

PROJECT: 49010.1.STR03T1B ID: C-4901 AD

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

STATE	STATE PROJECT REFERENCE NO.	SHEET	TOTAL
N.C.	49010.1.STR03T1B	1	14

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. C-4901 AD F.A. PROJ. N/A
COUNTY DAVIDSON
PROJECT DESCRIPTION CP "BOWERS (MP 309.8) TO LAKE (MP 314.0)
ON THE NCRR / NSRR MAINLINE

SITE DESCRIPTION PROPOSED BRIDGE ON NCRR / NSRR
MAINLINE OVER HAMBY CREEK TRIBUTARY

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 FIELD 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 (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.

PERSONNEL

B. Worley, PG

A. May, EI

L. Gonzalez-Castillo

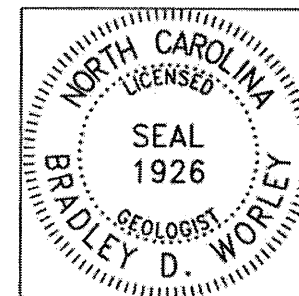
C. Husketh

INVESTIGATED BY B. Worley, PG

CHECKED BY D. Dewey, PE

SUBMITTED BY Summit Design and Engineering

DATE APRIL, 2013



DRAWN BY: B. Worley, PG, and M. Brandon

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT TIP # C-4901A

COUNTY Davidson

DATE 5/13/2013

SHEET 1 OF 1 SHEETS

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. 20%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-M1-	7572+00.00	7602+00.00	27,985		1,071		27,985	15,577		15,577	18,692	0	9,293	1,071	10,364
		SUBTOTAL	27,985		1,071		27,985	15,577		15,577	18,692	0	9,293	1,071	10,364
-M1-	7602+00.00	7632+00.00	57,017		0		57,017	13,784		13,784	16,541	0	40,476	0	40,476
		SUBTOTAL	57,017		0		57,017	13,784		13,784	16,541	0	40,476	0	40,476
-M1-	7632+00.00	7661+66.40	21,271		0		21,271	12,200		12,200	14,640	0	6,631	0	6,631
		SUBTOTAL	21,271		0		21,271	12,200		12,200	14,640	0	6,631	0	6,631
-M1-	7663+16.37	7692+00.00	25,747		0		25,747	22,030		22,030	26,436	689	0	0	0
		SUBTOTAL	25,747		0		25,747	22,030		22,030	26,436	689	0	0	0
-M1-	7692+00.00	7722+00.00	4,902		0		4,902	2,038		2,038	2,446	0	2,456	0	2,456
		SUBTOTAL	4,902		0		4,902	2,038		2,038	2,446	0	2,456	0	2,456
-M1-	7722+00.00	7740+37.14	16,001		0		16,001	662		662	794	0	15,207	0	15,207
		SUBTOTAL	16,001		0		16,001	662		662	794	0	15,207	0	15,207
-M1-	7741+55.53	7760+06.51	14,871		0		14,871	6,227		6,227	7,472	0	7,399	0	7,399
		SUBTOTAL	14,871		0		14,871	6,227		6,227	7,472	0	7,399	0	7,399
-M1-	7762+21.65	7792+00.00	24,130		0		24,130	18,617		18,617	22,340	0	1,790	0	1,790
		SUBTOTAL	24,130		0		24,130	18,617		18,617	22,340	0	1,790	0	1,790
-M1-	7792+00.00	7796+63.00	6,437		0		6,437	14		14	17	0	6,420	0	6,420
		SUBTOTAL	6,437		0		6,437	14		14	17	0	6,420	0	6,420
PROJECT SUBTOTAL			198,361	0	1,071	0	198,361	91,148	0	91,148	109,378	689	89,672	1,071	90,743
ADDITIONAL UNDERCUT					0										
**EST. LOSS DUE TO CLEARING & GRUBBING			-350				-350						-350		-350
WASTE TO REPLACE BORROW												-689	-689		-689
PROJECT TOTAL			198,011	0	1,071	0	198,011	91,148	0	91,148	109,378	0	88,633	1,071	89,704
GRAND TOTAL			198,011		1,071										
SAY			198,100		1,080										

EST. DDE = 9010 CY

EST. 250 CY OF SHALLOW UNDERCUT.

EST. 1080 CY OF SELECT GRANULAR MATERIAL

EST. 3200 CY OF CLASS III SELECT MATERIAL

EST. 510 TONS OF CLASS IV SUBGRADE STABILIZATION

* THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEER.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 49010.I.STRO3T1B SHEET NO. 2

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 1208, 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:</p> <p>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY 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>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</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. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL, DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC) - 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.</p>																																																																																																																																																																																																																																																																												
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p>MINERALOGICAL COMPOSITION</p>		<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>		<p>WEATHERING</p> <p>FRESH</p> <p>VERY SLIGHT (V SLI.)</p> <p>SLIGHT (SLI.)</p> <p>MODERATE (MOD.)</p> <p>MODERATELY SEVERE (MOD. SEV.)</p> <p>SEVERE (SEV.)</p> <p>VERY SEVERE (V SEV.)</p> <p>COMPLETE</p>																																																																																																																																																																																																																																																																												
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th colspan="2">A-1</th> <th colspan="2">A-3</th> <th colspan="3">A-2</th> <th colspan="2">A-4</th> <th colspan="2">A-5</th> <th colspan="3">A-6</th> <th colspan="2">A-7</th> <th colspan="2">A-1, A-2</th> <th colspan="2">A-4, A-5</th> <th colspan="2"></th> </tr> <tr> <th>SYMBOL</th> <td colspan="2">A-1-a</td> <td colspan="2">A-1-b</td> <td colspan="2">A-2-4</td> <td colspan="3">A-2-5</td> <td colspan="2">A-2-6</td> <td colspan="2">A-2-7</td> <td colspan="2">A-4-1</td> <td colspan="2">A-4-2</td> <td colspan="2">A-4-3</td> <td colspan="2">A-6, A-7</td> </tr> </thead> <tbody> <tr> <td>% PASSING</td> <td>50</td><td>10</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td> <td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td> <td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td> </tr> <tr> <td>LIQUID LIMIT</td> <td colspan="2">5</td><td colspan="2">10</td><td colspan="3">15</td><td colspan="2">20</td><td colspan="2">25</td><td colspan="2">30</td><td colspan="2">35</td><td colspan="2">40</td><td colspan="2">45</td><td colspan="2">50</td><td colspan="2">55</td><td colspan="2">60</td><td colspan="2">65</td><td colspan="2">70</td> </tr> <tr> <td>PLASTIC INDEX</td> <td colspan="2">0</td><td colspan="2">1</td><td colspan="3">2</td><td colspan="2">3</td><td colspan="2">4</td><td colspan="2">5</td><td colspan="2">6</td><td colspan="2">7</td><td colspan="2">8</td><td colspan="2">9</td><td colspan="2">10</td><td colspan="2">11</td><td colspan="2">12</td><td colspan="2">13</td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="2">0</td><td colspan="2">0</td><td colspan="3">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS, GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="2">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="2">GRANULAR SOILS</td> <td colspan="2">SILT-CLAY SOILS</td> <td colspan="2">MUCK, PEAT</td> <td colspan="2">HIGHLY ORGANIC SOILS</td> <td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td> </tr> <tr> <td>GEN. 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A-1		A-3		A-2			A-4		A-5		A-6			A-7		A-1, A-2		A-4, A-5				SYMBOL	A-1-a		A-1-b		A-2-4		A-2-5			A-2-6		A-2-7		A-4-1		A-4-2		A-4-3		A-6, A-7		% PASSING	50	10	30	40	50	60	70	80	90	100	10	20	30	40	50	60	70	80	90	100	10	20	30	40	50	60	70	80	90	100	LIQUID LIMIT	5		10		15			20		25		30		35		40		45		50		55		60		65		70		PLASTIC INDEX	0		1		2			3		4		5		6		7		8		9		10		11		12		13		GROUP INDEX	0		0		0			0		0		0		0		0		0		0		0		0		0		0		USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		GRANULAR SOILS		SILT-CLAY SOILS		MUCK, PEAT		HIGHLY ORGANIC SOILS										GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR		POOR		UNSUITABLE										<p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE</p> <p>MODERATELY COMPRESSIBLE</p> <p>HIGHLY COMPRESSIBLE</p>		<p>PERCENTAGE OF MATERIAL</p> <table border="1"> <thead> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </tbody> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>STATIC WATER LEVEL AFTER 24 HOURS</p> <p>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>SPRING OR SEEP</p>		<p>MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p>		<p>ROCK HARDNESS</p> <p>VERY HARD</p> <p>HARD</p> <p>MODERATELY HARD</p> <p>MEDIUM HARD</p> <p>SOFT</p> <p>VERY SOFT</p>	
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CARB. _____</p> <p>MUD ROTARY _____</p> <p>HAMMER TYPE:</p> <p>AUTOMATIC _____ MANUAL _____</p> <p>CORE SIZE:</p> <p>B _____</p> <p>N _____</p> <p>H _____</p> <p>HAND TOOLS:</p> <p>POST HOLE DIGGER _____</p> <p>AUGER _____</p> <p>SOUNDING ROD _____</p> <p>VANE SHEAR TEST _____</p>		<p>FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> <p>BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> <p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE</p> <p>MODERATELY INDURATED</p> <p>INDURATED</p> <p>EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FEET	VERY CLOSE	LESS THAN 0.16 FEET	TERM	THICKNESS	VERY THICKLY BEDDED	> 4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																															
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TIP PROJECT: C-4901A

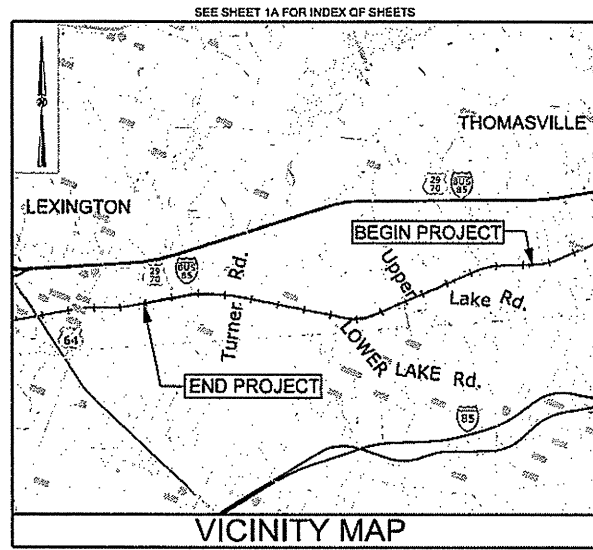
CONTRACT: C203160

NCDOT
RAIL DIVISION

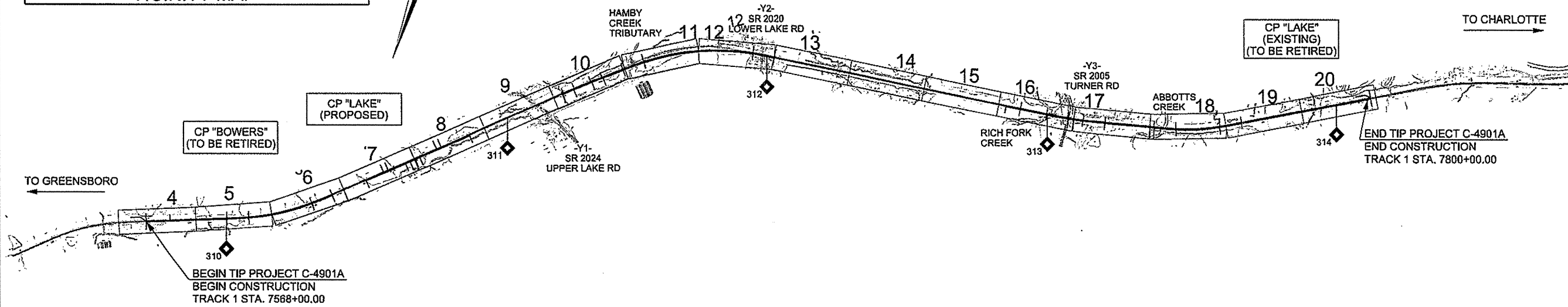
DAVIDSON COUNTY



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	C-4901A	2A	10
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
49010.1.STR03T1B		P.E.	
43219.2.STR02C4901		ROW	
49010.3.STR01T4A		UTIL. & CONST.	



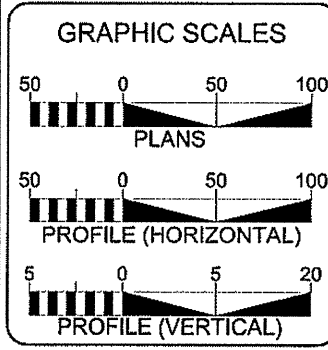
PROJECT TITLE: NCRR/NS MAINLINE BOWERS TO LAKE RAILROAD ROADBED
(MP 309.8 TO MP 314.0)
TYPE OF WORK: GRADING, DRAINAGE, STRUCTURE



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

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: RIGHT-OF-WAY
DATE: JULY 31, 2012



PROJECT LENGTH	
LENGTH OF RAIL TIP PROJECT	4.302 MILES
LENTGH OF STRUCTURES TIP PROJECT	0.092 MILES
TOTAL LENGTH OF TIP PROJECT	4.394 MILES

Prepared in the Office of:
HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

2012 STANDARD SPECIFICATIONS	ROBERT BURNETT, P.E. RAIL PROJECT ENGINEER
RIGHT OF WAY DATE: AUGUST 2012	COREY VERNIER, P.E. RAIL PROJECT DESIGN ENGINEER
LETTING DATE: MAY 2013	DAVID HAWKINS, P.E. STRUCTURE PROJECT ENGINEER
	JAMES BYRD, P.E. HYDRAULICS PROJECT ENGINEER
	JASON ORTHNER, P.E. NCDOT PROJECT MANAGER

RAIL ENGINEER

SIGNATURE: P.E.

HYDRAULICS ENGINEER

SIGNATURE: P.E.

NC DEPARTMENT OF
TRANSPORTATION
RAIL DIVISION

ENGINEERING AND SAFETY BRANCH
CAPITAL YARD
114 MAIL SERVICE CENTER
RALEIGH, NC 27609-1144



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

January 22, 2013

STATE PROJECT: 49010.1.STR03T1B (C-4901 A/D)
F.A. PROJECT: n/a
COUNTY: Davidson
DESCRIPTION: CP "Bowers" (MP 309.8) to CP "Lake" (MP 314.0) on the NCRR / NS Mainline
SUBJECT: *Revised* Geotechnical Report – Inventory for New Alignment Sections

Project Description

The project consists of constructing the second main line track (4.2 miles) and curve and safety improvements. The project is located Davidson County, between Thomasville, N.C., and Lexington, N.C, along the existing NCRR / NS main line. The project consists of the construction of a second main line track and two segments of new alignment designed to straighten existing main line curves. This project is part of the NCDOT Rail Division's American Recovery and Reinvestment Act (ARRA) Piedmont Improvement Program (PIP),

The geotechnical investigation was conducted in the late spring and summer of 2012 utilizing Summit Design and Engineering, LLC, personnel. Borings were advanced using CME-450 drill machine equipped with automatic standard penetration test (SPT) hammer. SPT borings were performed at specific locations to provide subsurface information for roadway design and construction. Representative soil samples were tested in Summit's NCDOT and AASHTO approved soils laboratory. This geotechnical roadway investigation concentrated on the areas of proposed railway realignment.

The following alignments were investigated for this project:

<u>Line</u>	<u>Station(±)</u>
-M1-	7591+00 to 7598+90
-M1-	7663+50 to 7679+00

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
Fax: 919-250-4237
www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Areas of Special Geotechnical Interest

- 1) Plastic Soils- Medium to highly plastic, alluvial clays were found to occur in the saturated area between Hamby Creek Tributary and 7673+00.
- 2) Alluvial Soils- Relatively recent flood plain deposits, typically consisting of medium to highly plastic silty clay and sandy silt, are found in the saturated area near Hamby Creek Tributary and near creeks that drain into Hamby Creek Tributary. Alluvial soils were found to range in depth across the project area from 3.0 to 7.9 ft. These soils have the potential to cause embankment stability/settlement problems and occur through the following sections:

<u>Line</u>	<u>Station (±)</u>
-M1-	7596+00 to 7598+90
-M1-	7661+00 to 7673+00

- 3) Crystalline Rock- No crystalline rock was encountered within 6 feet of proposed grade in areas of main line track realignment.
- 4) Ground Water- No areas were found to exhibit a high water table, seasonal high ground water, or the potential for ground water related construction problems.

Physiography, Geology and Surface Water

The project corridor is located in the Piedmont Physiographic Province, between Thomasville and Lexington, N.C. Topography in the project area is generally gently rolling and is comprised of farmland, pine and hardwood forest, and residential/commercial development.

Geologically the project area is located in the northern Charlotte Belt and is underlain by Cambrian/Late Proterozoic-age mafic meta-volcanic rock (CZv). Residual soils were derived from the weathering of the meta-volcanic rock they overlie. More recent alluvial deposits occur in and around streams and drainages across the project.

Surface water is drained from the corridor by Hamby Creek Tributary and Abbott's Creek as well as several smaller unnamed creeks that generally trend north/south across the project.

Soils Properties

Soils encountered at the project site include both alluvial and residual deposits.

Alluvial deposits are located within the floodplains of Hamby Creek Tributary, Abbott's Creek, and the ditches and wetland areas that traverse the project. These soils are primarily Brown, very loose, clayey sand (A-2-6) and orange brown to gray, very soft to stiff, sandy silt (A-4), plastic silty clay (A-7-6), and sandy clay (A-6).

Residual soils were encountered throughout the project. These soils consist of brown, dense, saprolitic, coarse sand (A-1-b) and silty sand (A-2-4); orange-brown, very stiff, saprolitic, silty clay (A-7) and clayey silt (A-5); gray and brown, hard, saprolitic, sandy silt (A-4), and Brown, stiff, sandy clay (A-6).

Rock Properties

Weathered rock was encountered during the roadway investigation. It originates from the underlying mafic meta-volcanic rock.

Crystalline rock was not encountered during the roadway investigation but was encountered during the structure investigation for the proposed bridge over Hamby Creek Tributary, near 7663+00. Crystalline rock that underlies the project area consists of dark green to black, fresh, hard, close-fractured, mafic meta-volcanic rock. No rock outcrops, or rock in the subsurface, was encountered within 6 feet of proposed grade.

Ground Water

Ground water data was collected during average rainfall conditions. Water levels across the project vary due to topographic relief and soil permeability. The presence of less permeable clayey soils may cause water levels to be relatively shallow. In upland areas adjacent to flood plains ground water levels occur at depths of 4 to 10 feet below natural ground. Within flood plains water levels were generally just below or at the natural ground surface. Groundwater may fluctuate with seasonal precipitation.

Surface Water

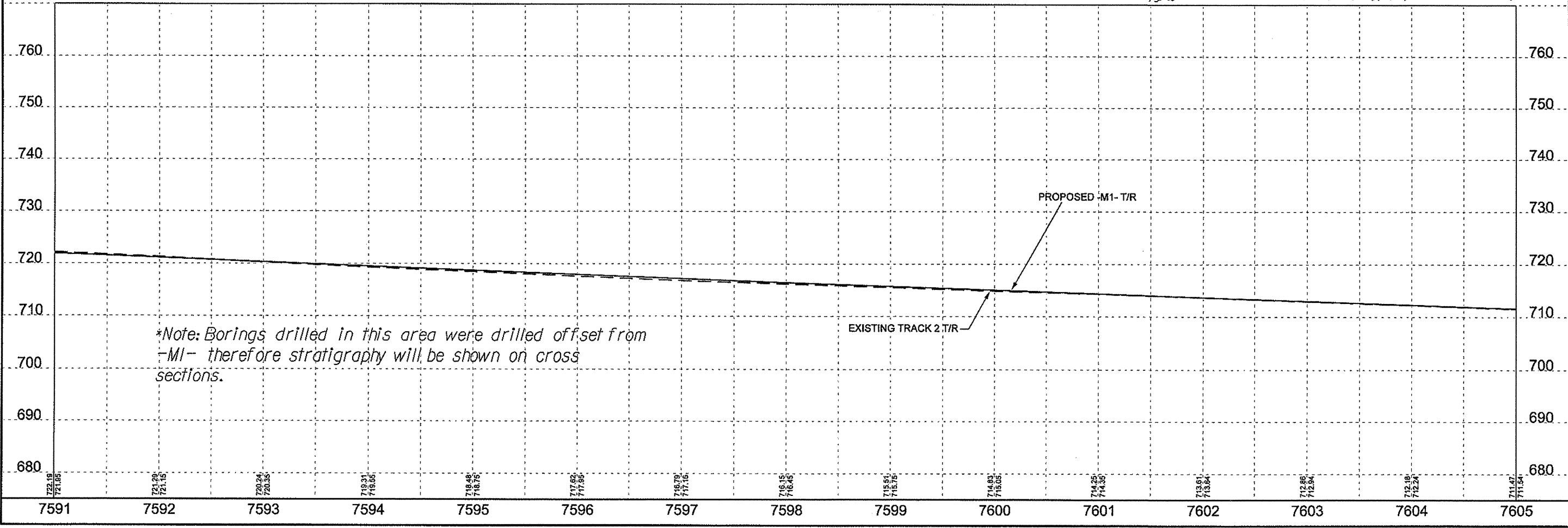
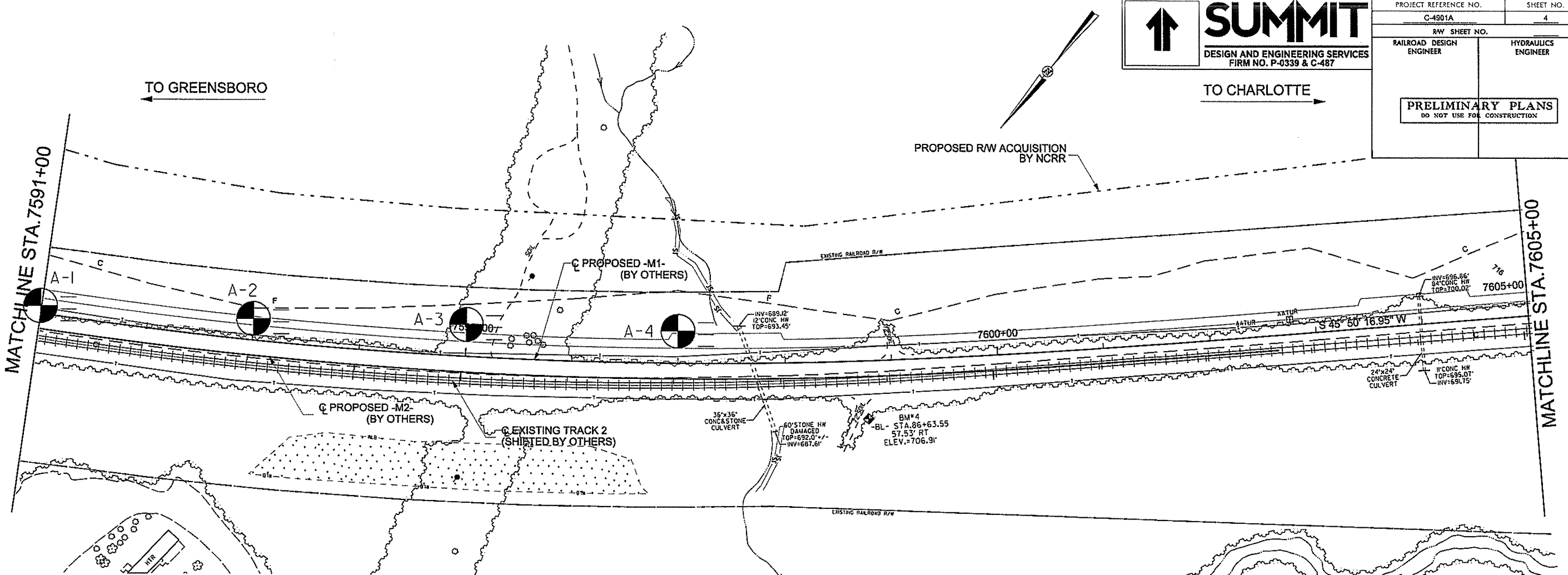
Surface water exist in the area of proposed track realignment, to the north side of the existing NCRR / NS mainline, between stations 7664+00 and 7672+50. Water depth varies with seasonal rainfall, but was observed during drilling to be 0.75 to 1.0 ft. During the property owner contact phase of the investigation, field personnel were told that the standing water was due to a beaver dam on a small creek that empties into Hamby Creek Tributary.

Respectfully Submitted,

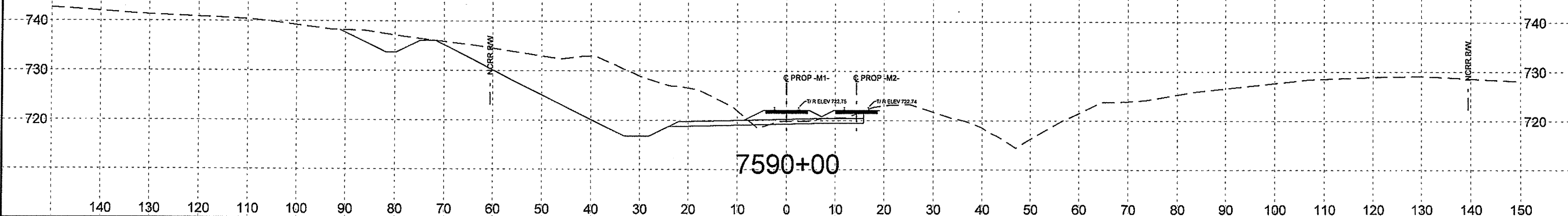
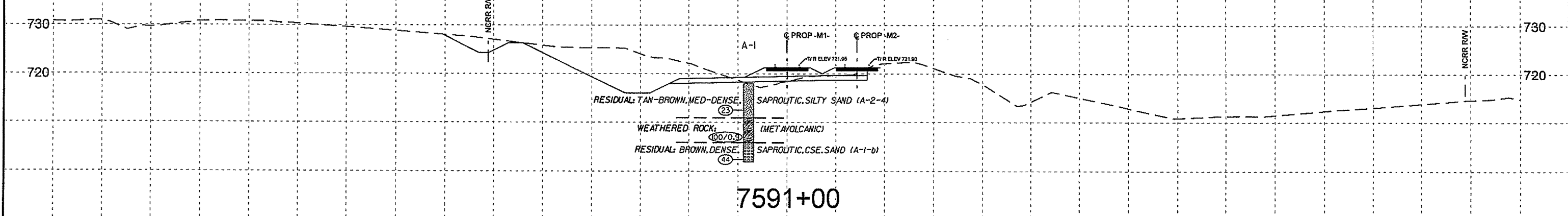
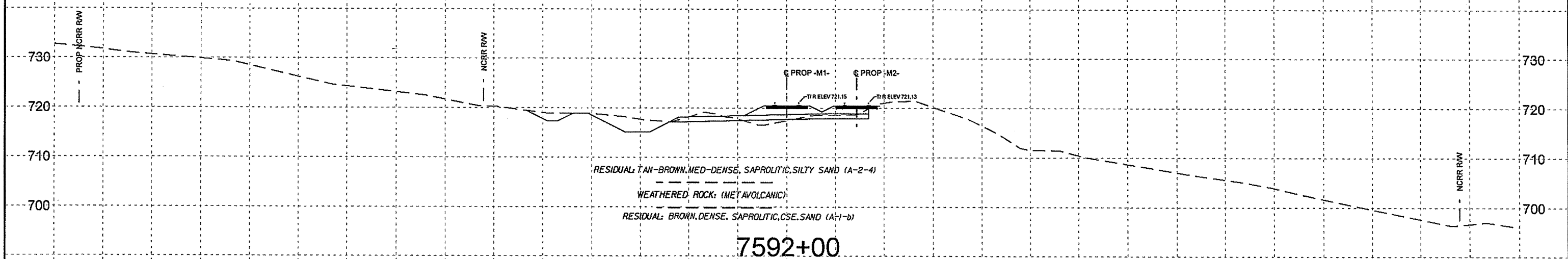


Bradley D. Worley
Sr. Transportation Geologist

PROJECT REFERENCE NO. C-4901A	SHEET NO. 4
RW SHEET NO.	
RAILROAD DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

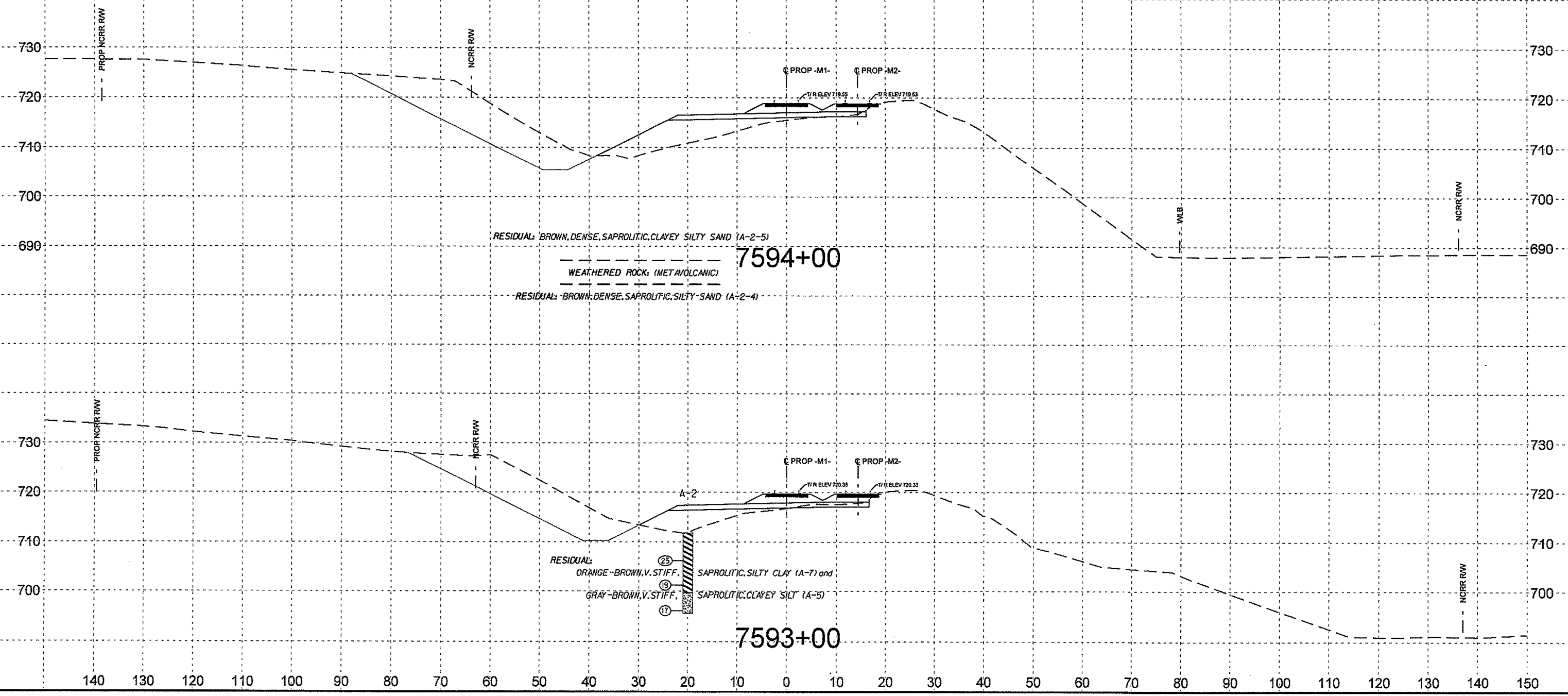


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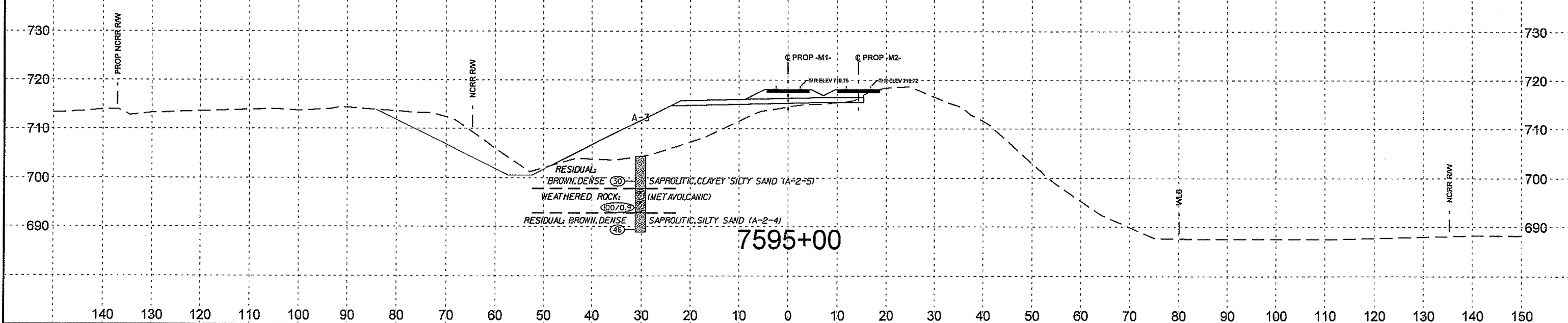
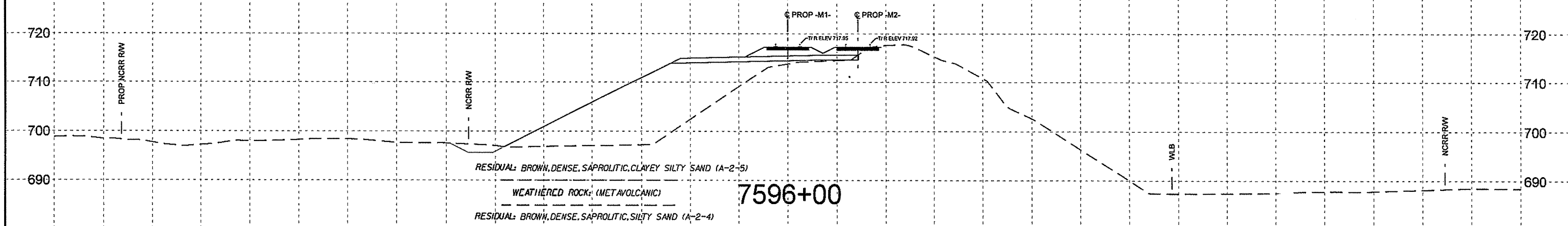
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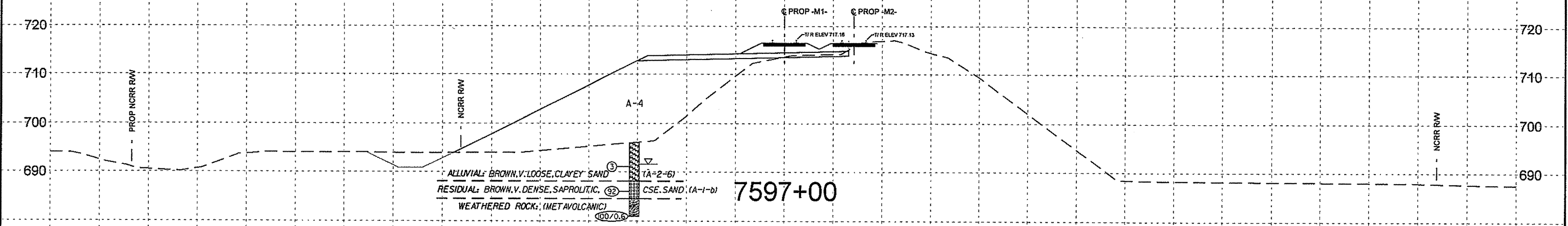
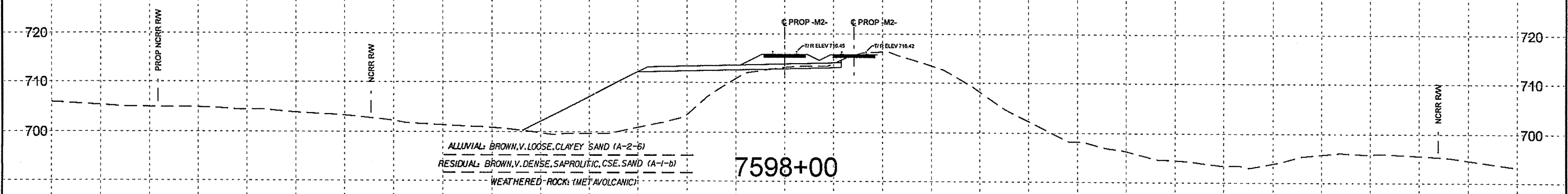
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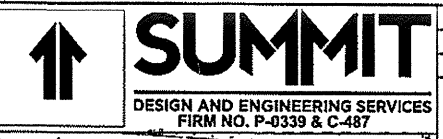
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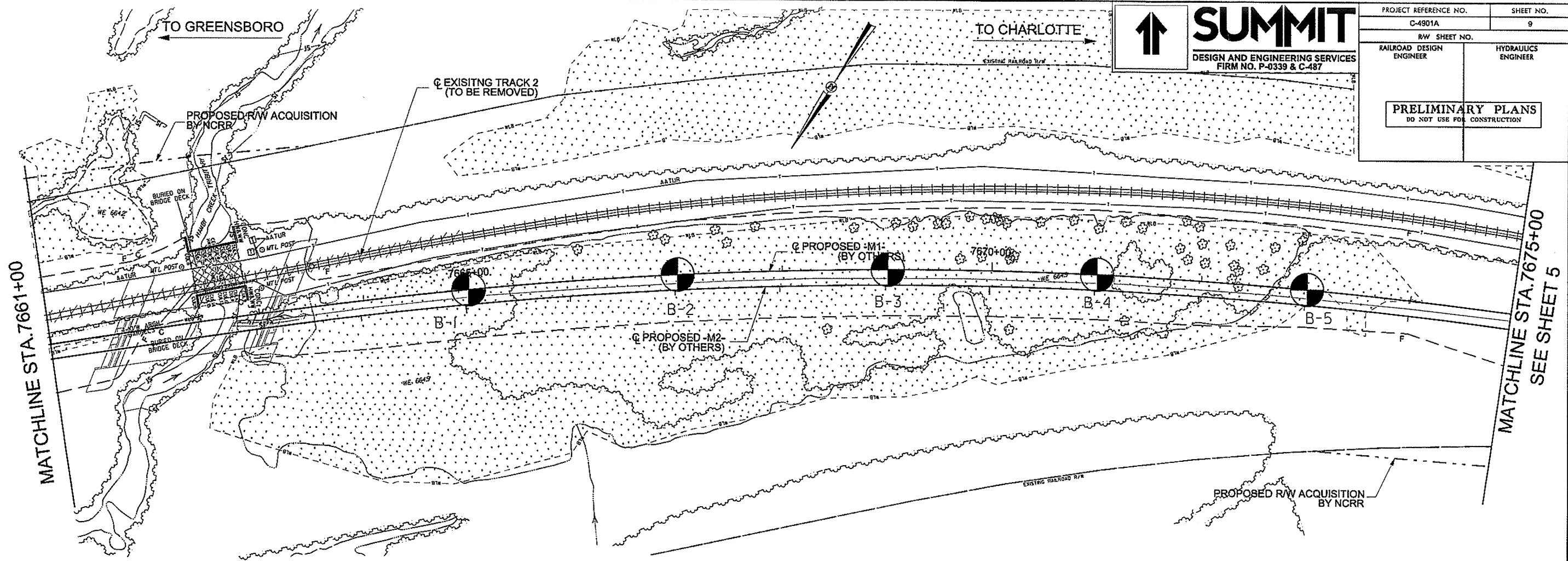
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TO GREENSBORO

TO CHARLOTTE



PROJECT REFERENCE NO. C-4901A	SHEET NO. 9
RW SHEET NO.	
RAILROAD DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL (FT.)	AASHTO CLASS	LL	PI	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40			200
SS-1	CL	7665+00	0.0 - 1.5	A-4 (3)	25	6	10.3	19.1	43.5	27.0	99	93	77	28.6	n/a
SS-3	CL	7667+00	0.0 - 1.5	A-7-6 (20)	49	35	13.5	23.6	17.6	45.3	99	93	68	26.1	n/a
SS-4	CL	7667+00	5.0 - 6.5	A-4 (0)	30	4	32.1	24.6	26.0	17.2	77	58	39	21.0	n/a
SS-8	CL	7669+00	0.0 - 1.5	A-2-4 (0)	15	NP	50.2	26.8	8.6	14.4	94	66	25	21.2	n/a
SS-9	CL	7671+00	0.0 - 1.5	A-4 (0)	28	2	13.5	44.1	34.6	7.8	100	94	54	19.0	n/a

