

SEE SHEET 3 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.	R-2707E	1	47

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. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

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

PERSONNEL

HPC

TRIGON

GOODNIGHT, D.W.

WEIS, J.M.

LANE, R.W.

INVESTIGATED BY FALCON ENG.

DRAWN BY HILL, M. J.

CHECKED BY HUNSBERGER, W. S.

SUBMITTED BY FALCON ENG.

DATE OCTOBER 2018

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74, SHELBY BYPASS FROM
WEST OF SR 2238 (LONG BRANCH RD.)

TO WEST OF SR 1001

INVENTORY

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	851+00.00 - 990+00.00	4-13	16-26
-Y42RPA-	10+00.00 - 23+66.43	6,7	27
-Y42RPB-	10+00.00 - 25+75.11	6	28
-Y42RPC-	10+00.00 - 25+48.29	6	29
-Y42RPD-	10+00.00 - 30+11.39	6,7	30
-RABTI-	10+00.00 - 12+89.02	6	31
-Y4I-	10+00.00 - 17+37.51	6,15	32
-Y42-	10+00.00 - 15+34.00	6	32
-Y46-	10+75.00 - 14+79.57	9	33
-SR6-	11+50.00 - 31+03.30	5,6	34
-SR7-	10+20.00 - 79+52.00	6-11	35-37
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APPENDICES

APPENDIX	TITLE	SHEETS
A	CORE LOGS AND PHOTOGRAPHS	41-42

REFERENCE: R-2707E

PROJECT: 34497



DocuSigned by:

W. Scott Hunsberger

10/26/2018 11:43:33 AM PDT

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																		
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 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, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND 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 IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-2</th><th>A-3</th><th>A-4</th><th>A-5</th> <th>A-6</th><th>A-7</th><th>A-8</th><th>A-9</th><th>A-10</th> <th>A-11</th><th>A-12</th><th>A-13</th><th>A-14</th><th>A-15</th> <th>A-16</th><th>A-17</th><th>A-18</th><th>A-19</th><th>A-20</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td><td>A-1-b</td><td>A-2-4</td><td>A-2-5</td><td>A-2-6</td><td>A-2-7</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-8</td><td>A-9</td><td>A-10</td><td>A-11</td><td>A-12</td><td>A-13</td><td>A-14</td><td>A-15</td><td>A-16</td><td>A-17</td> </tr> <tr> <td>SYMBOL</td> <td colspan="5">[Pattern]</td><td colspan="5">[Pattern]</td><td colspan="5">[Pattern]</td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12	A-13	A-14	A-15	A-16	A-17	A-18	A-19	A-20	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12	A-13	A-14	A-15	A-16	A-17	SYMBOL	[Pattern]					[Pattern]					[Pattern]					<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>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 - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (IV SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</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, WOULD YIELD SPT N VALUES > 100 BPF</i></p> <p>VERY SEVERE (IV SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD 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>									
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<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>COMPRESSION</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<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>																																																														
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<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>BENCH MARK:</p> <p>BORING ELEVATIONS TAKEN FROM R2707_Is.trn.I80309.tin</p> <p>DATED 03/28/18 ELEVATION: FEET</p> <p>NOTES:</p> <p>FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>																																																																																																						



Roadway Subsurface Investigation Report - Inventory

US 74, Shelby Bypass from West of SR 2238 (Long Branch Road) to West of SR 1001
Cleveland County, North Carolina
WBS: 34497.1.1 TIP: R-2707E
Falcon Project No.: G17053.00

Prepared for:

Stantec
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606-3563

Submitted by:

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October 26, 2018

WBS: 34497.1.1
TIP: R-2707E
COUNTY: Cleveland
DESCRIPTION: US 74, Shelby Bypass From West of SR 2238 (Long Branch Road) to West of SR 1001
SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of 2.6 miles of proposed widening in Cleveland County. Existing US 74 will be widened/improved from the beginning of the project west of Long Branch Road to west of the existing US 74 Business Interchange. The bypass will include multiple ramps, service roads, and structures. Multiple side streets and attached drives will be widened, realigned, or graded at various locations, including a new grade separated interchange near existing Potts Creek Road with multiple service roads.

Included in this project is one bridge structure over the mainline. Borings for the bridge structure are not included herein and will be submitted under separate cover. Various stream relocations are proposed, and borings for those locations have been submitted separately.

The investigation was conducted between December 4, 2017 and May 1, 2018 in general accordance with our Proposal to Provide Geotechnical Engineering Services, dated July 12, 2017. The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of one hundred and fifty-eight (158) Standard Penetration Test (SPT) borings were drilled for the proposed roadway alignments. All mechanical borings were drilled using a CME-550X or Mobil B-57 ATV rig equipped with 2 ¼-inch inside diameter hollow-stem augers, and SPT testing was performed with an automatic hammer. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications.





The following alignments, totaling approximately 2.63 miles were explicitly investigated. Other minor Y-lines and driveways are included on the project but improvements are not anticipated to be significant enough to warrant investigation.

<u>Alignment</u>	<u>Station (ft)</u>
-L- (Shelby Bypass)	851+00—990+00
-Y42RPA-	10+00.00—23+66.43
-Y42RPB-	10+00.00—25+75.11
-Y42RPC-	10+00.00—25+48.29
-Y42RPD-	10+00.00—30+11.39
-RABT1-	10+00.00—12+89.02
-Y41-	10+00.00—17+37.51
-Y42-	10+00.00—15+34.00
-Y46-	10+75.00—14+79.57
-SR6-	11+50.00—31+03.30
- SR7-	10+20.00—79+52.00
- SR8-	10+75.00—35+75.00
- SR9-	10+00.00—21+38.92
- SR10-	10+20.00—28+50.00

In many instances, multiple alignments run parallel, and a single boring may be considered relevant to two or more alignments.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. Shallow ground water was measured within the following area and may cause groundwater related stability problems during construction:

<u>Alignment</u>	<u>Station (ft)</u>
-SR10-	18+00

- II. Alluvial soils were encountered near the following locations. The potential for shallow groundwater and wet, soft or organic soils should be anticipated at these locations:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	858+95
-L-	903+00

Isolated alluvial soils are likely to exist elsewhere on the site between borings in proximity to natural waterways.

- III. Artificial fill was encountered at the following locations:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	903+00
-SR10-	20+00
-SR7-	62+48
-SR7-	72+00 – 75+93

- IV. Roadway Embankment was encountered at the following locations associated with private drives:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	895+00 – 897+00
-L-	906+05
-L-	935+00
-L-	939+00
-L-	951+00 – 953+00
-L-	974+98 – 979+00
-L-	987+00 – 988+97
-Y42RPB-	22+00
-SR7-	26+03 – 28+00
-SR8-	21+00





- V. Shallow rock, within 6 feet of proposed subgrade was encountered at the following locations:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	851+00 – 858+00
-L-	911+00 – 914+00
-SR7-	29+00 – 33+00

- VI. A small pond will be filled at the following location:

<u>Alignment</u>	<u>Station (ft)</u>
-SR10-	10+00 – 11+00

PHYSIOGRAPHY AND GEOLOGY

According to the *Geologic Map of North Carolina* (1985), the project site is in the Inner Piedmont Belt Physiographic Province of North Carolina. Specifically, bedrock at the site is noted as Cherryville Granite (**Mc**). The Cherryville Granite is of the Mississippian subperiod and is noted to consist of granite – massive to weakly foliated; containing pegmatites.

Existing site topography is typical of North Carolina's foothills region. The foothills region is a portion of the Western Piedmont that approaches the mountain region. Terrain is typically more rugged than the majority of the piedmont, but with less overall elevation change than the mountain region. Topography along the project is generally rolling, with steep ravines in the vicinity of streams. The existing ground surface generally grades upward in the upstation direction, with elevations ranging from a high of around 845 feet to a low of around 670 feet.

Existing land use is a mix of agriculture, residential, industrial, and commercial, with the majority of the project along the existing US 74 corridor. The corridor is heavily developed with mainly residential and commercial buildings.





SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, artificial fill, alluvial deposits, residual soils, weathered rock and crystalline rock. Areas where soils at the ground surface are of a unique origin (i.e. not residual soils) are approximately delineated on the boring location plans based on subsurface conditions encountered in nearby borings, and various topographical, vegetative, or other visual surface features.

Topsoil and rootmat was encountered in grassy, brushy, and wooded areas ranging in thickness from 0.1 to 0.5 feet, and typically on the order of 0.3 to 0.4 feet.

Artificial Fill soils were encountered at the ground surface or beneath topsoil/rootmat. Consisting of approximately 3 to 8 feet of moist to wet, very loose to loose, silty sands (A-2-4) and moist to wet, very soft to stiff, sandy and silty clays (A-6, A-7).

Roadway Embankment soils were encountered at the ground surface or beneath topsoil/rootmat adjacent to existing roadways. These consist of 3 to 19 feet of moist to wet, very loose to medium dense, silty sand (A-2-4) and moist to wet, soft to very stiff, sandy silt and sandy and silty clay (A-4, A-6, A-7).

Alluvial soils were encountered at the ground surface or below artificial fill near the historic floodplains of natural waterways. These soils extended to depths of up to approximately 17 feet and consist of wet, very soft, silty clays (A-7) and loose to medium dense, silty and clayey sands (A-2-4, A-2-6) with trace amounts of organic material.

Residual soils were encountered at the ground surface, or beneath artificial fill, roadway embankments or alluvial deposits. These soils consist of dry to wet, loose to dense, clayey and silty sands (A-2-4 and A-2-6) and very soft to very stiff, sandy clay and silt, clayey silt, and silty clays (A-4, A-5, A-6, A-7).

Weathered Rock (WR) is a very hard material with properties intermediate of soil and rock. WR is classified as having an N-value of greater than 100 blows per one foot. WR encountered on the project generally consists of tan, white and gray weathered granite.

Crystalline Rock, in the form of granite, was encountered beneath weathered rock or residual soils at various locations throughout the site. CR is classified as material that yields auger refusal or SPT refusal (blow count of 60/0.0 or 60/0.1 feet.)

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in many cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential or livestock areas were backfilled immediately after completion due to safety considerations.

Groundwater levels across the site were generally deep, with the exception of areas near streams and existing low, wet areas. One existing pond was noted within the project right of way limits. Nine wells were noted within the project right of way.





CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

Report Prepared By:

Report Reviewed By:

A handwritten signature in blue ink, appearing to read "W. Scott Hunsberger".

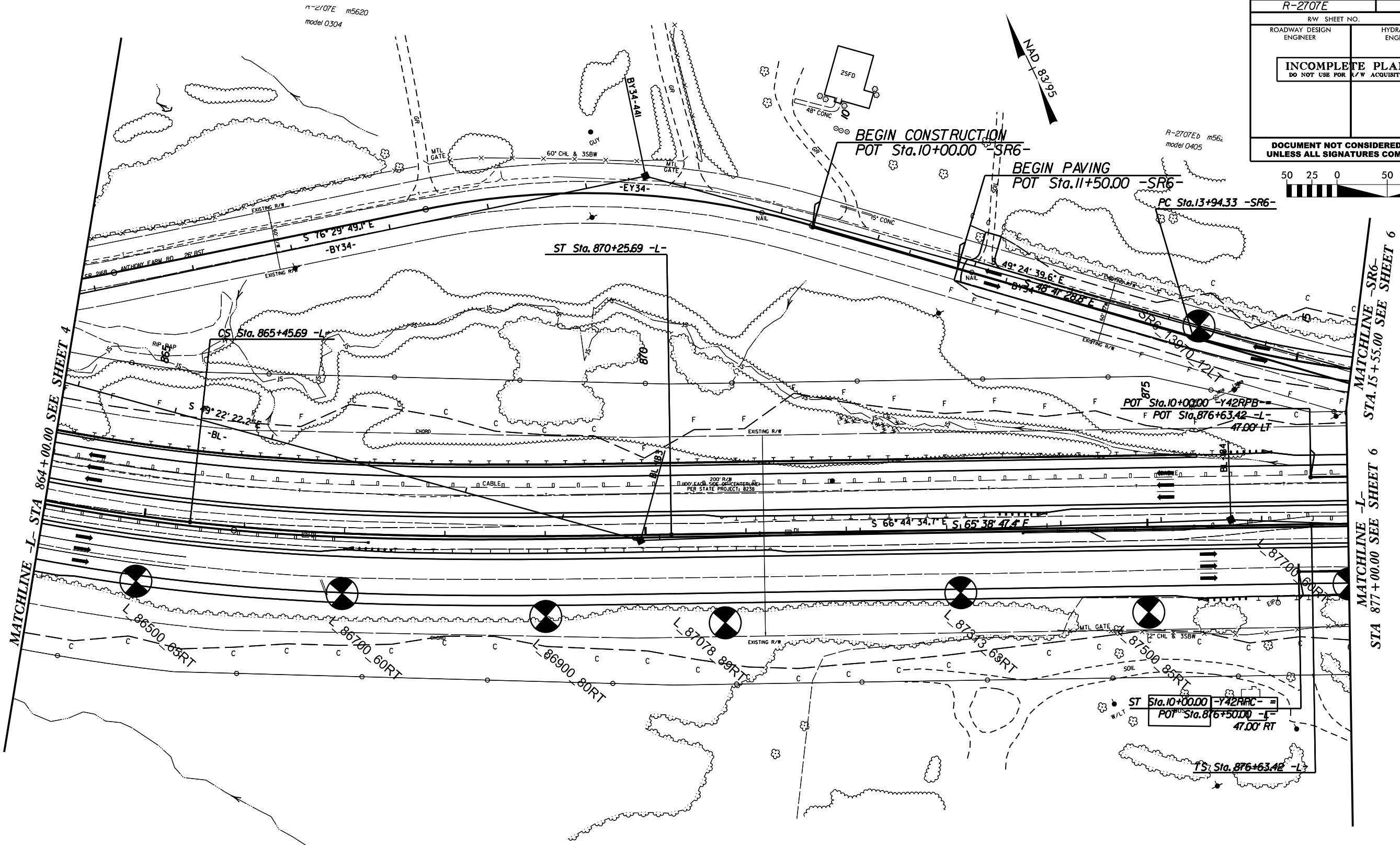
A handwritten signature in blue ink, appearing to read "Jeremy R. Hamm".

W. Scott Hunsberger, PE
Geotechnical Engineer

Jeremy R. Hamm, PE
Geotechnical Engineering Manager



PROJECT REFERENCE NO. R-2707E	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



MATCHLINE -L- STA 864+00.00 SEE SHEET 4

MATCHLINE -SR6- STA. 15+55.00 SEE SHEET 6

MATCHLINE -L- STA 877+00.00 SEE SHEET 6

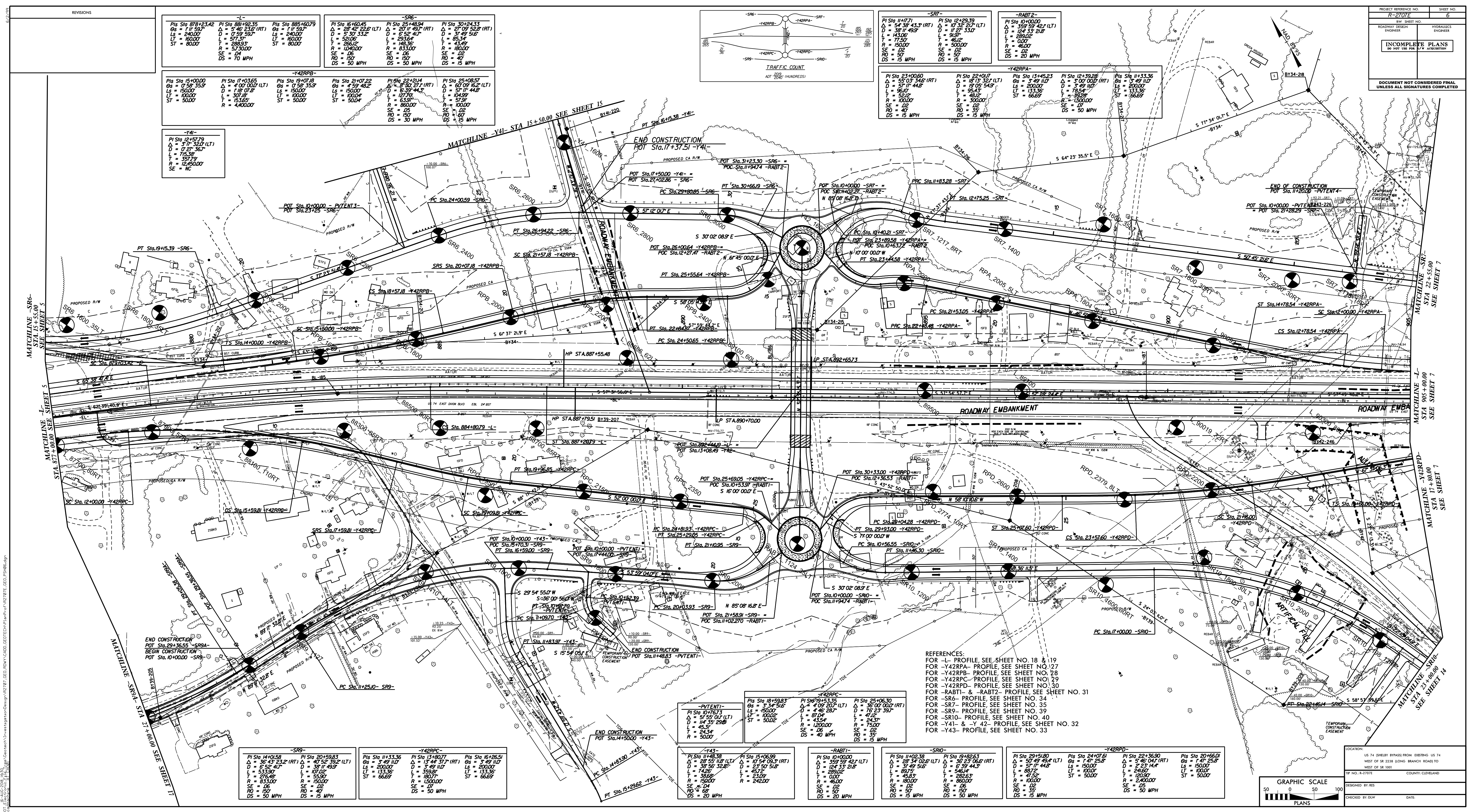
-L-	
PI Sta 860+97.91	PIs Sta 867+05.93
$\Delta = 27^\circ 23' 57.3" (LT)$	$\Theta_s = 7' 11" 58.1"$
$D = 2^\circ 59' 59.2"$	$L_s = 480.00'$
$L = 913.38'$	$LT = 320.27'$
$T = 465.59'$	$ST = 160.24'$
$R = 1,910.00'$	
$SE = .08$	
$DS = 70 \text{ MPH}$	

-L-	
PIs Sta 878+23.42	
$\Theta_s = 1' 11" 59.7"$	
$L_s = 240.00'$	
$LT = 160.00'$	
$ST = 80.00'$	

-SR6-	
PI Sta 16+60.45	
$\Delta = 28^\circ 42' 22.6" (LT)$	
$D = 5^\circ 30' 33.2"$	
$L = 521.06'$	
$T = 266.12'$	
$R = 1,040.00'$	
$SE = .06$	
$RO = 150'$	
$DS = 50 \text{ MPH}$	

REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 17
 FOR -SR6- PROFILE, SEE SHEET NO. 34

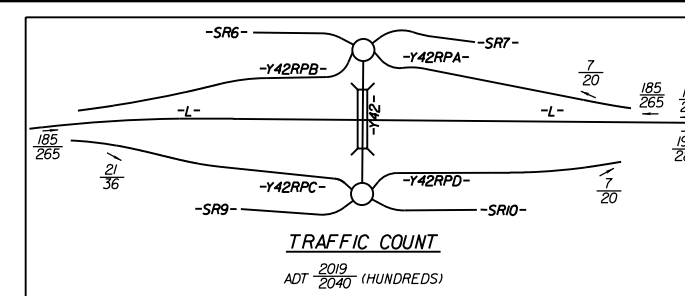
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 8/17/18



REVISIONS

<p>-L-</p> <p>PI Sta 878+23.42 Δ = 11' 59" D = 24000' L = 16000' R = 288500' SE = 04' DS = 70 MPH</p>	<p>-L-</p> <p>PI Sta 881+92.35 Δ = 5' 46" 23.6 (RT) D = 0' 59" 59.7 L = 571.31' R = 53300' SE = 04' DS = 70 MPH</p>	<p>-L-</p> <p>PI Sta 885+60.79 Δ = 11' 59" D = 24000' L = 16000' R = 288500' SE = 04' DS = 70 MPH</p>	<p>-SR6-</p> <p>PI Sta 16+60.45 Δ = 28' 42" 22.2 (LT) D = 5' 33" 13.2 L = 52006' R = 26616' SE = 06' DS = 50 MPH</p>	<p>-SR6-</p> <p>PI Sta 25+48.54 Δ = 20' 11" 49.7 (RT) D = 5' 32" 41.7 L = 23354' R = 14636' SE = 06' DS = 50 MPH</p>	<p>-SR6-</p> <p>PI Sta 30+24.33 Δ = 27' 09" 52.2 (RT) D = 3' 49" 51.8 L = 8534' R = 4349' SE = 02' DS = 15 MPH</p>
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<p>-Y41-</p> <p>PI Sta 12+57.79 Δ = 37' 32.7 (LT) D = 0' 27" 36.7 L = 762.35' R = 1245000' SE = NC</p>	<p>-Y42RPB-</p> <p>PI Sta 15+00.00 Δ = 4' 59" 35.9 D = 118' 07.2 L = 18000' R = 440000'</p>	<p>-Y42RPB-</p> <p>PI Sta 17+03.65 Δ = 4' 00" 00.0 (LT) D = 118' 07.2 L = 307.8' R = 440000'</p>	<p>-Y42RPB-</p> <p>PI Sta 19+07.18 Δ = 4' 59" 35.9 D = 118' 07.2 L = 18000' R = 440000'</p>	<p>-Y42RPB-</p> <p>PI Sta 21+07.22 Δ = 4' 59" 35.9 D = 118' 07.2 L = 18000' R = 440000'</p>	<p>-Y42RPB-</p> <p>PI Sta 22+12.14 Δ = 6' 39" 41.1 D = 1277.9' R = 860000'</p>	<p>-Y42RPB-</p> <p>PI Sta 25+08.57 Δ = 60' 09" 52.2 (LT) D = 37' 17" 41.6 L = 14959' R = 100000'</p>
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<p>-SR7-</p> <p>PI Sta 11+17.71 Δ = 54' 38" 43.3 (RT) D = 38' 11" 49.7 L = 43006' R = 150000' SE = 02' DS = 15 MPH</p>	<p>-SR7-</p> <p>PI Sta 12+29.39 Δ = 17' 32" 21.2 (LT) D = 11' 27" 33.0 L = 17150' R = 500000' SE = 02' DS = 15 MPH</p>	<p>-RABT2-</p> <p>PI Sta 10+00.00 Δ = 399' 59" 12.1 (LT) D = 124' 13" 21.6 L = 28902' R = 4600' SE = 02' DS = 20 MPH</p>
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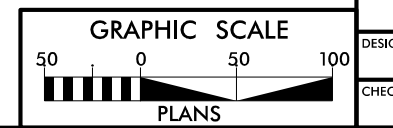
<p>-Y42RPA-</p> <p>PI Sta 23+00.00 Δ = 55' 03" 34.2 (RT) D = 57' 17" 44.8 L = 56000' R = 100000'</p>	<p>-Y42RPA-</p> <p>PI Sta 22+10.17 Δ = 18' 13" 32.2 (LT) D = 19' 05" 54.9 L = 13336' R = 4812' SE = 02' DS = 15 MPH</p>	<p>-Y42RPA-</p> <p>PI Sta 13+46.23 Δ = 3' 49" 11.0 D = 3' 49" 11.0 L = 17654' R = 100000'</p>	<p>-Y42RPA-</p> <p>PI Sta 12+32.28 Δ = 3' 00" 00.0 (RT) D = 3' 49" 11.0 L = 17654' R = 100000'</p>	<p>-Y42RPA-</p> <p>PI Sta 11+33.36 Δ = 3' 49" 11.0 L = 20000' R = 13336' ST = 66.69'</p>
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PROJECT REFERENCE NO. P-2707	SHEET NO. 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS BY NOT IN THE FIELD OF ASSURANCE	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 18 & 19
 FOR -Y42RPA- PROFILE, SEE SHEET NO. 27
 FOR -Y42RPB- PROFILE, SEE SHEET NO. 28
 FOR -Y42RPC- PROFILE, SEE SHEET NO. 29
 FOR -Y42RPD- PROFILE, SEE SHEET NO. 30
 FOR -RABT1- & -RABT2- PROFILE, SEE SHEET NO. 31
 FOR -SR6- PROFILE, SEE SHEET NO. 34
 FOR -SR7- PROFILE, SEE SHEET NO. 35
 FOR -SR9- PROFILE, SEE SHEET NO. 39
 FOR -SR10- PROFILE, SEE SHEET NO. 40
 FOR -Y41- & -Y42- PROFILE, SEE SHEET NO. 32
 FOR -Y43- PROFILE, SEE SHEET NO. 33

<p>-SR9-</p> <p>PI Sta 14+01.58 Δ = 35' 43" 23.2 (RT) D = 6' 52" 41.7 L = 53336' R = 833000'</p>	<p>-SR9-</p> <p>PI Sta 20+59.83 Δ = 40' 52" 30.2 (LT) D = 38' 11" 49.7 L = 18700' R = 150000'</p>	<p>-Y42RPC-</p> <p>PI Sta 11+33.36 Δ = 3' 49" 11.0 D = 20000' L = 13336' R = 18000' SE = 02' DS = 50 MPH</p>	<p>-Y42RPC-</p> <p>PI Sta 13+46.23 Δ = 15' 44" 37.2 (RT) D = 3' 49" 11.0 L = 30948' R = 150000'</p>	<p>-Y42RPC-</p> <p>PI Sta 15+26.51 Δ = 3' 49" 11.0 D = 23' 50" 51.6 L = 13336' R = 18000' SE = 02' DS = 50 MPH</p>
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<p>-Y43-</p> <p>PI Sta 11+48.38 Δ = 28' 55" 18.1 (LT) D = 74.25' L = 45.3' R = 150000'</p>	<p>-Y43-</p> <p>PI Sta 15+06.59 Δ = 17' 02.9 (RT) D = 57.2' L = 23.59' R = 24200'</p>	<p>-RABT1-</p> <p>PI Sta 10+00.00 Δ = 399' 59" 12.1 (LT) D = 124' 13" 21.6 L = 28902' R = 4600' SE = 02' DS = 20 MPH</p>	<p>-SR10-</p> <p>PI Sta 11+02.38 Δ = 28' 54" 02.6 (LT) D = 3' 49" 51.8 L = 8975' R = 4883' SE = 02' DS = 15 MPH</p>	<p>-Y42RPD-</p> <p>PI Sta 23+51.80 Δ = 57' 17" 44.8 (LT) D = 57' 17" 44.8 L = 56000' R = 100000'</p>	<p>-Y42RPD-</p> <p>PI Sta 24+07.61 Δ = 3' 49" 11.0 (RT) D = 3' 49" 11.0 L = 17654' R = 100000'</p>	<p>-Y42RPD-</p> <p>PI Sta 22+14.60 Δ = 3' 46" 04.1 (RT) D = 3' 49" 11.0 L = 20457' R = 12000' SE = 02' DS = 50 MPH</p>	<p>-Y42RPD-</p> <p>PI Sta 20+66.01 Δ = 1' 47" 25.2 D = 2' 23" 14.4 L = 20457' R = 120000'</p>
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LOCATION: US 74 GRIFFIN BYPASS FROM EXISTING US 74
 WEST OF SR 2228 BRANCH ROAD RD
 WEST OF SR 1000
 COUNTY CLEVELAND
 DESIGNED BY: RES
 CHECKED BY: SEW
 DATE:

PROJECT REFERENCE NO. R-2707E	SHEET NO. 7
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



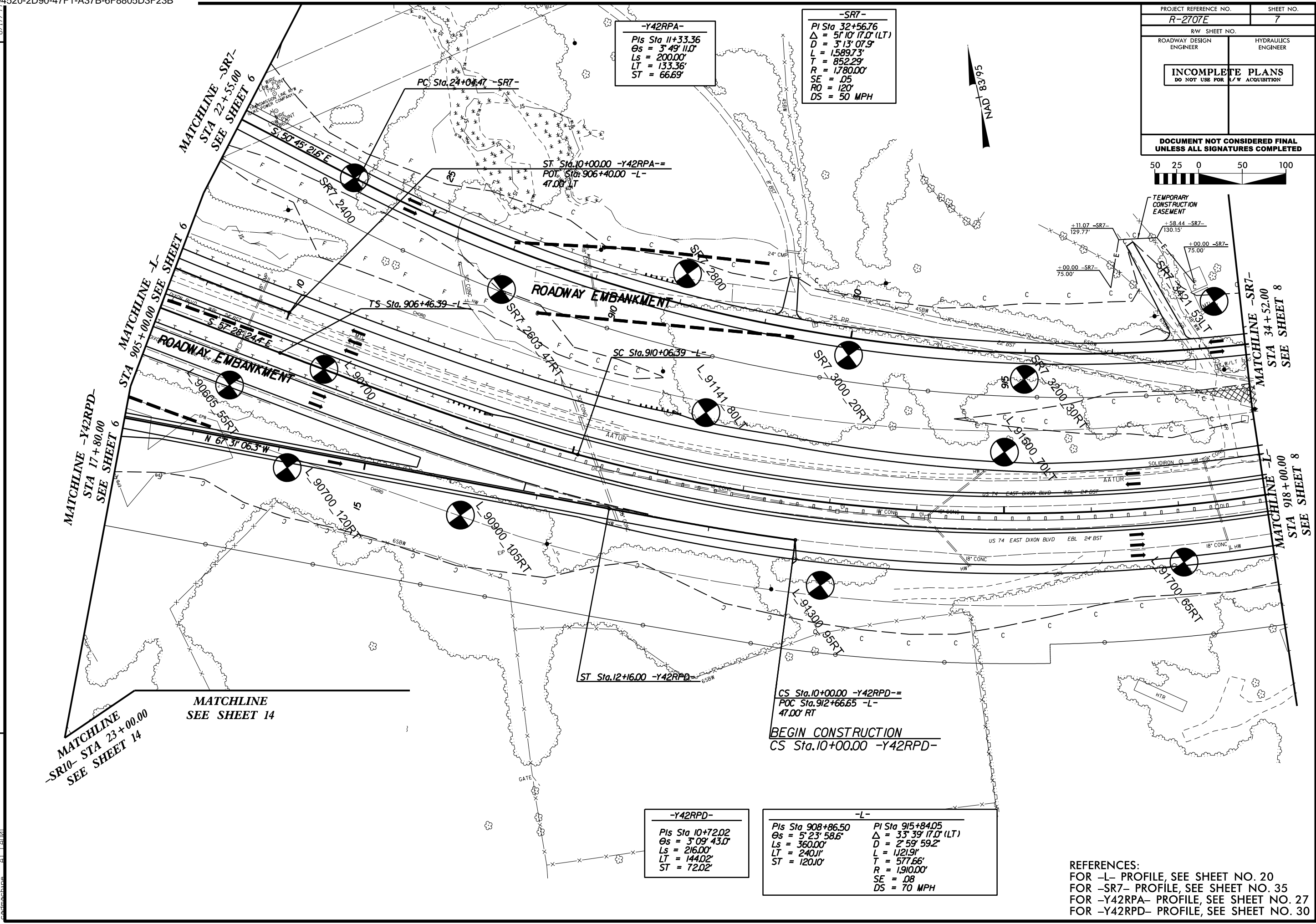
-Y42RPA-
 PIs Sta 11+33.36
 $\Theta_s = 3^\circ 49' 11.0''$
 $L_s = 200.00'$
 $LT = 133.36'$
 $ST = 66.69'$

-SR7-
 PI Sta 32+56.76
 $\Delta = 51^\circ 10' 17.0'' (LT)$
 $D = 3^\circ 13' 07.9''$
 $L = 1589.73'$
 $T = 852.29'$
 $R = 1780.00'$
 $SE = .05$
 $RO = 120'$
 $DS = 50 MPH$

-Y42RPD-
 PIs Sta 10+72.02
 $\Theta_s = 3^\circ 09' 43.0''$
 $L_s = 216.00'$
 $LT = 144.02'$
 $ST = 72.02'$

-L-
 PIs Sta 908+86.50 PI Sta 915+84.05
 $\Theta_s = 5^\circ 23' 58.6''$ $\Delta = 33^\circ 39' 17.0'' (LT)$
 $L_s = 360.00'$ $D = 2^\circ 58' 59.2''$
 $LT = 240.11'$ $L = 1121.91'$
 $ST = 120.10'$ $T = 577.66'$
 $R = 1910.00'$
 $SE = .08$
 $DS = 70 MPH$

REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 20
 FOR -SR7- PROFILE, SEE SHEET NO. 35
 FOR -Y42RPA- PROFILE, SEE SHEET NO. 27
 FOR -Y42RPD- PROFILE, SEE SHEET NO. 30



REVISIONS
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 8/17/18

PROJECT REFERENCE NO.	SHEET NO.
R-2707E	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



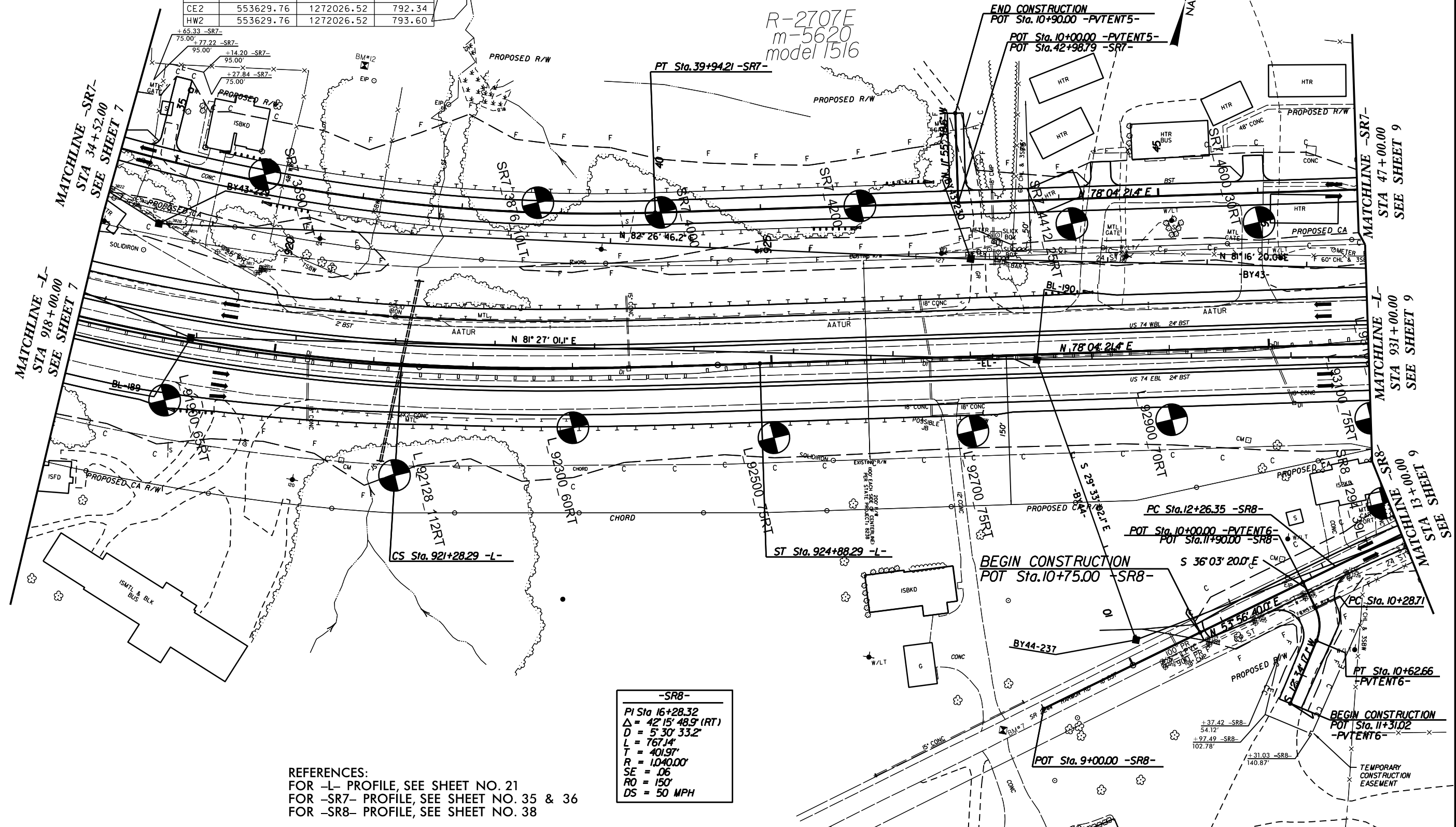
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 PI Sta 32+5676
 $\Delta = 51^{\circ}10'17.0''$ (LT)
 $D = 3^{\circ}13'07.9''$
 $L = 1,589.73'$
 $T = 852.29'$
 $R = 1,780.00'$
 $SE = .05$
 $RO = 1250'$
 $DS = 50$ MPH

-L-
 PI Sta 915+8405
 $\Delta = 33^{\circ}39'17.0''$ (LT)
 $D = 2^{\circ}59'59.2''$
 $L = 1,121.91'$
 $T = 577.66'$
 $R = 1,910.00'$
 $SE = .08$
 $DS = 70$ MPH

PIs Sta 922+48.40
 $\Theta_s = 5^{\circ}23'58.6''$
 $L_s = 360.00'$
 $LT = 240.11'$
 $ST = 120.10'$

	NORTH	EAST	ELEV.
L1	553444.45	1272018.76	799.85
JL2	553444.38	1272020.76	799.85
CE1	553444.90	1272019.43	801.85
HW1	553444.90	1272019.43	803.75
CUL3	553630.54	1272025.34	790.34
CUL4	553630.47	1272027.34	790.34
CE2	553629.76	1272026.52	792.34
HW2	553629.76	1272026.52	793.60

CULVERT #1
ONE BARREL

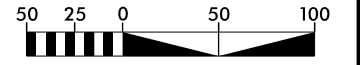


-SR8-
 PI Sta 16+28.32
 $\Delta = 42^{\circ}15'48.9''$ (RT)
 $D = 5^{\circ}30'33.2''$
 $L = 767.14'$
 $T = 401.97'$
 $R = 1,040.00'$
 $SE = .06$
 $RO = 150'$
 $DS = 50$ MPH

REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 21
 FOR -SR7- PROFILE, SEE SHEET NO. 35 & 36
 FOR -SR8- PROFILE, SEE SHEET NO. 38

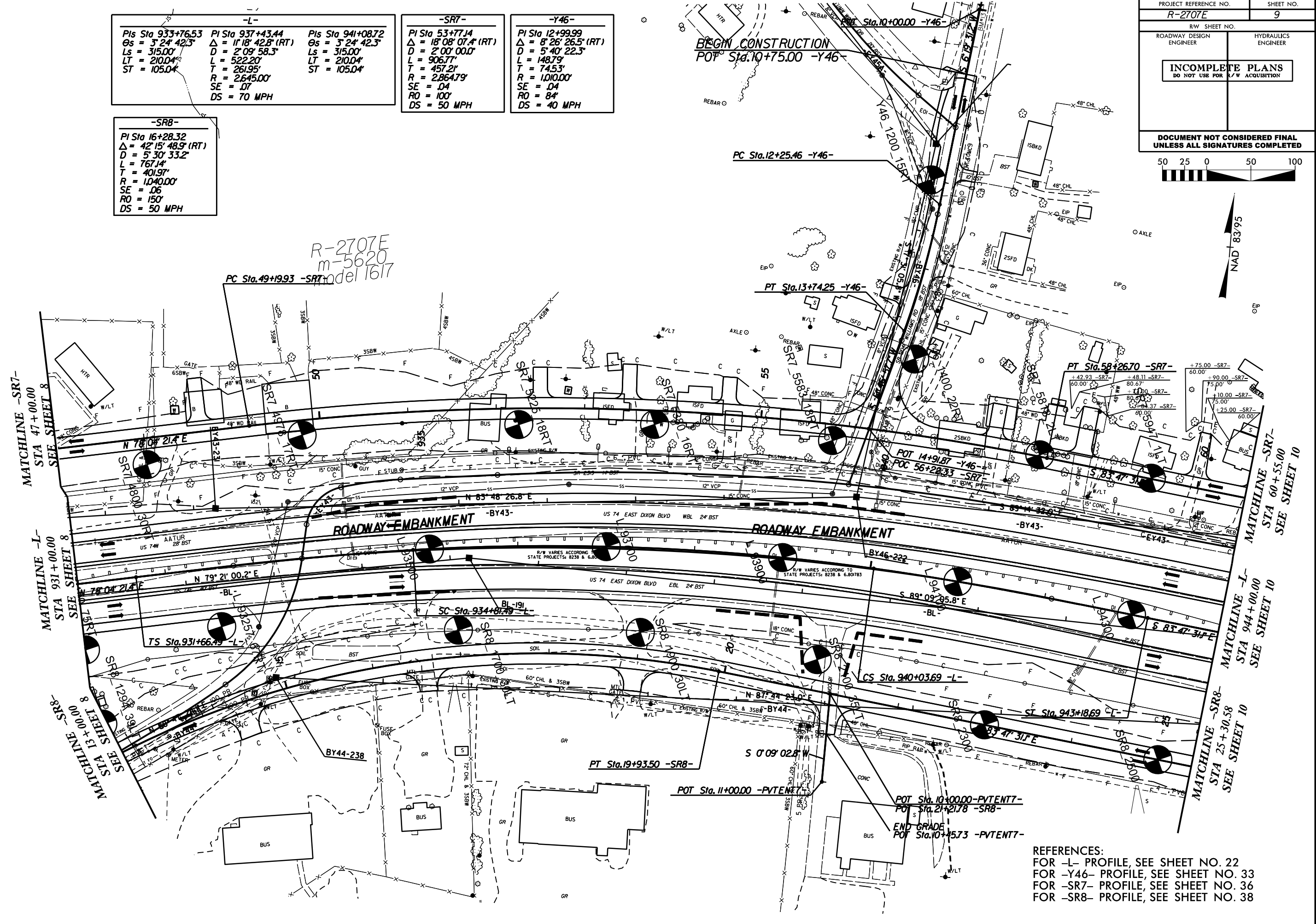
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PROJECT REFERENCE NO.	SHEET NO.
R-2707E	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/R ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



-L-	-SR7-	-Y46-
PIs Sta 933+76.53 $\Delta s = 3' 24' 42.3"$ $Ls = 315.00'$ $LT = 210.04'$ $ST = 105.04'$	PIs Sta 937+43.44 $\Delta = 11' 18' 42.8" (RT)$ $D = 2' 09' 58.3"$ $L = 522.20'$ $T = 261.95'$ $R = 2,645.00'$ $SE = .07$ $DS = 70 MPH$	PIs Sta 941+08.72 $\Delta s = 3' 24' 42.3"$ $Ls = 315.00'$ $LT = 210.04'$ $ST = 105.04'$

-SR8-
PIs Sta 16+28.32 $\Delta = 42' 15' 48.9" (RT)$ $D = 5' 30' 33.2"$ $L = 767.14'$ $T = 401.97'$ $R = 1,040.00'$ $SE = .06$ $RO = 150'$ $DS = 50 MPH$



REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 22
 FOR -Y46- PROFILE, SEE SHEET NO. 33
 FOR -SR7- PROFILE, SEE SHEET NO. 36
 FOR -SR8- PROFILE, SEE SHEET NO. 38

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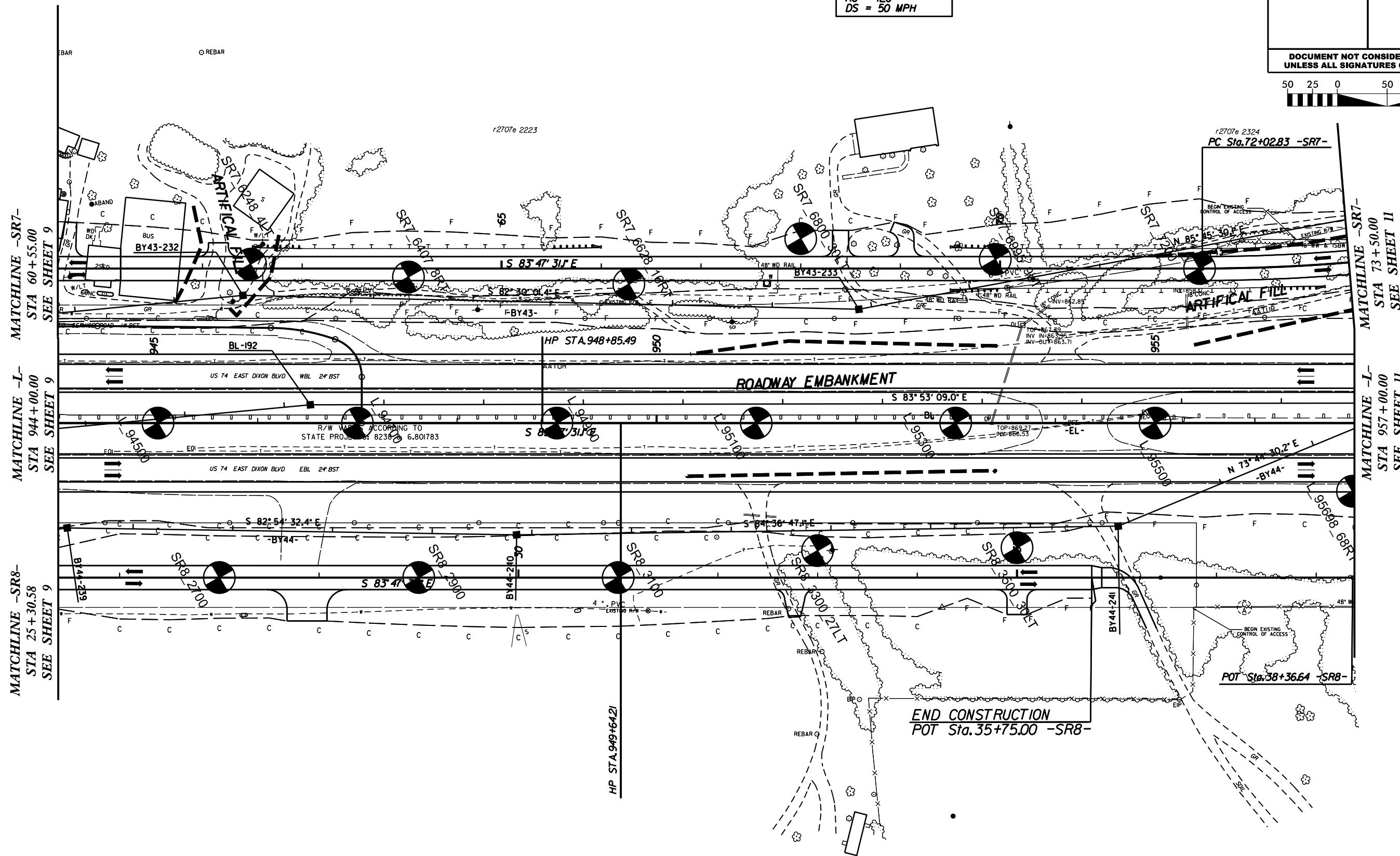
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REVISIONS

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-SR7-
PI Sta 74+83.67
 $\Delta = 17^{\circ} 55' 53.6" (LT)$
 $D = 3^{\circ} 13' 07.9"$
 $L = 557.08'$
 $T = 280.83'$
 $R = 1780.00'$
SE = 05
RO = 120'
DS = 50 MPH

PROJECT REFERENCE NO.	SHEET NO.
R-2707E	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REFERENCES:
 FOR -L- PROFILE, SEE SHEET NO. 23
 FOR -SR7- PROFILE, SEE SHEET NO. 36 & 37
 FOR -SR8- PROFILE, SEE SHEET NO. 38

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-SR7-
PI Sta 74+83.67
 $\Delta = 17^{\circ} 55' 53.6" (LT)$
 $D = 3^{\circ} 13' 07.9"$
 $L = 557.08'$
 $T = 280.83'$
 $R = 1780.00'$
SE = .05
RO = 120'
DS = 50 MPH

END CONSTRUCTION
POT Sta.79+52.00 -SR7-

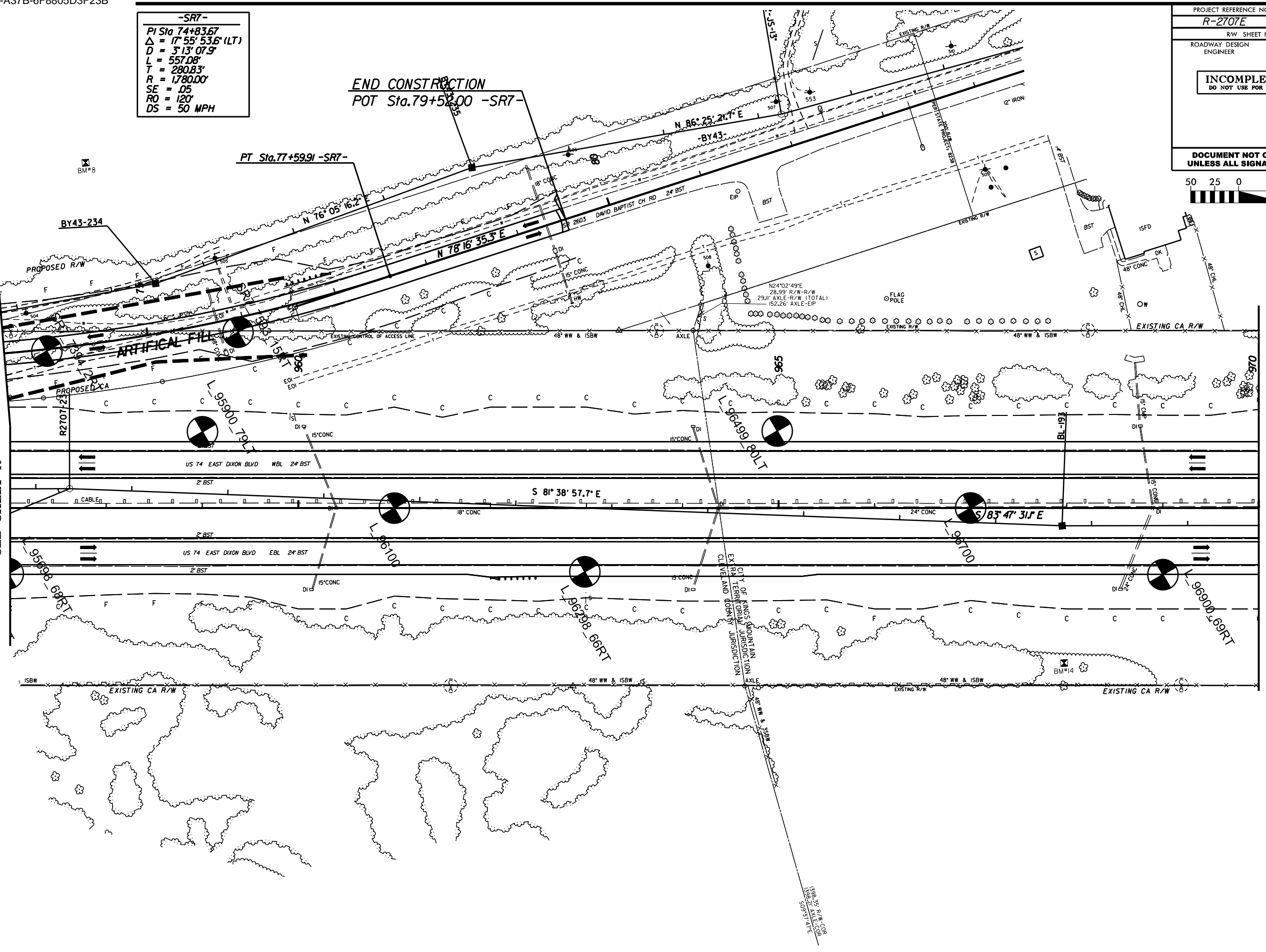
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R-2707E	II
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



MATCHLINE -SR7-
STA 73+50.00
SEE SHEET 10

MATCHLINE -L-
STA 957+00.00
SEE SHEET 10

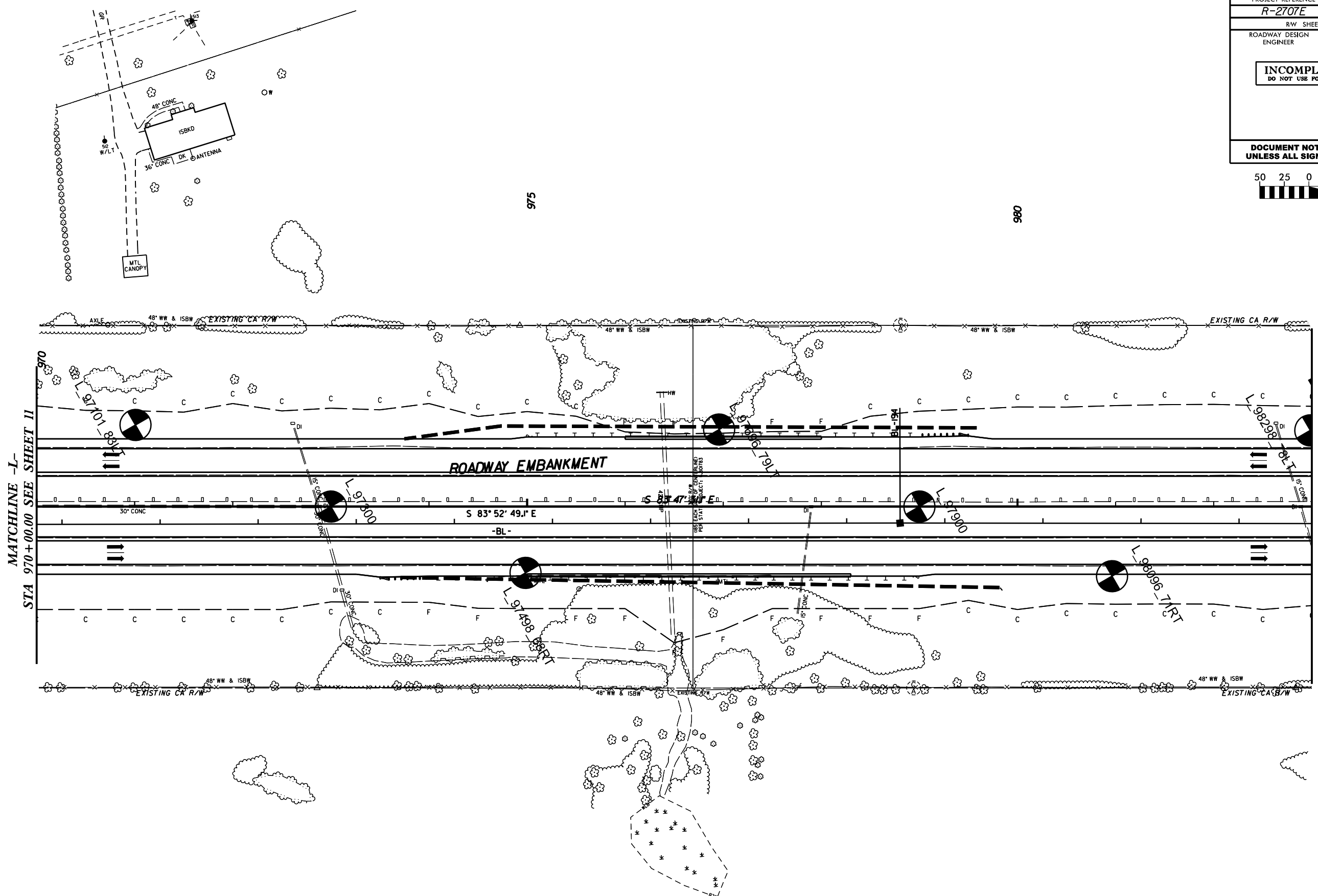
MATCHLINE -L-
STA 970+00.00
SEE SHEET 12



REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 24
FOR -SR7- PROFILE, SEE SHEET NO. 37

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REVISIONS
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MATCHLINE -L-
STA 970+00.00 SEE SHEET 11

MATCHLINE -L-
STA 983+00.00 SEE SHEET 13

PROJECT REFERENCE NO. <i>R-2707E</i>	SHEET NO. <i>12</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

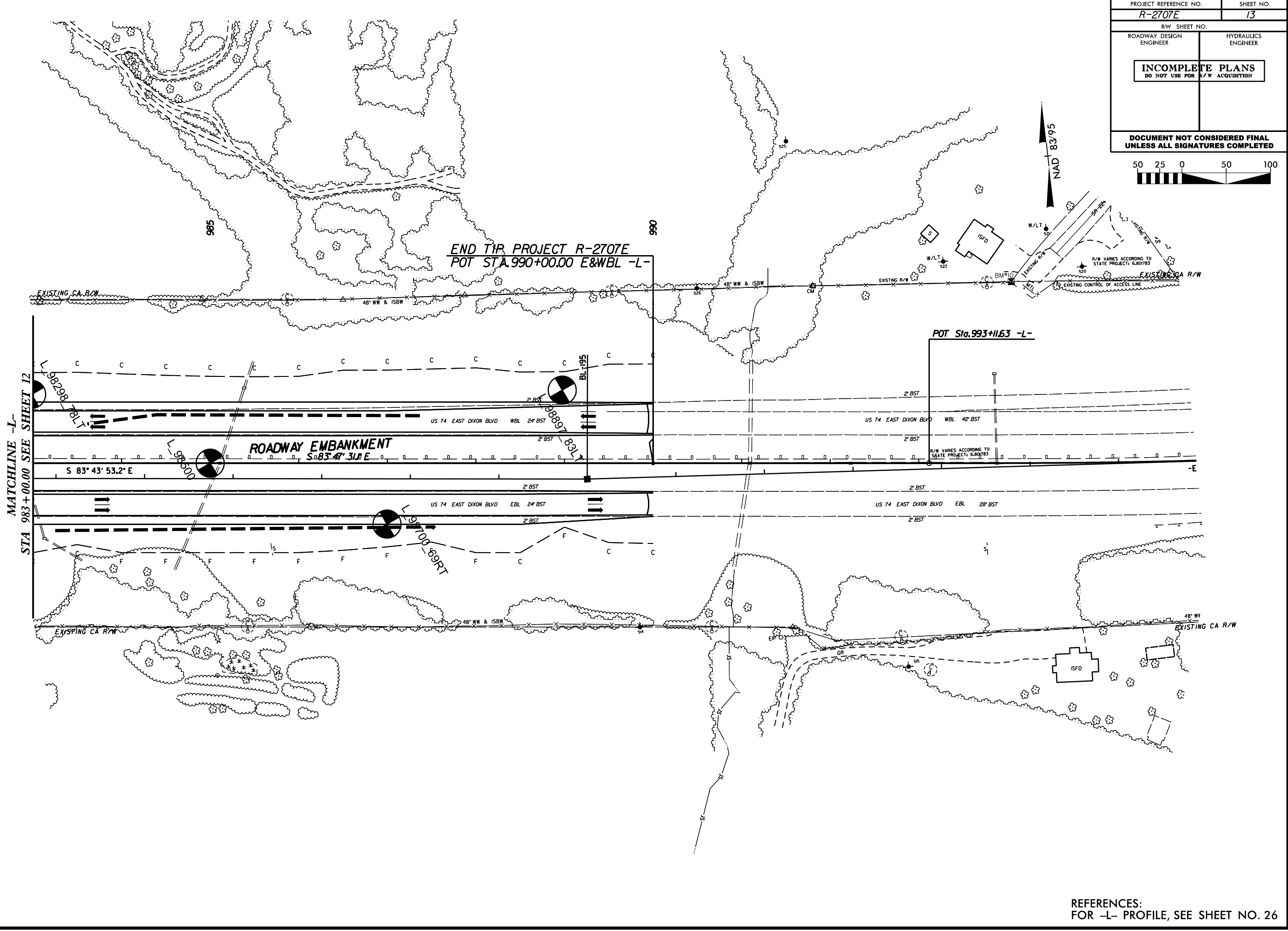


REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 25

PROJECT REFERENCE NO. R-2707E	SHEET NO. 13
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



NAD 83/95



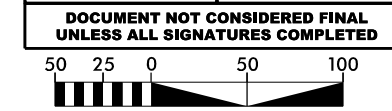
MATCHLINE -L- STA 983+00.00 SEE SHEET 12

POT Sta. 993+11.63 -L-

REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 26

REVISIONS
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 8/17/19

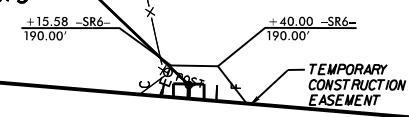
PROJECT REFERENCE NO.	SHEET NO.
R-2707E	15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	



-Y41-
 PI Sta 12+57.79
 $\Delta = 3' 17'' 32.0''$ (LT)
 $D = 0' 27'' 36.7''$
 $L = 715.38'$
 $T = 357.79'$
 $R = 12,450.00'$
 SE = NC

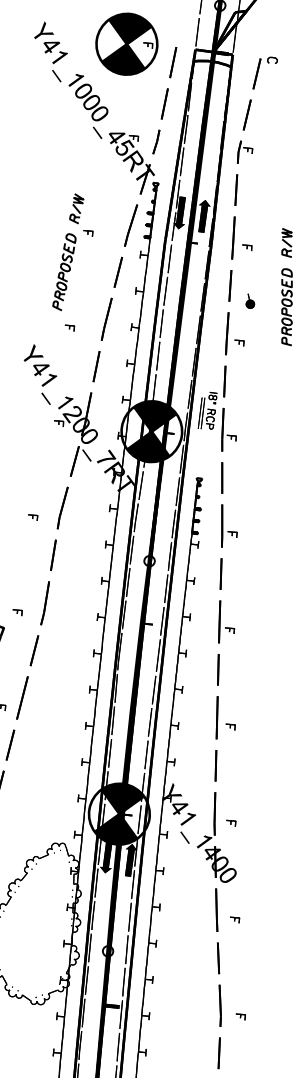
<p>-L-</p> <p>PI Sta 881+92.35 $\Delta = 5' 46'' 23.6''$ (RT) $D = 0' 59'' 59.7''$ $L = 577.37'$ $R = 288.93'$ $T = 57.30.00'$ $SE = 04'$ $DS = 70$ MPH</p>	<p>PI Sta 885+60.79 $\Theta_s = 1' 11'' 59.7''$ $L_s = 240.00'$ $LT = 160.00'$ $ST = 80.00'$</p>	<p>-SR6-</p> <p>PI Sta 16+60.45 $\Delta = 28' 42'' 22.6''$ (LT) $D = 5' 30'' 33.2''$ $L = 521.06'$ $R = 266.12'$ $T = 1040.00'$ $SE = 06'$ $RO = 150'$ $DS = 50$ MPH</p>	<p>PI Sta 25+48.94 $\Delta = 20' 11'' 49.7''$ (RT) $D = 6' 52'' 41.7''$ $L = 293.64'$ $R = 148.36'$ $T = 833.00'$ $SE = 06'$ $RO = 150'$ $DS = 50$ MPH</p>	<p>PI Sta 30+24.33 $\Delta = 27' 09'' 52.8''$ (RT) $D = 3' 49'' 51.6''$ $L = 85.34'$ $R = 43.49'$ $T = 180.00'$ $SE = 02'$ $RO = 40'$ $DS = 15$ MPH</p>
<p>PI Sta 17+03.65 $\Delta = 4' 00'' 00.0''$ (LT) $D = 1' 18'' 07.8''$ $T = 307.18'$ $L_s = 153.65'$ $ST = 4.400.00'$</p>	<p>-Y42RPB-</p> <p>PIs Sta 19+07.18 $\Theta_s = 0' 58'' 35.9''$ $L_s = 150.00'$ $LT = 100.00'$ $ST = 50.00'$</p>	<p>PIs Sta 21+07.22 $\Theta_s = 4' 59'' 48.2''$ $L_s = 150.00'$ $LT = 100.00'$ $ST = 50.04'$</p>	<p>PI Sta 22+21.4 $\Delta = 8' 39'' 44.3''$ (RT) $D = 6' 39'' 44.3''$ $L = 127.76'$ $R = 63.97'$ $T = 860.00'$ $SE = 05'$ $RO = 150'$ $DS = 30$ MPH</p>	<p>PI Sta 25+08.57 $\Delta = 60' 09'' 16.2''$ (LT) $D = 57' 17'' 44.8''$ $L = 104.99'$ $R = 57.91'$ $T = 100.00'$ $SE = 02'$ $RO = 160'$ $DS = 15$ MPH</p>

END CONSTRUCTION
 POT Sta. 11+80.00 -PVTENT3-



MATCHLINE -Y41- STA 15+50.00 SEE SHEET 6

BEGIN CONSTRUCTION
 POT Sta. 10+00.00 -Y41-



REVISIONS
 15-AUG-2018 13:47
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 8/17/18

5/28/08
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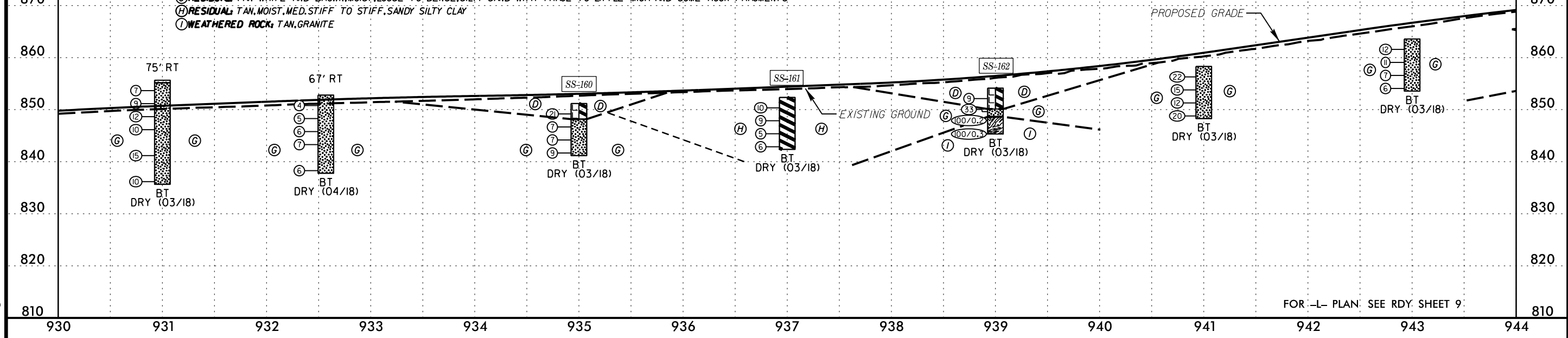
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PROJECT REFERENCE NO. R-2707E	SHEET NO. 22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS	
DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

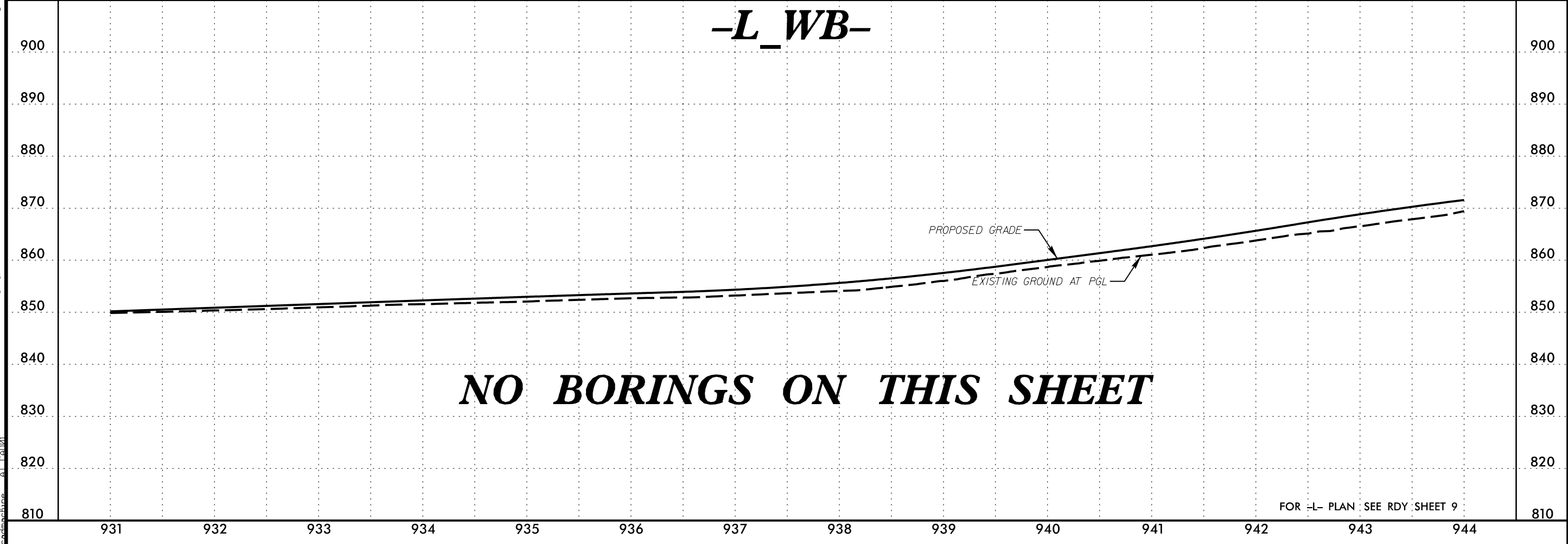
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-160	CL	935+00	1.0' - 2.5'	A-7-6	43	17	27	15	18	40	77	63	47	15	-
SS-161	CL	937+00	1.0' - 2.5'	A-7-5	48	15	25	19	25	81	99	84	61	21	-
SS-162	CL	939+00	1.0' - 2.5'	A-7-6	47	20	29	14	13	44	97	77	58	18	-

- Ⓓ **ROADWAY EMBANKMENT:** TAN AND TAN-RED, MOIST, STIFF TO V. STIFF, SANDY CLAY AND SILTY SAND CLAY WITH TRACE GRAVEL
- Ⓔ **RESIDUAL:** TAN WHITE AND BROWN, MOIST, LOOSE TO DENSE, SILTY SAND WITH TRACE TO LITTLE MICA AND SOME ROCK FRAGMENTS
- Ⓗ **RESIDUAL:** TAN, MOIST, MED. STIFF TO STIFF, SANDY SILTY CLAY
- Ⓘ **WEATHERED ROCK:** TAN, GRANITE



FOR -L- PLAN SEE RDY SHEET 9

-L_WB-



NO BORINGS ON THIS SHEET

FOR -L- PLAN SEE RDY SHEET 9

-L_EB-

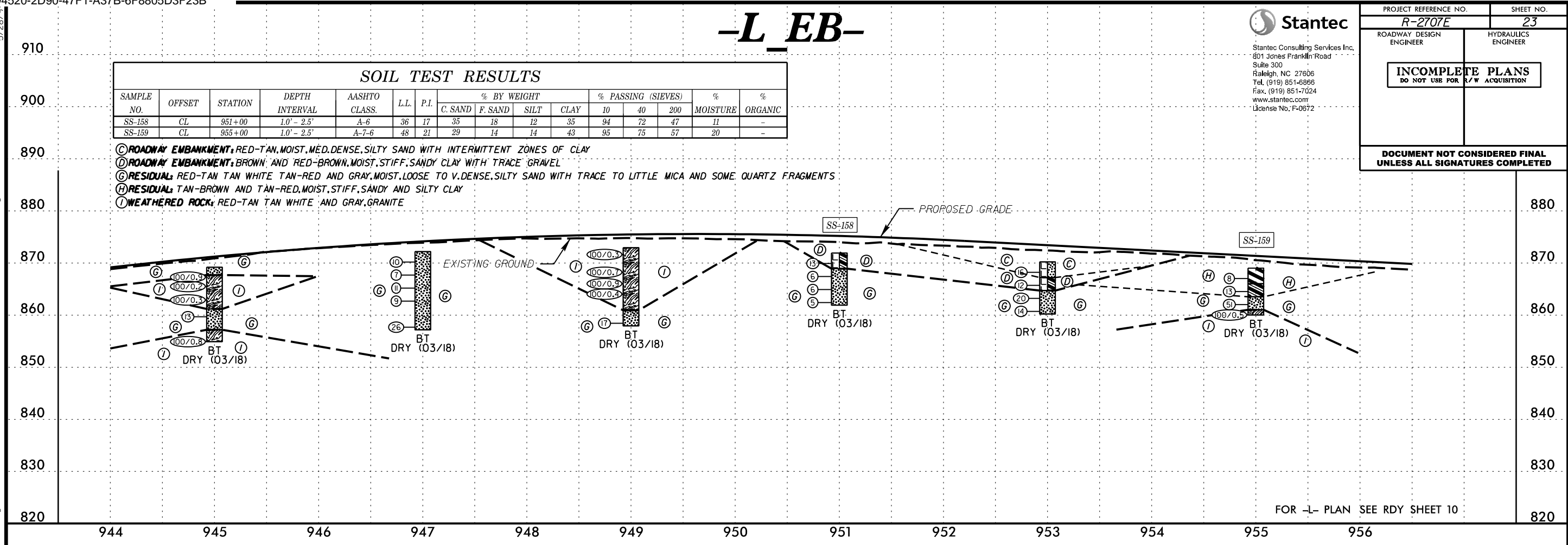


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PROJECT REFERENCE NO. R-2707E	SHEET NO. 23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

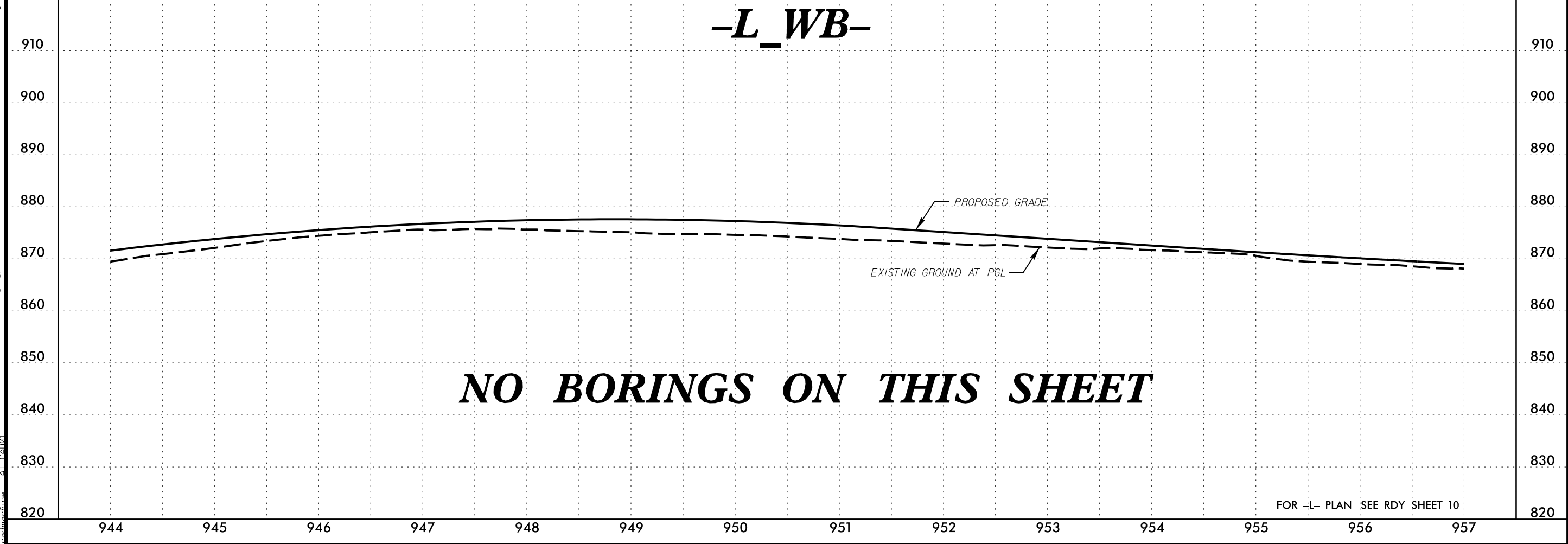
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-158	CL	951+00	1.0' - 2.5'	A-6	36	17	35	18	12	35	94	72	47	11	-
SS-159	CL	955+00	1.0' - 2.5'	A-7-6	48	21	29	14	14	43	95	75	57	20	-

- Ⓒ ROADWAY EMBANKMENT: RED-TAN, MOIST, MED. DENSE, SILTY SAND WITH INTERMITTENT ZONES OF CLAY
- Ⓓ ROADWAY EMBANKMENT: BROWN AND RED-BROWN, MOIST, STIFF, SANDY CLAY WITH TRACE GRAVEL
- Ⓔ RESIDUAL: RED-TAN TAN WHITE TAN-RED AND GRAY, MOIST, LOOSE TO V. DENSE, SILTY SAND WITH TRACE TO LITTLE MICA AND SOME QUARTZ FRAGMENTS
- Ⓗ RESIDUAL: TAN-BROWN AND TAN-RED, MOIST, STIFF, SANDY AND SILTY CLAY
- Ⓘ WEATHERED ROCK: RED-TAN TAN WHITE AND GRAY, GRANITE



FOR -L- PLAN SEE RDY SHEET 10

-L_WB-



NO BORINGS ON THIS SHEET

FOR -L- PLAN SEE RDY SHEET 10

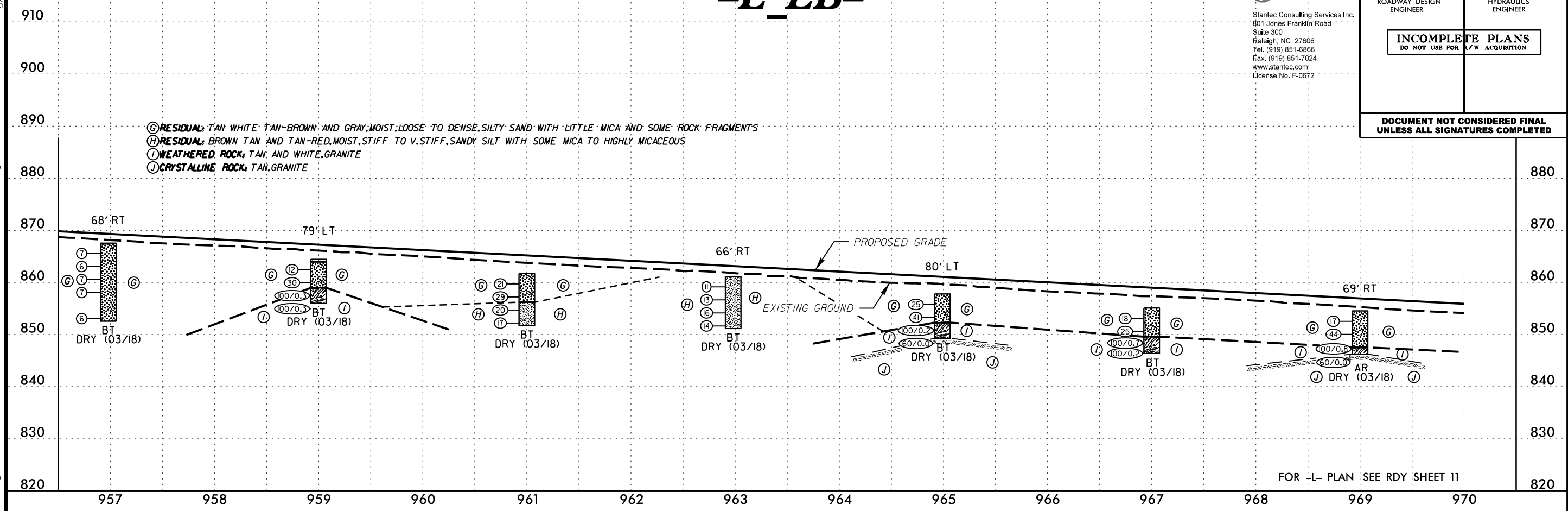
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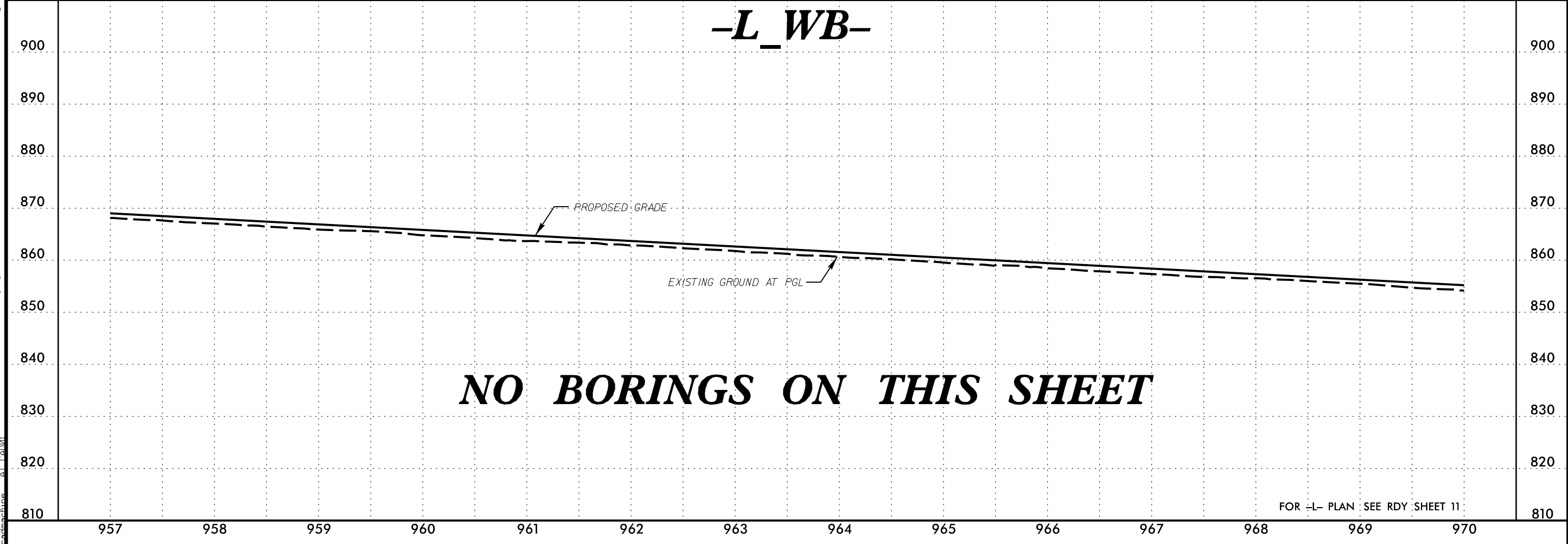
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PROJECT REFERENCE NO. R-2707E	SHEET NO. 24
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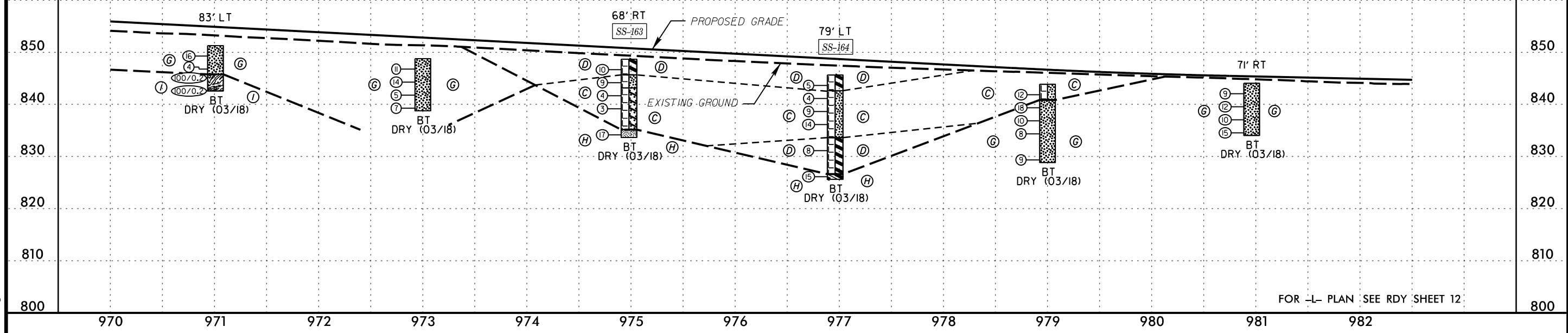
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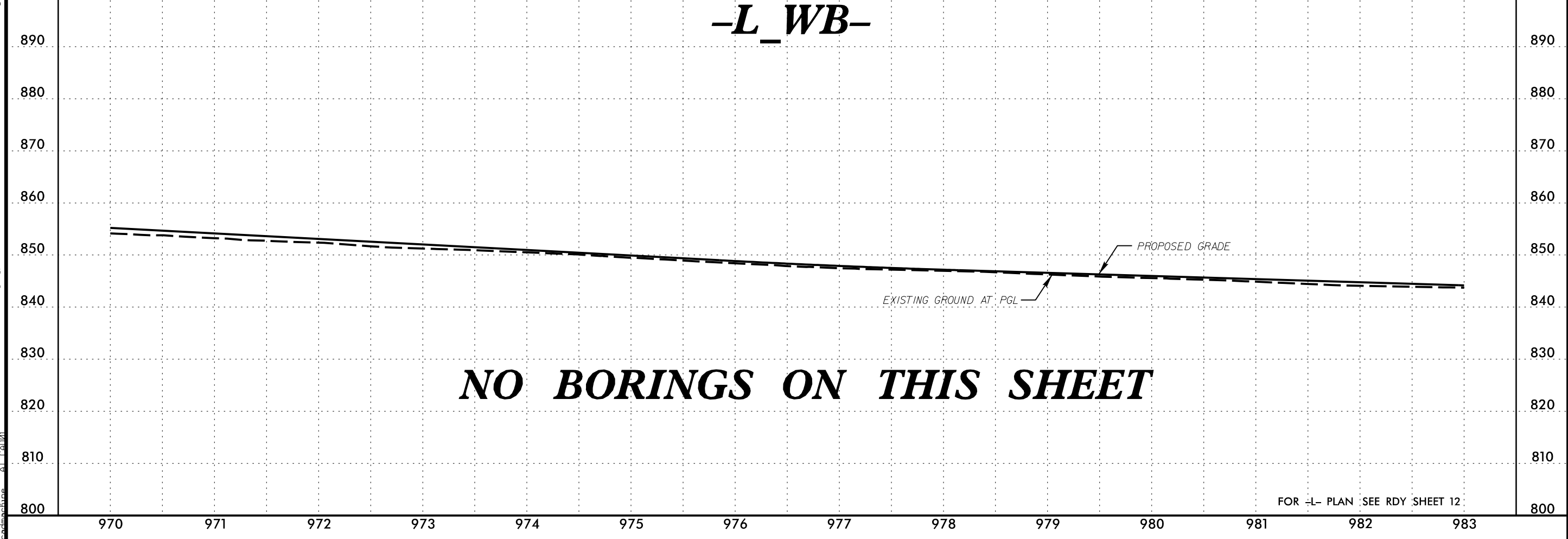
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-163	68 FT RT	974+98	1.0' - 2.5'	A-7-5	63	24	16	15	14	55	98	89	70	32	-
SS-164	79 FT LT	976+96	1.0' - 2.5'	A-7-5	45	15	29	24	15	32	91	74	46	27	-

- Ⓒ **ROADWAY EMBANKMENT:** TAN-GRAY GRAY BROWN AND RED-TAN, MOIST TO WET, LOOSE TO MED. DENSE, SILTY CLAYEY SAND WITH SOME ORGANICS (WOOD) DEBRIS AND TRACE TO LITTLE GRAVEL AND CLAY SEAMS
- Ⓓ **ROADWAY EMBANKMENT:** RED-BROWN RED AND BROWN, MOIST, STIFF TO MED. STIFF, SANDY SILTY CLAY WITH TRACE TO LITTLE MICA AND TRACE GRAVEL
- Ⓔ **RESIDUAL:** TAN RED-TAN AND WHITE, MOIST, LOOSE TO MED. DENSE, SILTY SAND WITH SOME ROCK FRAGMENTS AND TRACE TO LITTLE MICA
- Ⓕ **RESIDUAL:** RED TAN AND TAN-RED, MOIST, V. STIFF, SANDY CLAY AND SANDY SILT WITH LITTLE MICA
- Ⓖ **WEATHERED ROCK:** TAN, GRANITE



-L_WB-

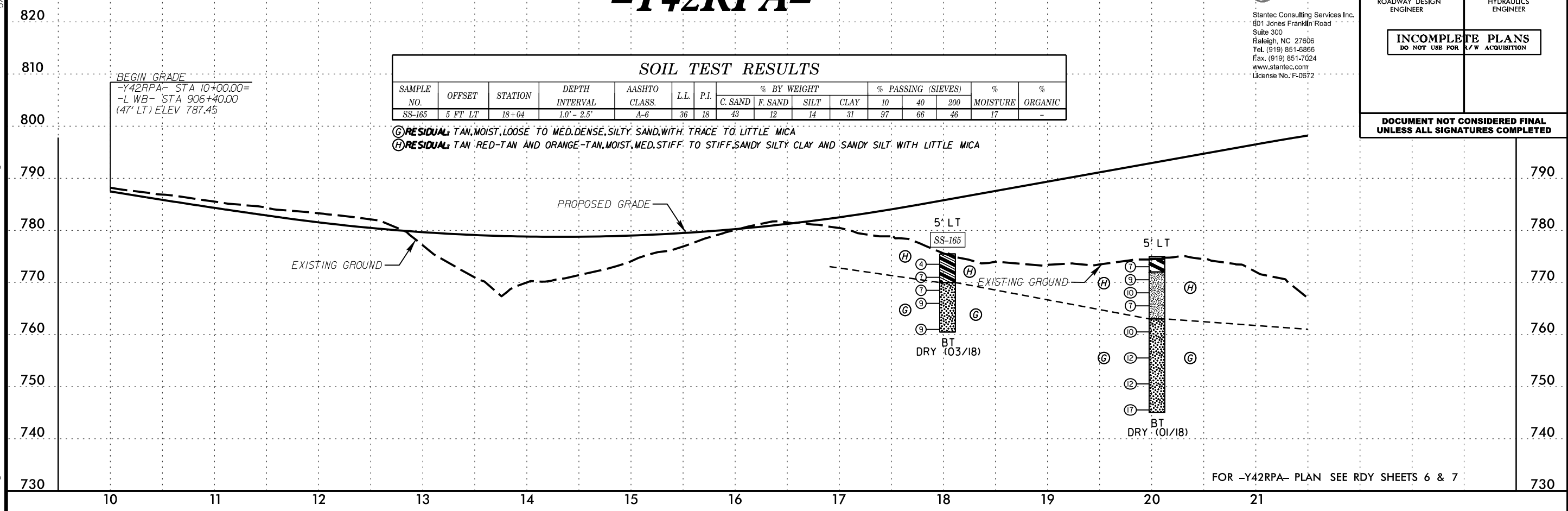


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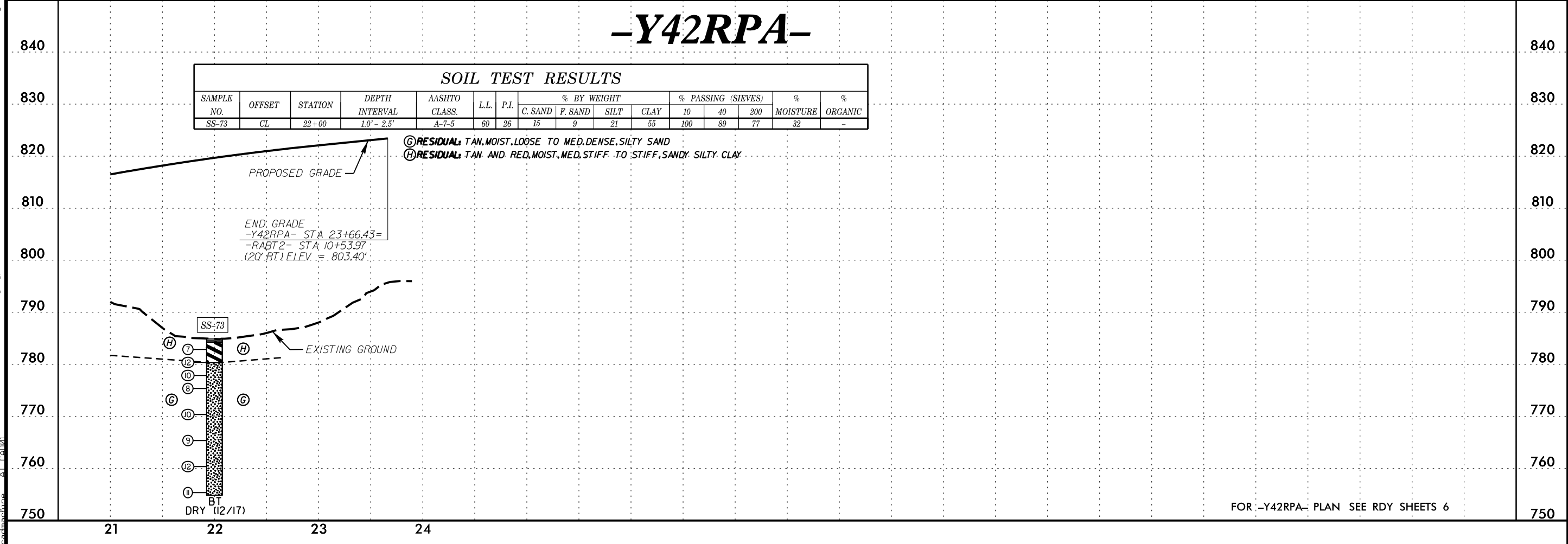
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PROJECT REFERENCE NO. R-2707E	SHEET NO. 27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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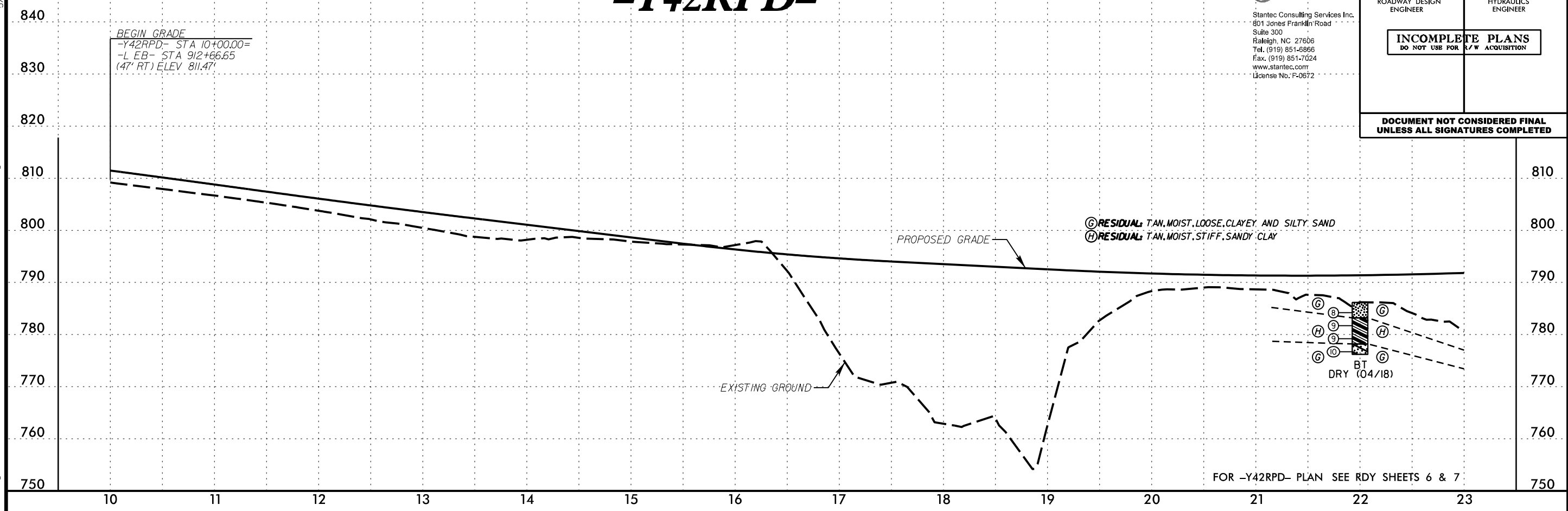


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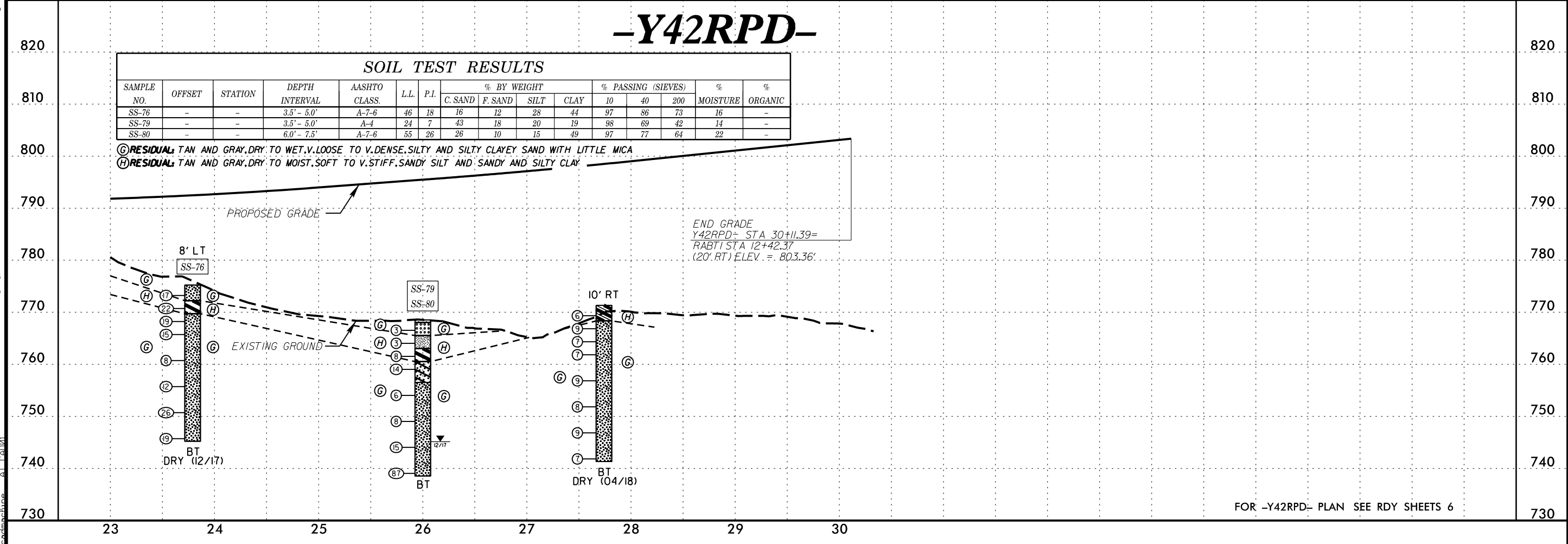


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PROJECT REFERENCE NO. R-2707E	SHEET NO. 30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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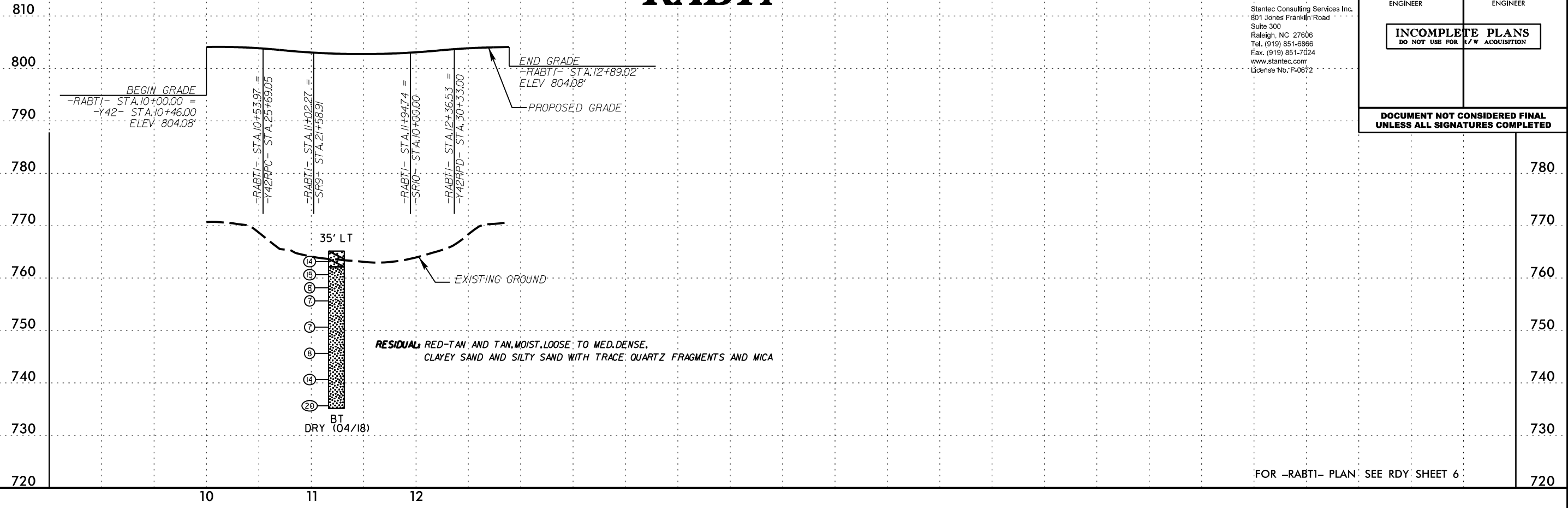
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 5/28/08

5/28/09
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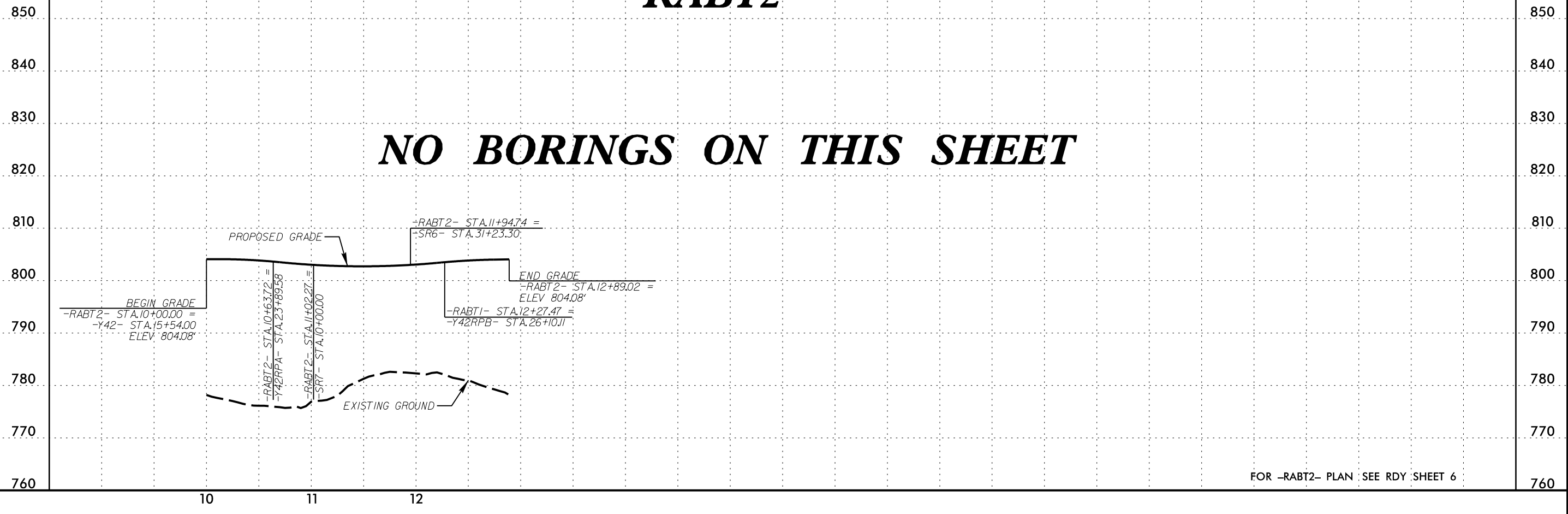
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PROJECT REFERENCE NO. R-2707E	SHEET NO. 31
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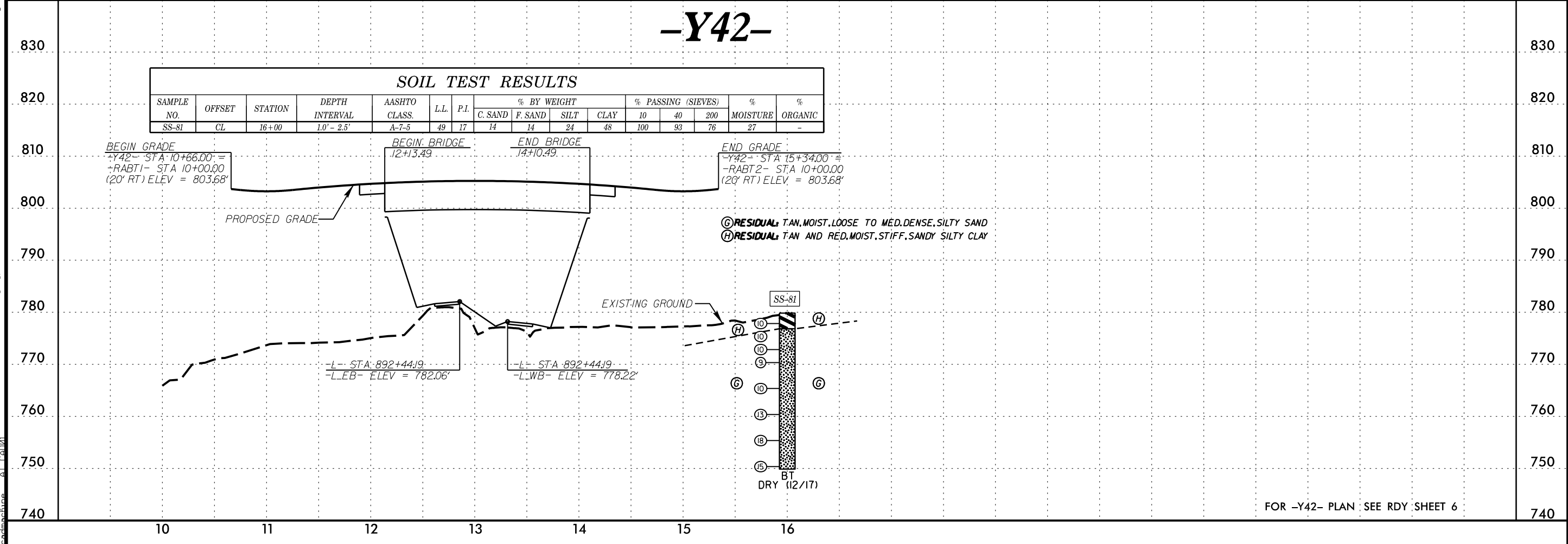
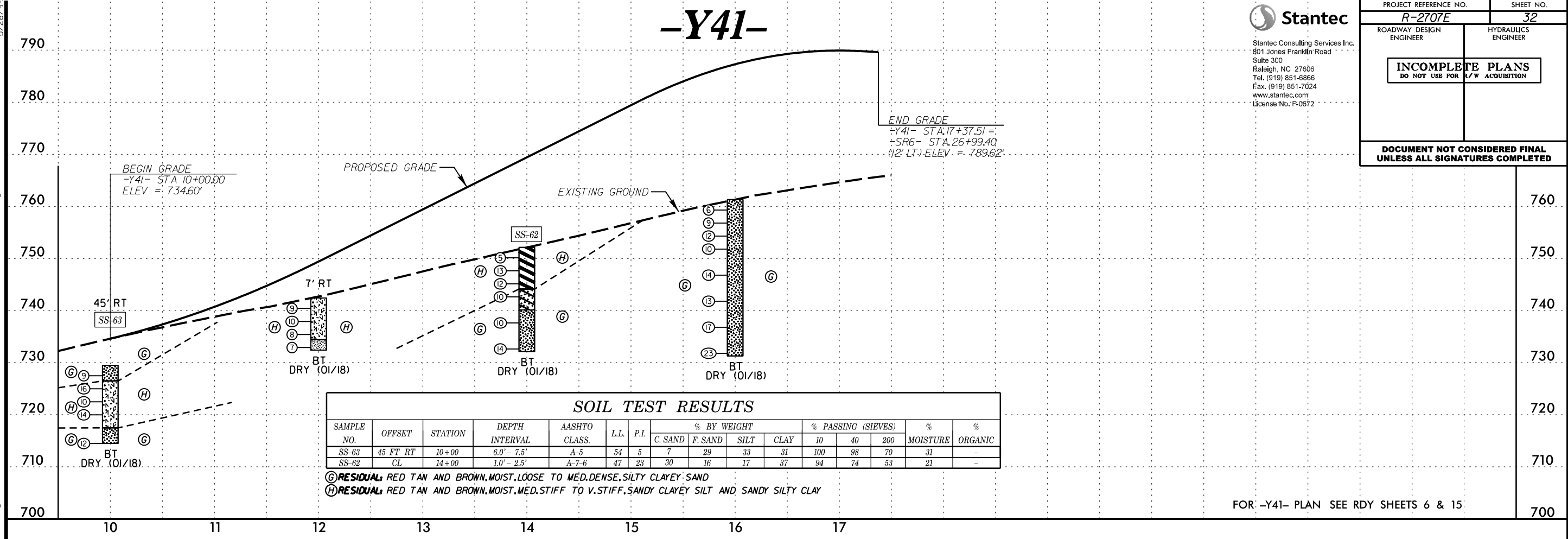
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PROJECT REFERENCE NO. R-2707E	SHEET NO. 32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
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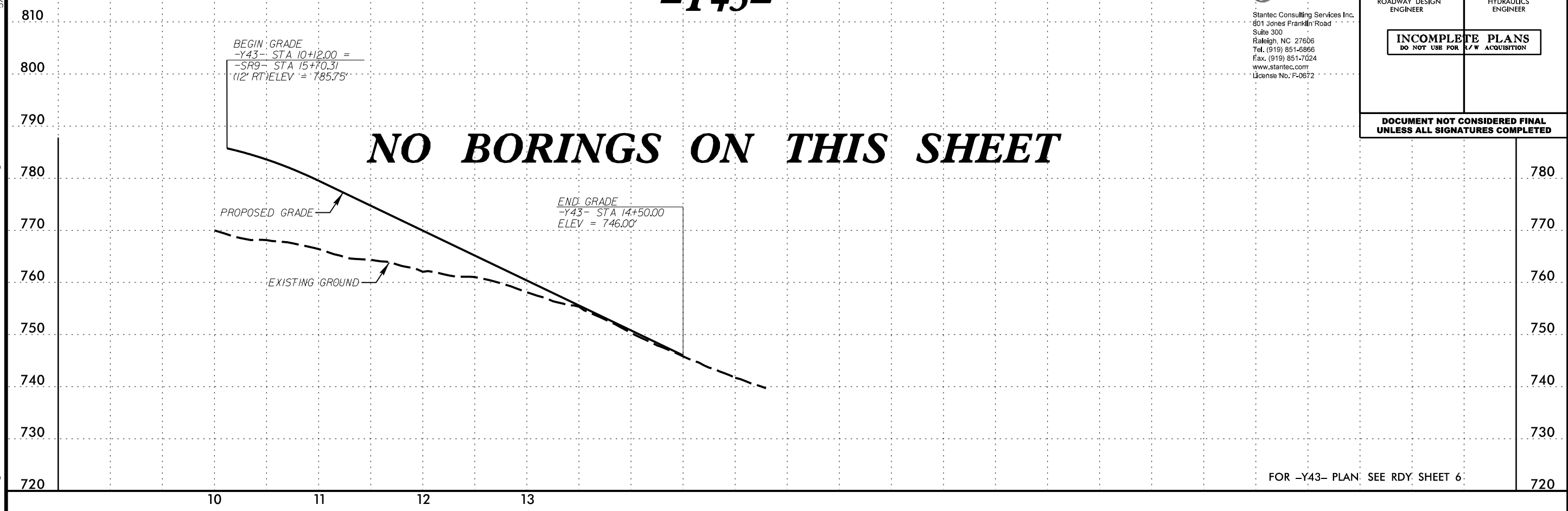


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 cadman@stn.com

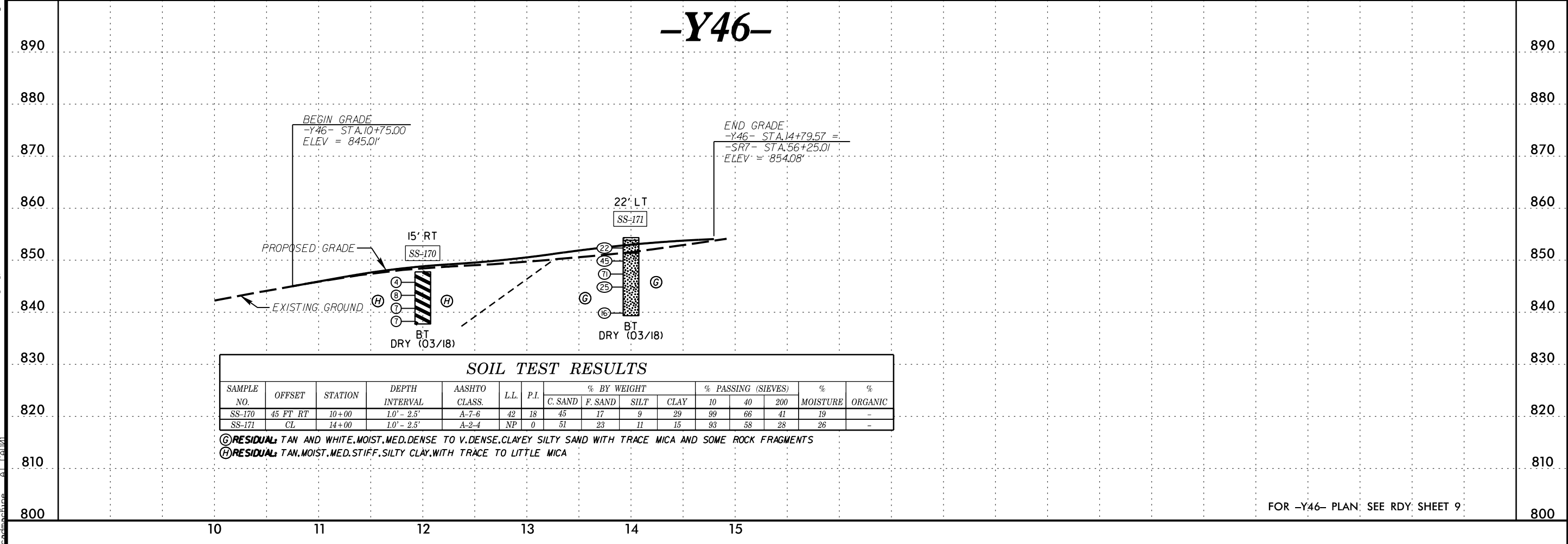


PROJECT REFERENCE NO. <i>R-2707E</i>	SHEET NO. 33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

-Y43-



-Y46-



-SR6-

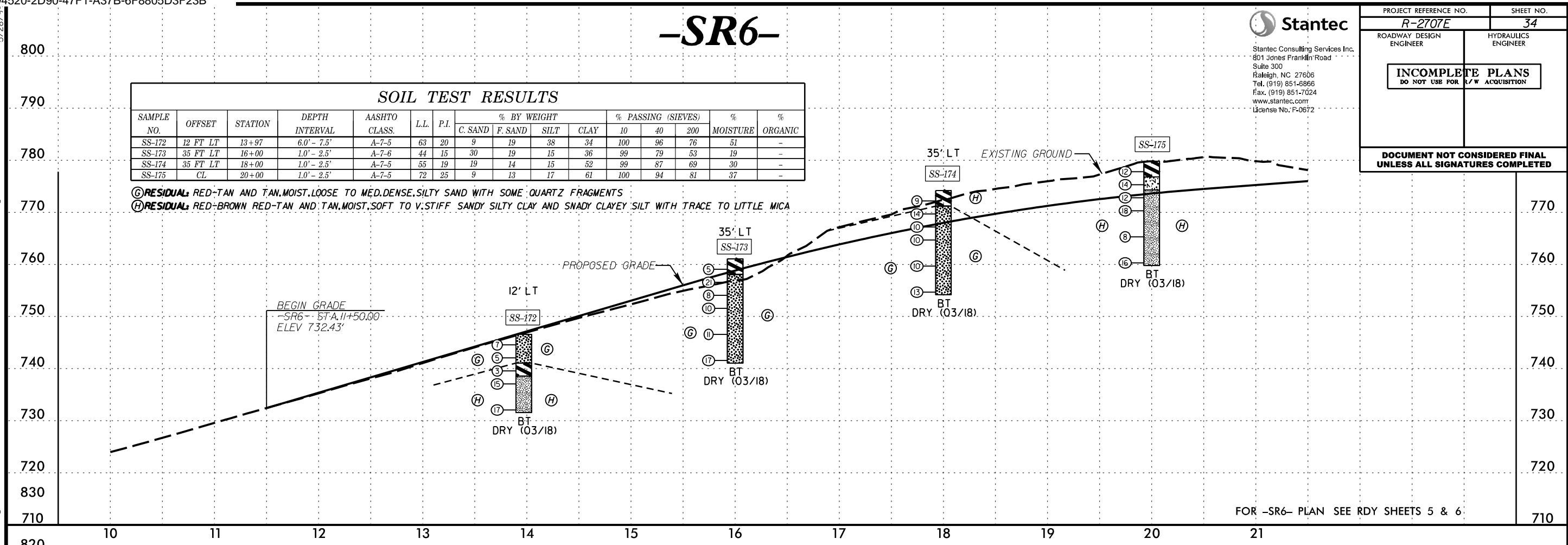


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PROJECT REFERENCE NO. R-2707E	SHEET NO. 34
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-172	12 FT LT	13+97	6.0' - 7.5'	A-7-5	63	20	9	19	38	34	100	96	76	51	-
SS-173	35 FT LT	16+00	1.0' - 2.5'	A-7-6	44	15	30	19	15	36	99	79	53	19	-
SS-174	35 FT LT	18+00	1.0' - 2.5'	A-7-5	55	19	19	14	15	52	99	87	69	30	-
SS-175	CL	20+00	1.0' - 2.5'	A-7-5	72	25	9	13	17	61	100	94	81	37	-

(G) RESIDUAL: RED-TAN AND TAN, MOIST, LOOSE TO MED. DENSE, SILTY SAND WITH SOME QUARTZ FRAGMENTS
(H) RESIDUAL: RED-BROWN RED-TAN AND TAN, MOIST, SOFT TO V. STIFF SANDY SILTY CLAY AND SNADY CLAYEY SILT WITH TRACE TO LITTLE MICA

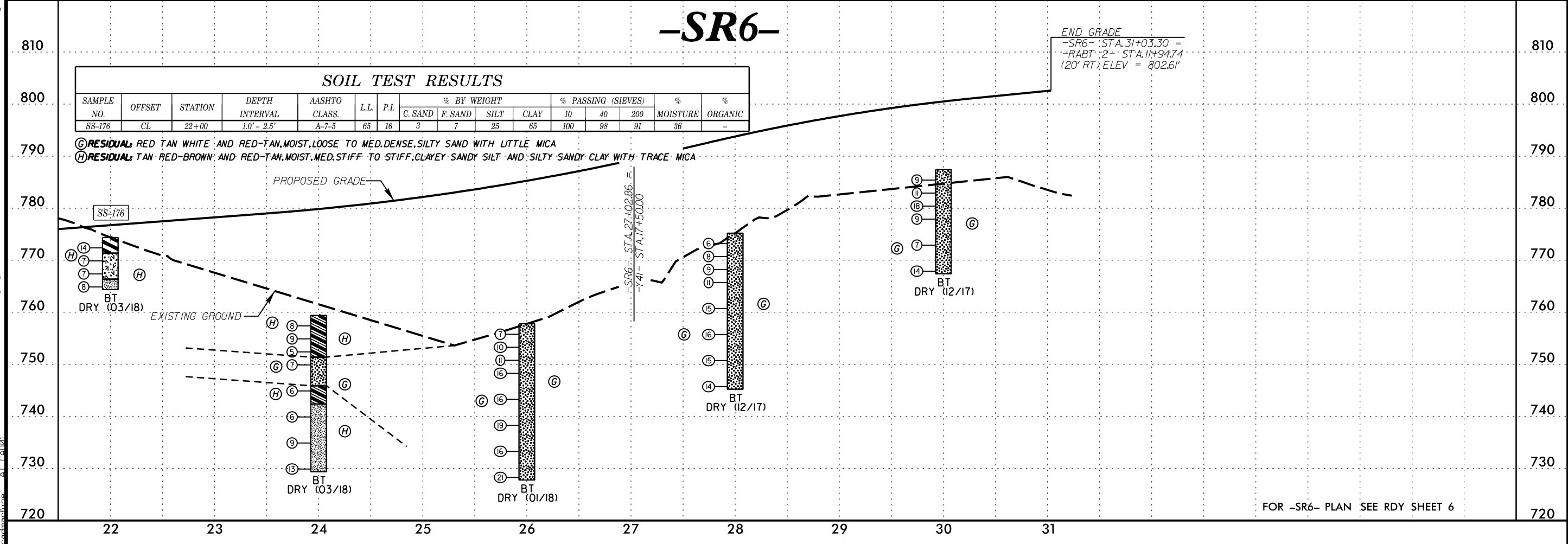


FOR -SR6- PLAN SEE RDY SHEETS 5 & 6

-SR6-

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-176	CL	22+00	1.0' - 2.5'	A-7-5	65	16	3	7	25	65	100	98	91	36	-

(G) RESIDUAL: RED TAN WHITE AND RED-TAN, MOIST, LOOSE TO MED. DENSE, SILTY SAND WITH LITTLE MICA
(H) RESIDUAL: TAN RED-BROWN AND RED-TAN, MOIST, MED. STIFF TO STIFF, CLAYEY SANDY SILT AND SILTY SANDY CLAY WITH TRACE MICA



FOR -SR6- PLAN SEE RDY SHEET 6

5/28/08
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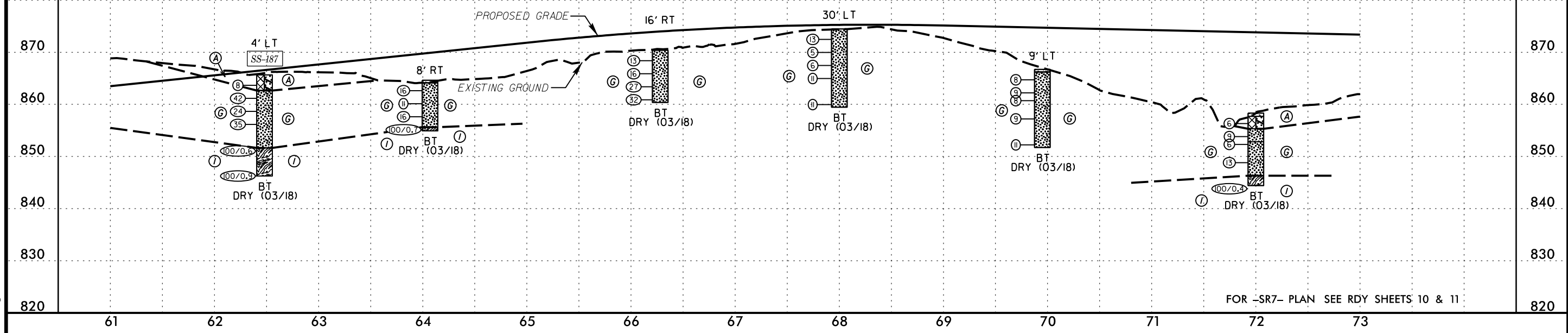
-SR7-

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PROJECT REFERENCE NO. <i>R-2707E</i>	SHEET NO. <i>37</i>
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INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-187	4 FT LT	62+48	1.0' - 2.5'	A-2-7	44	11	31	18	24	27	67	52	35	26	-

- (A) ARTIFICIAL FILL: RED-TAN, MOIST, LOOSE, SILTY AND CLAYEY SAND WITH TRACE ROOTS AND GRAVEL
- (G) RESIDUAL: TAN RED-TAN WHITE ORANGE AND RED, MOIST, LOOSE TO DENSE, CLAYEY SILTY SAND AND SILTY SAND WITH TRACE TO LITTLE MICA
- (I) WEATHERED ROCK: TAN, GRANITE



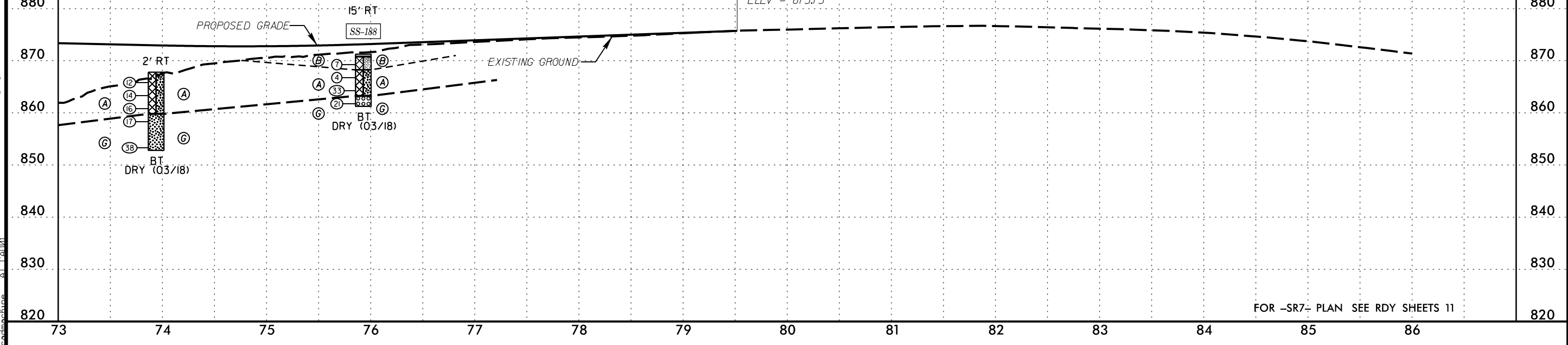
FOR -SR7- PLAN SEE RDY SHEETS 10 & 11

-SR7-

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-188	15 FT RT	75+93	1.0' - 2.5'	A-4	NP	0	38	18	27	17	80	62	36	20	-

- (A) ARTIFICIAL FILL: TAN, MOIST, LOOSE TO MED. DENSE, SILTY SAND, WITH SOME MICA AND TRACE TO LITTLE GRAVEL AND TRACE ORGANICS
- (B) ARTIFICIAL FILL: TAN AND BROWN, MOIST, MED. STIFF, SANDY SILT WITH LITTLE GRAVEL
- (G) RESIDUAL: TAN, DRY TO MOIST, MED. DENSE TO DENSE, SILTY SAND WITH SOME MICA

END GRADE
 -SR7- STA 79+52.00
 ELEV = 875.75'



FOR -SR7- PLAN SEE RDY SHEETS 11

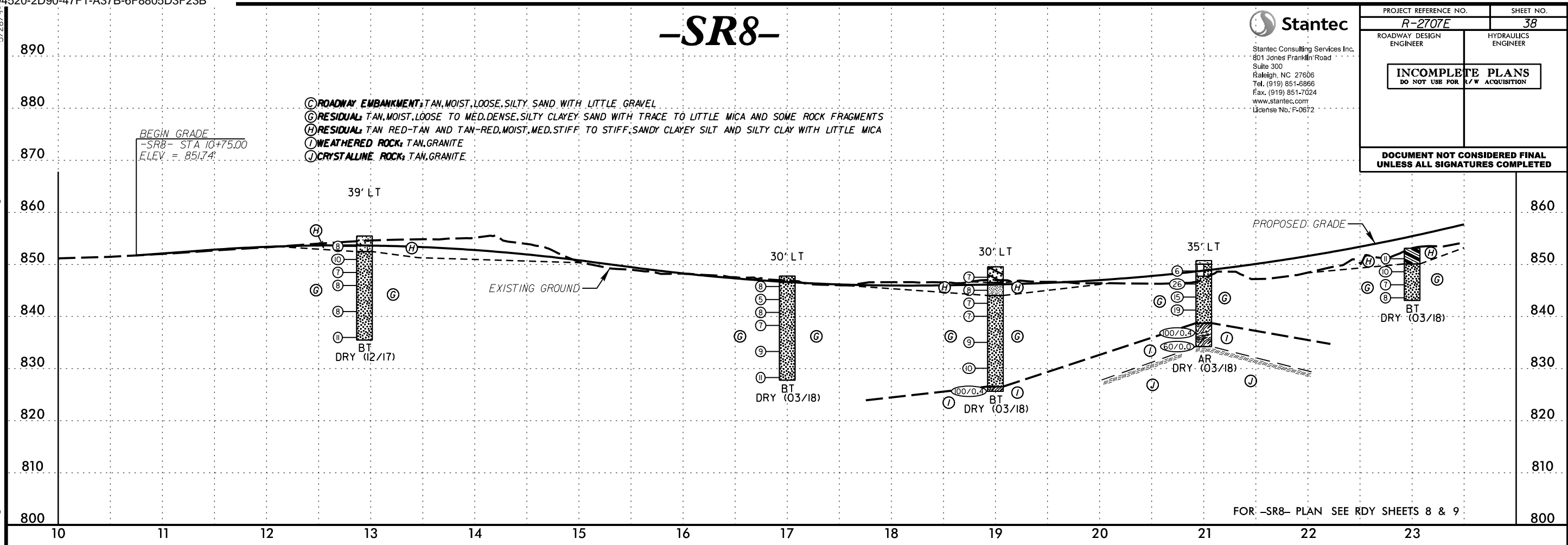
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-SR8-

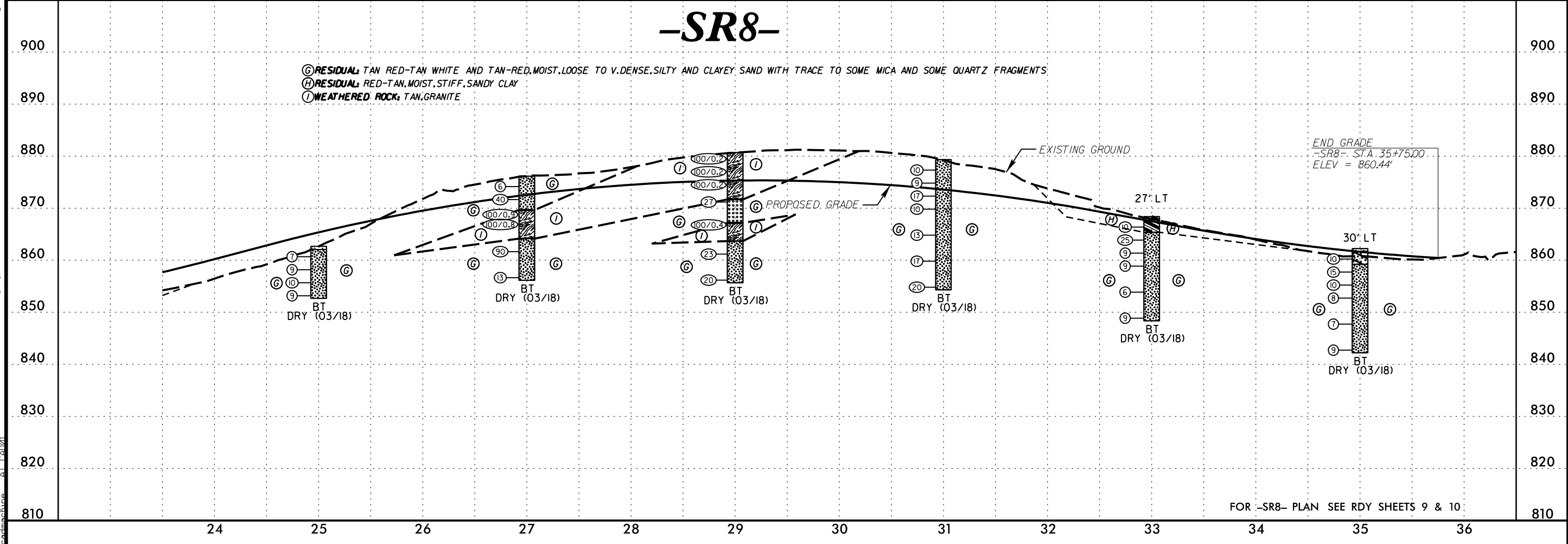


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PROJECT REFERENCE NO. R-2707E	SHEET NO. 38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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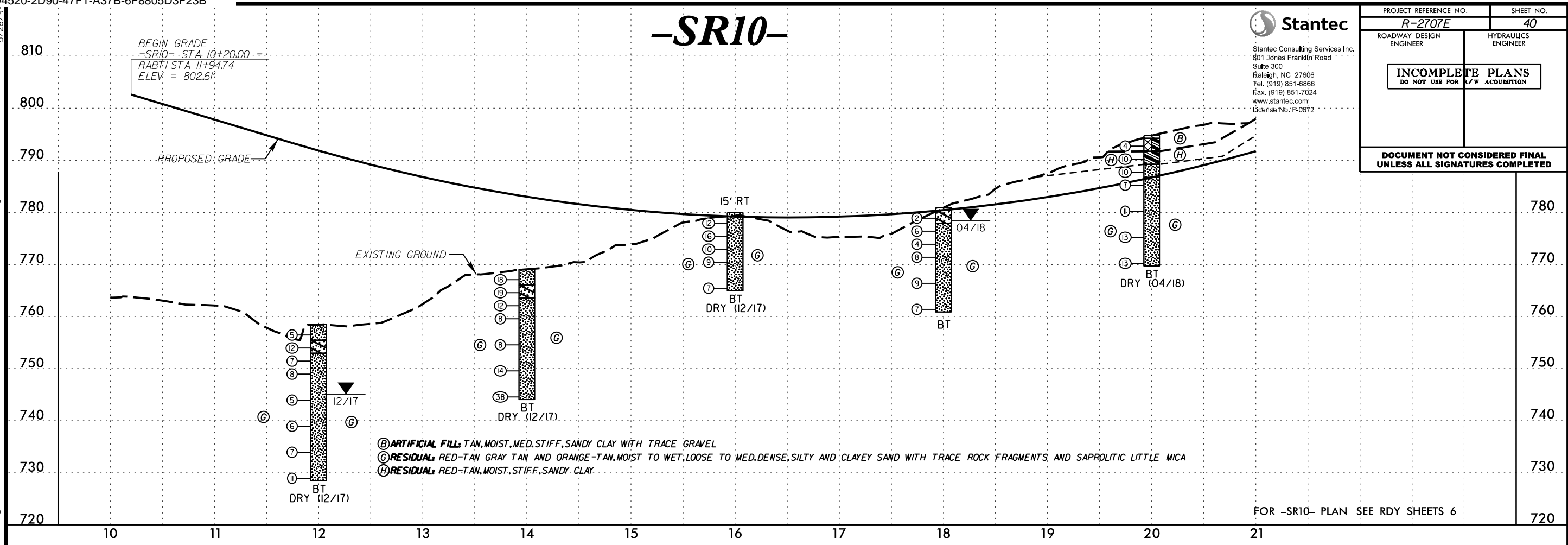
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-SR10-

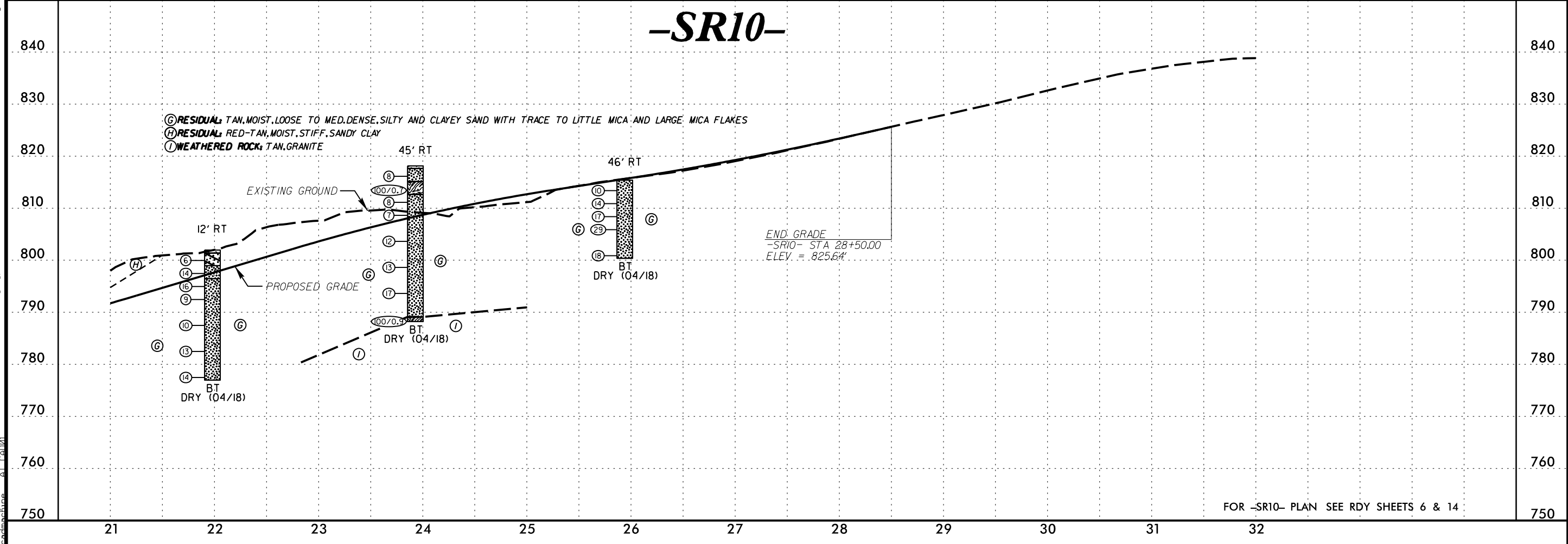


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PROJECT REFERENCE NO. R-2707E	SHEET NO. 40
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-SR10-



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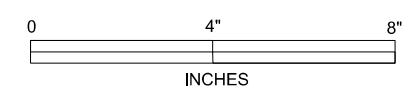
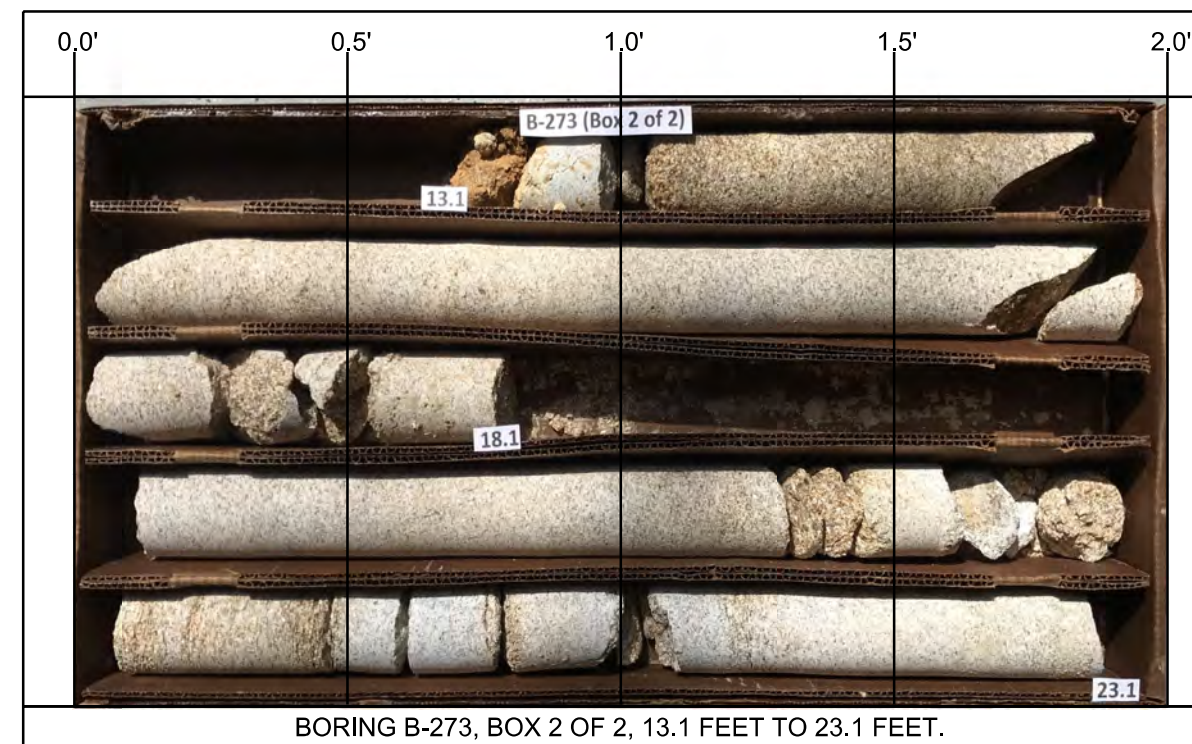
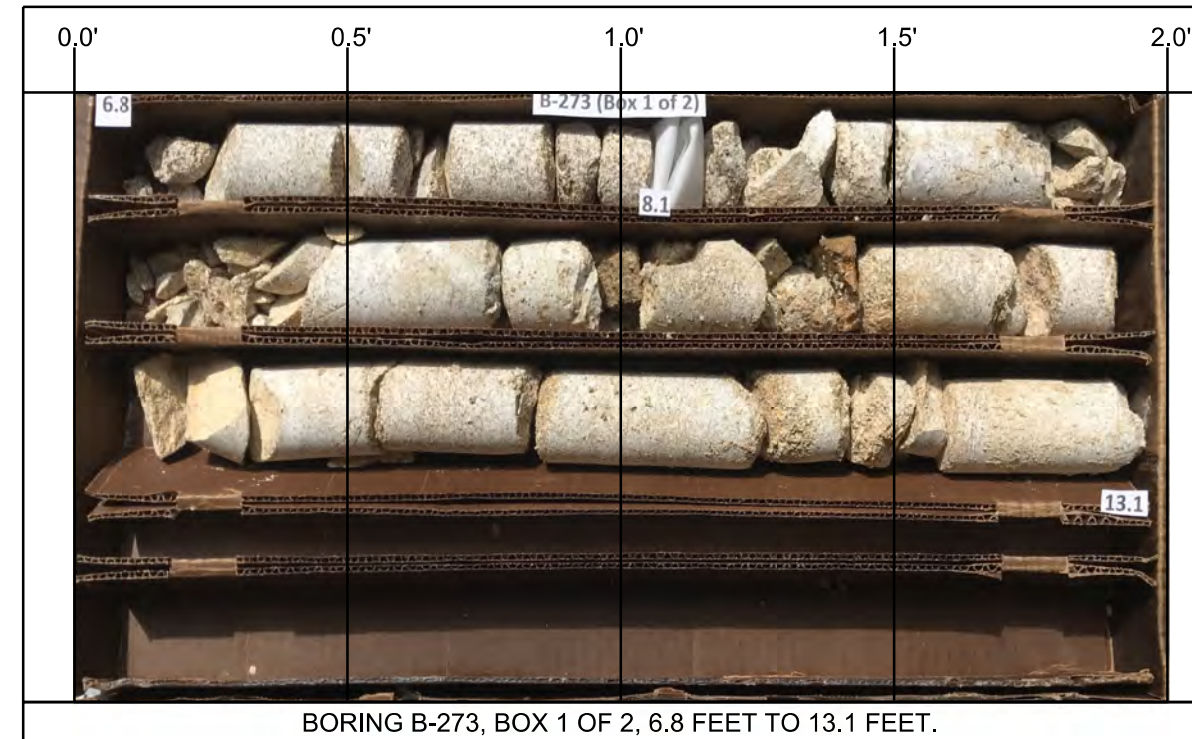
REFERENCE: R-2707E

PROJECT: 34497

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
APPENDIX A
CORE LOGS AND PHOTOGRAPHS**

GEOTECHNICAL BORING REPORT CORE LOG

WBS 34497.1.1		TIP R-2707E		COUNTY CLEVELAND		GEOLOGIST Goodnight, D. J.					
SITE DESCRIPTION US 74, Shelby Bypass from East of NC 150 to Existing US 17, West of SR 2238 (Long Branch Rd)							GROUND WTR (ft)				
BORING NO. B-273		STATION 30+00		OFFSET 20 ft RT		ALIGNMENT -SR7-					
COLLAR ELEV. 810.2 ft		TOTAL DEPTH 23.1 ft		NORTHING 553,790		EASTING 1,271,262					
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 01/10/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic					
DRILLER Cain, J.		START DATE 03/14/18		COMP. DATE 03/14/18		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 16.3 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
803.4	803.4	6.8	1.3	0:41/0.3	(0.9)	(0.0)	(12.6)	(6.9)		Begin Coring @ 6.8 ft CRYSTALLINE ROCK MODERATELY SEVERE TO MODERATE WEATHERING, MEDIUM TO MODERATELY HARD, TAN GRANITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING	6.8
	802.1	8.1	5.0	2:01/1.0 1:23/1.0 2:24/1.0 1:46/1.0 2:37/1.0	69%	0%					803.4
800					(4.4)	(1.8)					
	797.1	13.1			88%	36%					
795			5.0	0:54/1.0 1:18/1.0 1:46/1.0 1:49/1.0 1:59/1.0	(3.7)	(2.6)					
	792.1	18.1			74%	52%					
790			5.0	1:57/1.0 1:14/1.0 1:19/1.0 1:34/1.0 2:22/1.0	(3.6)	(2.5)					
	787.1	23.1			72%	50%					
Boring Terminated at Elevation 787.1 ft IN CRYSTALLINE ROCK: GRANITE											



<p style="font-size: 8px;">FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	<p>ROCK CORE PHOTOS</p> <p style="font-size: 8px;">US 74, SHELBY BYPASS FROM WEST OF SR 2238 TO WEST OF SR 1001 CLEVELAND COUNTY WBS: 34497.1.1 & TIP: R-2707E FALCON PROJECT NO. G17053.00</p>
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NCDOT CORE SINGLE R2707_GEO_BORINGS_AREA-E.GPJ NC_DOT.GDT 7/3/18