.10-15.60	A-2-4(0)	19	NP	38.8	49.8	6.3	5.1	100	88	19	-	-
SS-50	15 RT	378+00	1.00-1.60	A-2-4(0)	16	NP	63.8	26.0	2.2	8.0	100	61	11	-	-
SS-51	15 RT	378+00	3.80-5.20	A-1-b(0)	14	NP	74.9	18.0	2.0	5.0	100	49	8	-	-
SS-52	15 RT	378+00	8.80-10.20	A-3(0)	21	NP	64.1	28.4	0.5	7.0	100	72	9	-	-
SS-53	15 RT	378+00	13.80-15.20	A-3(0)	20	NP	59.5	37.6	1.9	2.0	100	78	5	-	-
SS-124	50 RT	379+00	4.30-5.80	A-1-b(0)	21	NP	78.0	17.8	1.2	3.0	100	46	5	-	-
SS-125	50 RT	379+00	9.30-10.80	A-3(0)	22	NP	63.7	29.0	0.2	7.1	100	77	9	-	-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-126	50 RT	379+00	14.30-15.80	A-3(0)	23	NP	83.2	13.7	0.0	3.0	99	58	4	-	-
SS-127	50 RT	379+00	19.30-20.80	A-3(0)	21	NP	46.5	50.3	0.2	3.0	100	86	5	-	-
SS-54	15 RT	380+00	3.70-5.20	A-3(0)	20	NP	61.8	29.4	2.8	6.0	100	68	10	-	-
SS-55	15 RT	380+00	8.70-10.20	A-3(0)	22	NP	57.5	40.5	1.0	1.0	100	83	3	-	-
SS-56	20 RT	382+00	3.80-5.30	A-3(0)	21	NP	60.0	34.3	1.7	4.0	100	71	7	-	-
SS-57	15 RT	384+00	8.80-10.30	A-3(0)	22	NP	54.4	42.2	1.4	2.0	100	82	5	-	-
SS-58	20 RT	382+00	13.80-15.30	A-2-4(0)	18	NP	40.5	44.9	4.6	10.0	100	88	20	-	-
SS-59	15 RT	384+00	4.10-5.60	A-3(0)	21	NP	57.5	36.4	3.1	3.0	100	77	8	-	-
SS-60	15 RT	384+00	9.10-10.60	A-3(0)	17	NP	60.1	35.5	2.4	2.0	100	73	6	-	-
SS-61	15 RT	384+00	14.10-15.60	A-3(0)	17	NP	56.0	42.2	0.8	1.0	100	84	3	-	-
SS-128	40 RT	385+00	4.00-5.50	A-3(0)	18	NP	71.0	25.7	0.3	3.0	100	61	4	-	-
SS-129	40 RT	385+00	9.00-10.50	A-3(0)	21	NP	66.0	30.3	0.7	3.0	100	66	5	-	-
SS-130	40 RT	385+00	14.00-15.50	A-3(0)	2	NP	57.3	39.6	0.1	3.0	100	85	4	-	-
SS-62	20 RT	386+00	4.20-5.70	A-3(0)	20	NP	55.2	39.2	3.6	2.0	100	81	8	-	-
SS-63	20 RT	386+00	9.20-10.70	A-2-4(0)	17	NP	49.5	40.0	3.5	7.0	100	78	13	-	-
SS-64	20 RT	386+00	14.20-15.70	A-3(0)	24	NP	54.2	43.8	1.0	1.0	100	79	3	-	-
SS-65	15 RT	388+00	4.10-5.60	A-3(0)	19	NP	61.8	30.8	2.4	5.0	100	89	8	-	-
SS-66	15 RT	388+00	9.10-10.60	A-3(0)	18	NP	66.1	30.6	1.3	2.0	100	70	4	-	-

PROJECT REFERENCE NO. R-2502B SHEET NO. 19

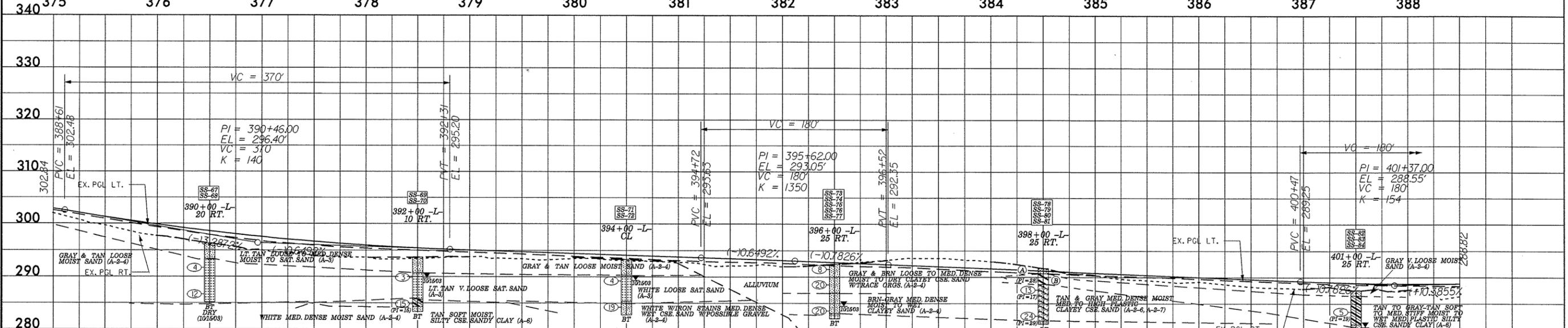
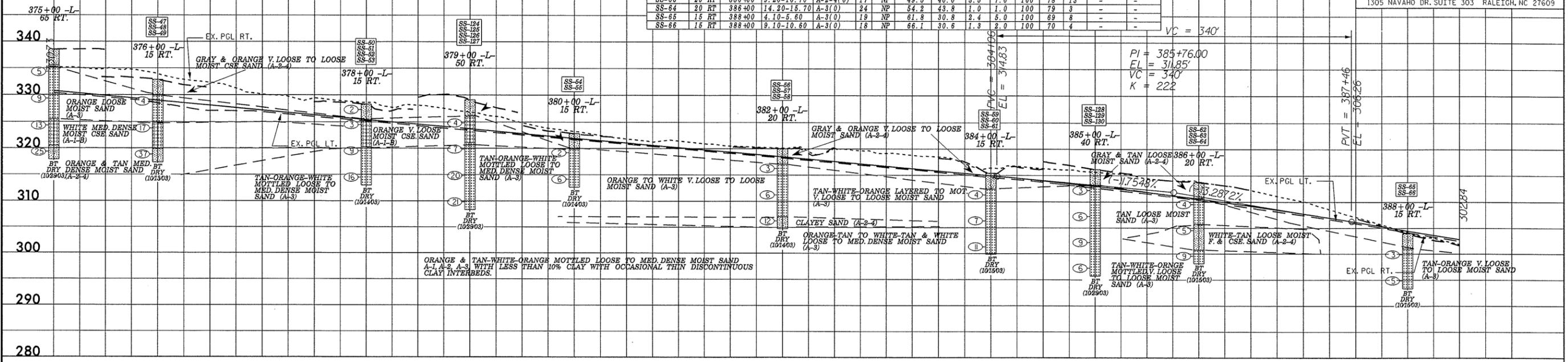
ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR A/W ACQUISITION

H S M M

ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-67	20 RT	390+00	4.70-6.20	A-3(0)	21	NP	57.5	39.7	1.8	1.0	100	79	4	-	-
SS-68	20 RT	390+00	9.70-11.20	A-3(0)	20	NP	72.9	23.8	2.2	1.0	98	56	4	-	-
SS-69	10 RT	392+00	3.90-5.40	A-3(0)	20	NP	56.8	35.6	1.6	6.0	100	73	9	-	-
SS-70	10 RT	392+00	8.90-10.00	A-6(3)	32	15	60.7	7.8	17.4	24.0	100	60	43	-	-
SS-71	CL	394+00	4.10-5.60	A-3(0)	22	NP	57.2	40.3	1.5	1.0	100	81	3	-	-
SS-72	CL	394+00	9.10-10.60	A-2-4(0)	22	NP	70.1	17.4	6.4	6.0	100	62	15	-	-
SS-73	25 RT	396+00	1.00-2.50	A-2-4(0)	20	NP	69.7	13.5	6.7	11.0	100	63	18	-	-
SS-74	25 RT	396+00	3.90-5.00	A-2-4(0)	21	NP	66.3	29.1	6.6	8.0	100	70	16	-	-
SS-75	25 RT	398+00	5.00-6.40	A-2-4(0)	19	NP	64.3	26.5	6.2	14.0	100	70	22	-	-
SS-76	25 RT	398+00	8.90-9.40	NOT ENOUGH MAT.			69.8	15.1	6.0	9.0	100	65	16	-	-
SS-77	25 RT	398+00	9.40-10.40	A-1-b(0)	15	NP	82.4	13.2	1.4	3.0	97	47	5	-	-
SS-78	25 RT	398+00	1.00-2.50	A-7-6(10)	50	28	40.1	10.0	11.8	38.1	100	73	51	-	-
SS-79	25 RT	398+00	4.10-5.60	A-2-6(1)	32	17	49.5	18.2	8.2	24.0	98	69	33	-	-
SS-80	25 RT	398+00	9.10-10.00	A-2-7(1)	42	29	72.4	6.3	2.2	19.0	98	47	21	-	-
SS-81	25 RT	398+00	10.00-10.60	A-1-b(0)	19	NP	87.6	7.3	1.1	4.0	98	36	5	-	-
SS-82	25 RT	401+00	4.10-5.60	A-6(5)	35	19	37.5	18.8	13.6	30.1	100	80	46	-	-
SS-83	25 RT	401+00	9.10-10.00	A-2-4(0)	22	7	53.7	23.8	4.4	18.0	98	70	24	-	-
SS-84	25 RT	401+00	10.00-10.60	NOT ENOUGH MAT.			89.6	8.3	1.1	1.0	86	27	2	-	-

389 390 391 392 393 394 395 396 397 398 399 400 401 402

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	=6150	CFS
DESIGN FREQUENCY	=50	YRS
DESIGN HW ELEVATION	=279.49	FT
BASE DISCHARGE	=8057	CFS
BASE FREQUENCY	=100	YRS
BASE HW ELEVATION	=280.36	FT
OVERTOPPING DISCHARGE	=13500	CFS
OVERTOPPING FREQUENCY	=500+	YRS
OVERTOPPING ELEVATION	=283.9	FT

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	PL I.	% BY WEIGHT			% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40		
SS-213	CL	432+00	10.40-11.80	A-4(0)	26	5	28.5	32.1	21.7	18.3	100	89	44	-
SS-214	CL	432+00	15.40-16.80	A-1-a(0)	18	NP	77.2	25.4	1.4	6.1	41	16	4	-
SS-215	CL	432+00	20.40-21.80	A-6(1)	32	15	37.2	25.4	4.9	22.5	96	81	37	-
SS-216	CL	432+00	20.40-21.80	A-7-6(9)	42	25	32.3	16.1	13.0	38.6	98	77	59	-
SS-217	CL	432+00	40.00-41.50	A-6(2)	27	12	24.0	38.2	29.7	8.1	100	86	49	-
SS-201	CL	437+00	5.10-6.60	A-2-4(0)	22	6	57.7	24.4	1.6	16.3	88	57	18	-
SS-202	CL	437+00	10.10-11.60	A-2-4(0)	26	NP	58.3	32.1	5.5	4.1	100	64	13	-
SS-203	CL	437+00	15.10-16.60	A-1-a(0)	22	NP	71.5	24.4	0.0	4.0	39	21	2	-
SS-204	CL	437+00	20.10-21.60	A-6(1)	29	11	24.2	36.6	18.9	20.3	100	90	43	-
SS-205	CL	437+00	24.60-26.10	A-2-7(2)	42	23	51.6	17.5	8.5	22.4	100	75	33	-
SS-206	CL	437+00	34.60-36.10	A-6(13)	38	24	13.6	30.1	23.8	32.5	100	92	65	-
SS-207	CL	437+00	39.60-41.10	A-6(9)	35	18	14.8	31.9	37.0	16.3	100	91	64	-
SS-208	CL	437+00	49.20-50.70	A-2-4(0)	36	NP	47.0	27.4	19.5	6.1	91	60	28	-
SS-209	CL	441+10	10.30-11.80	A-1-b(0)	19	NP	73.6	19.9	2.4	4.1	65	32	6	-
SS-210	CL	441+10	20.30-21.80	A-2-7(3)	46	25	54.7	12.0	8.9	24.4	92	55	32	-
SS-211	CL	441+10	24.10-25.60	A-2-7(2)	44	24	53.9	16.1	5.7	24.4	99	74	32	-
SS-212	CL	441+10	34.10-35.60	A-6(12)	40	22	15.7	25.4	24.4	34.6	100	90	66	-

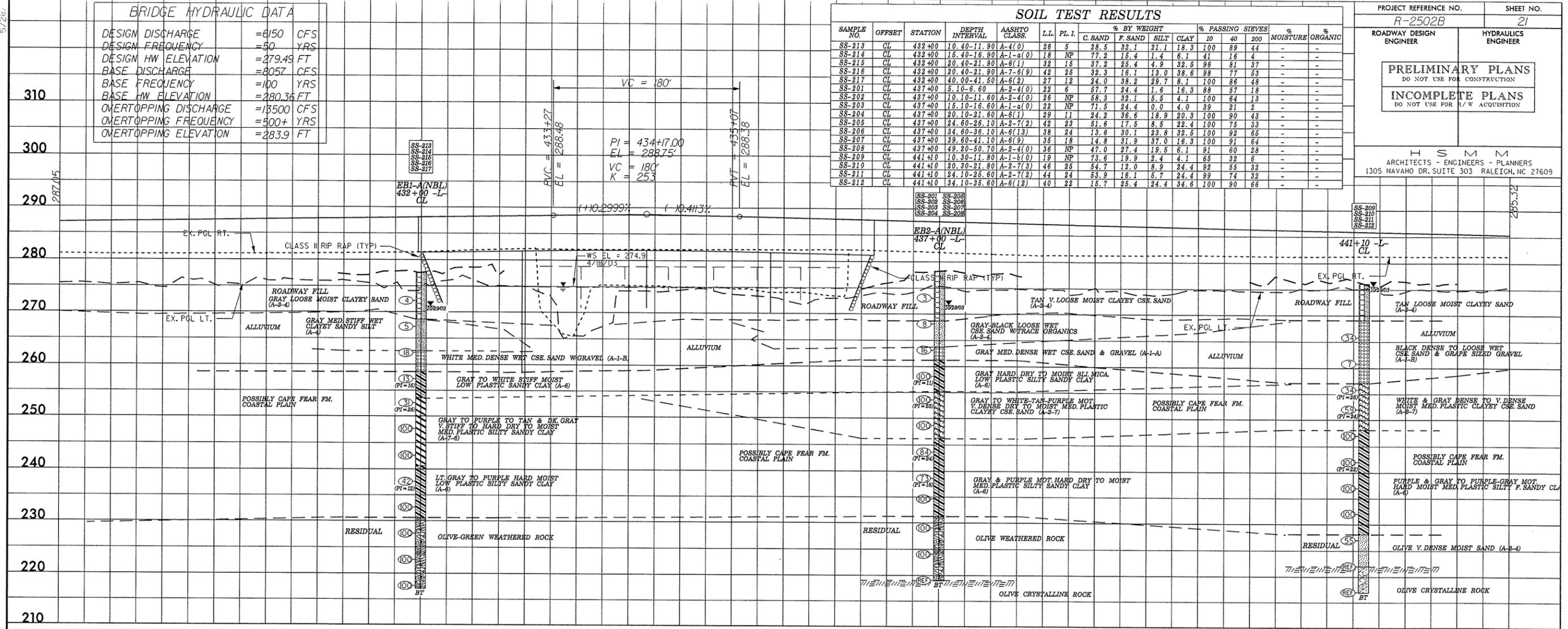
PROJECT REFERENCE NO. **R-2502B** SHEET NO. **21**

ROADWAY DESIGN ENGINEER: _____ HYDRAULICS ENGINEER: _____

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	PL I.	% BY WEIGHT			% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40		
SS-101	CL	445+00	1.00-2.50	A-2-4(0)	26	8	55.9	16.9	8.1	19.1	94	58	27	-
SS-102	CL	445+00	4.00-5.00	A-2-4(0)	23	9	48.0	23.3	10.5	18.2	98	70	31	-
SS-103	CL	445+00	8.50-10.00	A-2-4(0)	17	NP	71.8	17.9	1.2	9.1	98	51	11	-
SS-104A	CL	445+00	13.50-14.00	A-3(0)	20	NP	47.0	48.0	1.0	4.0	100	92	6	-
SS-104	CL	445+00	14.00-15.00	A-2-6(0)	39	13	67.7	16.8	6.3	20.2	100	60	28	-
SS-105	CL	445+00	18.50-20.00	A-2-7(1)	41	20	55.7	17.2	6.9	20.2	100	66	29	-
SS-106	35 LT	449+35	3.80-5.30	A-2-6(2)	39	21	46.6	24.6	2.6	26.3	97	68	31	-
SS-107	35 LT	449+35	8.80-10.30	A-2-4(0)	26	6	63.8	20.2	1.8	14.2	99	59	17	-
SS-108	15 RT	441+15	3.70-5.20	A-2-6(1)	33	16	42.1	28.1	3.4	26.3	96	68	31	-
SS-109	15 RT	441+15	8.70-10.20	A-2-6(1)	32	14	42.1	25.7	7.9	24.3	94	68	34	-
SS-110	CL	442+60	3.60-5.10	A-2-6(1)	38	22	58.3	18.3	1.1	22.3	82	46	20	-

5/28/21
 FILES: STOWMS, HAVIER, STOWMS, HAVIER
 10/15/21