

REFERENCE: B-5825

PROJECT: 45778

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

| LINE | STATION | PLAN |
|------|---------------------|------|
| -L- | 14+00.00 - 54+00.00 | 4-6 |
| -Y1- | 10+00.00 - 11+97.97 | 5 |
| -Y2- | 10+00.00 - 14+07.01 | 6 |
| -Y3- | 10+00.00 - 12+65.73 | 5 |

CROSS SECTIONS

| LINE | STATION | SHEETS |
|------|---------------------|--------|
| -L- | 14+00.00 - 54+00.00 | 7-20 |

APPENDICES

| APPENDIX | TITLE | SHEETS |
|----------|--------------------|--------|
| A | LABORATORY RESULTS | 21-22 |

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

ROADWAY
 SUBSURFACE INVESTIGATION

COUNTY YADKIN & FORSYTH
 PROJECT DESCRIPTION REPLACE BRIDGE NO. 35 ON NC 67
OVER YADKIN RIVER IN YADKIN COUNTY

INVENTORY

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | B-5825 | 1 | 22 |

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:
1. 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.
 2. 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

J. STICKNEY

C. SMITH

INVESTIGATED BY J. STICKNEY

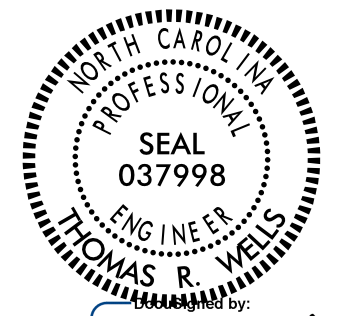
DRAWN BY C. DRISCOLL

CHECKED BY T. WELLS

SUBMITTED BY KLEINFELDER, INC.

DATE MARCH 2019

Prepared in the Office of:



Digitally signed by:

Thomas R. Wells

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3/15/2019

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 | | | |
|---|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|
| 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> | | | | 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. | | | | 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. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: | | | | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, 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 DISLOGGED 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 (ROQ) - 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 (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | MINERALOGICAL COMPOSITION | | | | WEATHERING | | | | 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 WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. | | | | FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. | | | |
| GROUP CLASS. A-1, A-1-b, A-1-c, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6, A-7-7, A-8, A-9, A-10, A-11, A-12, A-13, A-14, A-15, A-16, A-17 | | | | SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | | | | CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. | | | | VERY SLIGHT 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. | | | |
| SYMBOL | | | | COMPRESSIBILITY | | | | NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. | | | | 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. | | | |
| % PASSING #10 #40 #200 | | | | PERCENTAGE OF MATERIAL | | | | COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. | | | | 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. | | | |
| MATERIAL PASSING #40 LL PI | | | | ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL | | | | 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. IF TESTED, WOULD YIELD SPT REFUSAL | | | | 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. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF | | | |
| GROUP INDEX | | | | GROUND WATER | | | | SEVERE (V 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. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF | | | | 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. | | | |
| USUAL TYPES OF MAJOR MATERIALS | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION | | | | DIP & DIP DIRECTION OF ROCK STRUCTURES | | | | ROCK HARDNESS | | | |
| GEN. RATING AS SUBGRADE | | | | MISCELLANEOUS SYMBOLS | | | | UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | | | | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. | | | |
| PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30 | | | | RECOMMENDATION SYMBOLS | | | | HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. | | | | MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. | | | |
| CONSISTENCY OR DENSENESS | | | | ABBREVIATIONS | | | | MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. | | | | SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. | | | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL. | | | | TEXTURE OR GRAIN SIZE | | | |
| GENERALY GRANULAR MATERIAL (NON-COHEISVE) GENERALY SILT-CLAY MATERIAL (COHEISVE) | | | | DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST CME-550X | | | | ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT | | | | U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 | | | |
| VERY LOOSE 4 TO 10 LOOSE 10 TO 30 MEDIUM DENSE 30 TO 50 DENSE > 50 | | | | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -H -N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST | | | | BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) | | | | GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3 | | | |
| VERY SOFT 2 TO 4 SOFT 4 TO 8 MEDIUM STIFF 8 TO 15 STIFF 15 TO 30 VERY STIFF HARD > 30 | | | | SOIL MOISTURE - CORRELATION OF TERMS | | | | FRACTION SPACING | | | | BEDDING | | | |
| < 4 4 TO 10 10 TO 30 30 TO 50 > 50 | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | TERM SPACING | | | | TERM THICKNESS | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | VERY WIDE MORE THAN 10 FEET | | | | VERY THICKLY BEDDED 4 FEET | | | |
| < 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30 | | | | WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | WIDE 3 TO 10 FEET | | | | THICKLY BEDDED 1.5 - 4 FEET | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | MODERATELY CLOSE 1 TO 3 FEET | | | | THINLY BEDDED 0.16 - 1.5 FEET | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | CLOSE 0.16 TO 1 FOOT | | | | VERY THINLY BEDDED 0.03 - 0.16 FEET | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | PLASTICITY | | | | VERY CLOSE LESS THAN 0.16 FEET | | | | THICKLY LAMINATED 0.008 - 0.03 FEET | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | PLASTICITY INDEX (PI) DRY STRENGTH | | | | INDURATION | | | | INDURATION | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH | | | | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | BENCH MARK: N/A | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | COLOR | | | | ELEVATION: N/A FEET | | | | NOTES: | | | |
| < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | | | | DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | | | BORING ELEVATIONS OBTAINED FROM PROJECT TIN FILE B5825_ls.tin.tin, RECEIVED ON FEBRUARY 25, 2019 | | | | DATE: 8-15-14 | | | |

05-MAR-2019 15:24 W:\share\GEO\TECHNICAL\Projects\Active Projects\20190942\014A B-5825 Roadway\B5825_GEO_RDWY\CADD_GEO\TECH\PlanProf\B5825_GEO_inv_tsh.dgn
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TIP PROJECT: B-5825

CONTRACT:

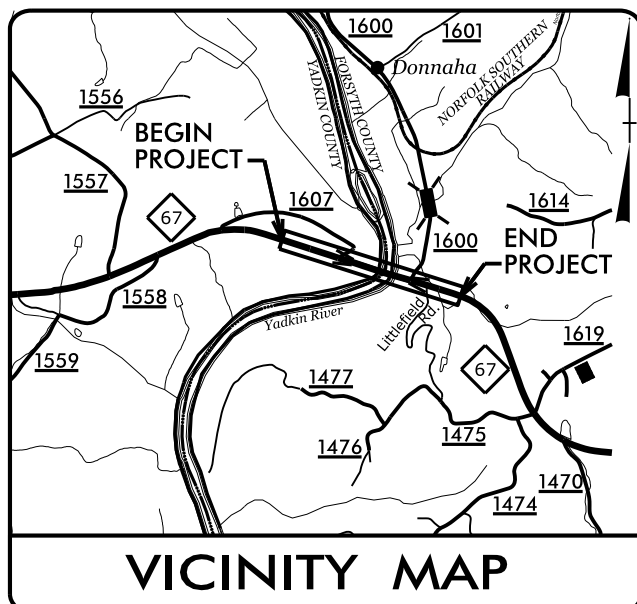
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

YADKIN & FORSYTH COUNTIES

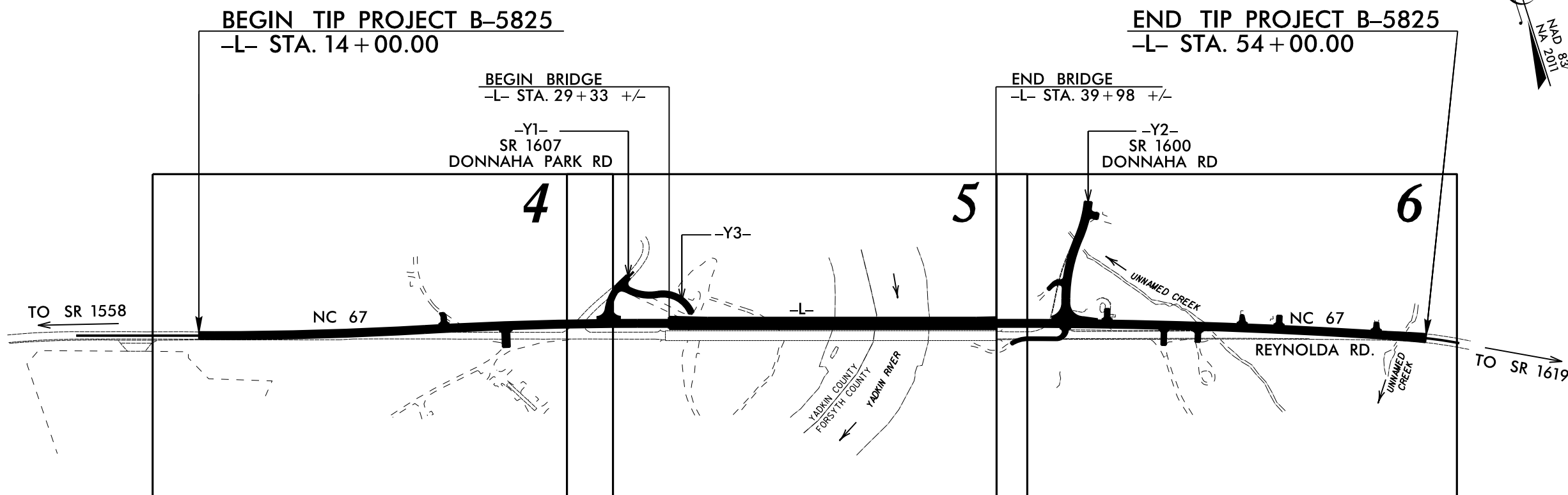
LOCATION: REPLACE BRIDGE NO. 35 OVER THE
YADKIN RIVER ON NC 67

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

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C. | B-5825 | 3 | 22 |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 45778.1.1 | N/A | PE | |
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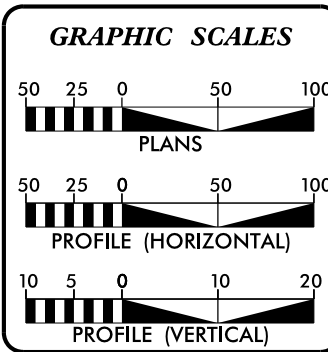


VICINITY MAP



DESIGN EXCEPTIONS
PAVEMENT CROSS SLOPE (LINE -L-)

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

| | |
|---------------|----------------|
| ADT 2020 = | 5100 |
| ADT 2040 = | 5600 |
| K = | 12 % |
| D = | 80 % |
| T = | 4 % * |
| V = | 60 MPH |
| * TTST = | 1% DUAL 3% |
| FUNC CLASS = | MINOR ARTERIAL |
| REGIONAL TIER | |

PROJECT LENGTH

| | | |
|--------------------------------------|---|------------|
| LENGTH ROADWAY TIP PROJECT B-5825 | = | 0.556 mile |
| LENGTH STRUCTURES TIP PROJECT B-5825 | = | 0.202 mile |
| TOTAL LENGTH TIP PROJECT B-5825 | = | 0.758 mile |

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

By:
TGS ENGINEERS
706 HILLSBOROUGH ST
SUITE 200
RALEIGH, NC 27603

PH (919) 773-8887
CORP. LICENSE NO.: C-0275

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 26, 2019

LETTING DATE:
JUNE 16, 2020

TOMMY REGISTER, PE
PROJECT ENGINEER

V. MARCUS LOWERY, PE
PROJECT DESIGN ENGINEER

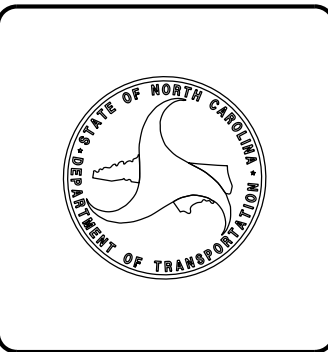
DAVID STUTTS, PE
NCDOT DIVISION 2 CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





March 13, 2019

STATE PROJECT: 45778.1.1 (B-5825)
 COUNTY: Yadkin & Forsyth
 DESCRIPTION: Replace Bridge No. 35 on NC 67 over Yadkin River in Yadkin County

SUBJECT: GEOTECHNICAL REPORT - INVENTORY

PROJECT DESCRIPTION

This project consists of the replacement of a bridge on NC 67 over the Yadkin River. NC 67 will be realigned to allow construction of the replacement bridge.

The geotechnical investigation was conducted in January 2019. Standard Penetration Test borings were advanced with a CME-550x drill rig with an automatic hammer. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by the NCDOT Soils Laboratory.

The following alignment, totaling 0.758 miles, was investigated. Plan sheets and cross sections of this alignment are included in this report.

| <u>LINE</u> | <u>STATIONS</u> |
|-------------|-----------------|
| -L- | 14+00 to 54+00 |

PHYSIOGRAPHY AND GEOLOGY

The project is located in the Piedmont Physiographic Province. The project corridor is comprised primarily of residential to industrial properties and undeveloped wooded areas. The general topography along the project is generally flat to steeply sloping.

Geologically, the project is located within the Inner Piedmont Belt. Soils are derived from the underlying bedrock which consists of granitic gneiss.

SOIL PROPERTIES

Soils encountered during this investigation are separated into three categories based on origin. They consist of roadway embankment, alluvial soil, and residual soils.

Roadway Embankment soils are present along the existing roadway on the project. The roadway embankment encountered consisted of moist, stiff, silty clay (A-7-5) with concrete fragments.

Alluvial soils are present along the existing rivers, floodplains, and creeks on the project. The alluvial soils encountered generally consist of moist to wet, soft to medium stiff, sandy silts (A-4), moist to saturated, stiff to very stiff, slightly to highly plastic, sandy clays and silty clays (A-6, A-7), and moist to wet, loose to medium dense, silty sands (A-2-4). The plasticity index of the alluvial silts and clays tested was 5 and 29, respectively.

Residual soils are derived from the weathering of underlying gneiss. The majority of the residual soils encountered consist of moist, soft to medium stiff, sandy silts (A-4), dry to moist, medium stiff to stiff, silty

clays (A-7), and dry to moist, loose to dense, silty fine sands (A-2-4). The plasticity index of the residual clays tested ranged from 14 to 21. The plasticity index of residual sands tested was 10.

ROCK PROPERTIES

Weathered rock was encountered along the existing roadway (-L-) at elevations ranging from 720.5 to 782.2 feet (MSL) and typically ranges from 4 to 28 feet below the existing ground surface. Crystalline rock was encountered as exposed outcrops along the existing roadway (-L-). The majority of the weathered rock and crystalline rock consists of gneiss.

GROUNDWATER

Groundwater was encountered at elevations ranging from 740 to 745.8 feet and typically ranges from 3 to 3.2 feet below the existing ground surface between STA. 29+00 and STA. 39+60. Groundwater was not encountered in any other areas.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

1) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following location:

| <u>LINE</u> | <u>STATIONS</u> | <u>OFFSETS</u> |
|-------------|-----------------|----------------|
| -L- | 18+00 to 21+00 | LT, RT |

2) Alluvial Soil: Alluvial Soil was encountered on the project at the following locations:

| <u>LINE</u> | <u>STATIONS</u> | <u>OFFSETS</u> |
|-------------|-----------------|----------------|
| -L- | 18+00 to 21+00 | LT, RT |
| -L- | 29+00 to 41+50 | LT, RT |
| -L- | 43+00 to 47+30 | LT |
| -L- | 47+00 to 49+00 | RT |
| -Y2- | 10+00 to 42+25 | LT, RT |

3) Rock Outcrops: Rock outcrops were observed on the project at the following locations:

| <u>LINE</u> | <u>STATIONS</u> | <u>OFFSETS</u> |
|-------------|-----------------|----------------|
| -L- | 40+00 to 45+00 | RT |
| -L- | 44+30 to 45+00 | LT |

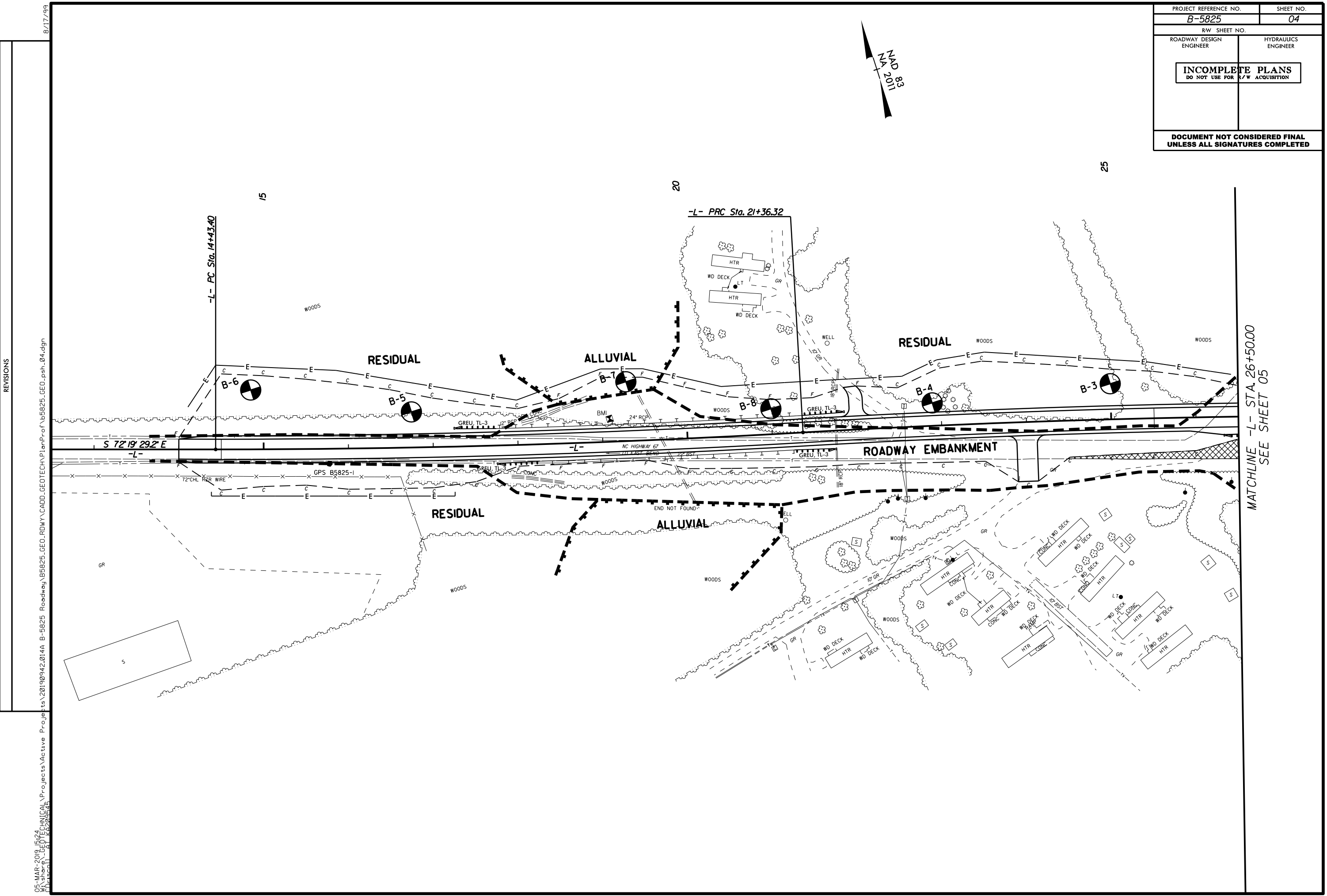
Prepared by,
KLEINFELDER, INC.
 NC License No. F-1312

F. Christopher Driscoll
 Staff Professional

Thomas R. Wells, PE
 Senior Professional

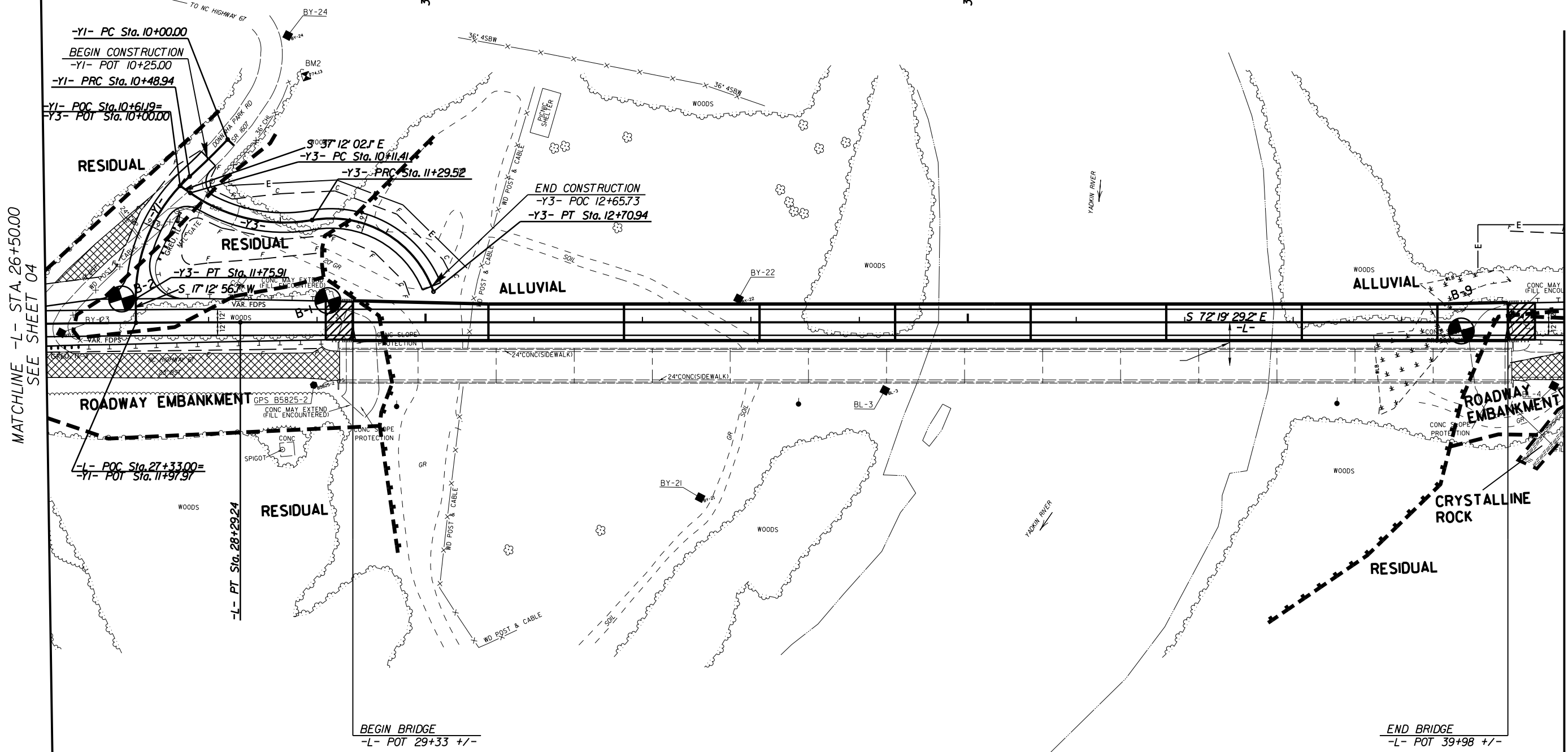
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| DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED | |



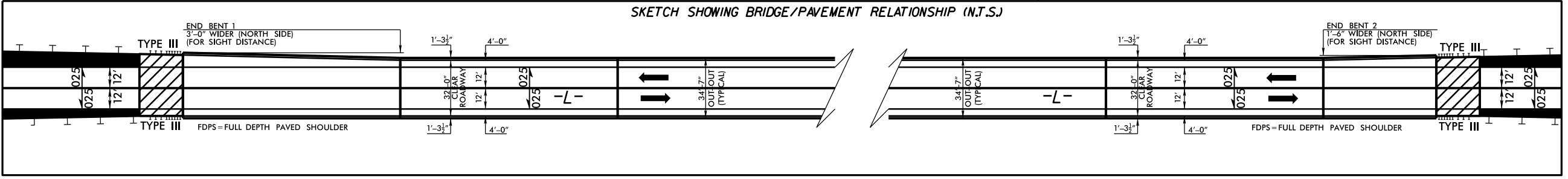
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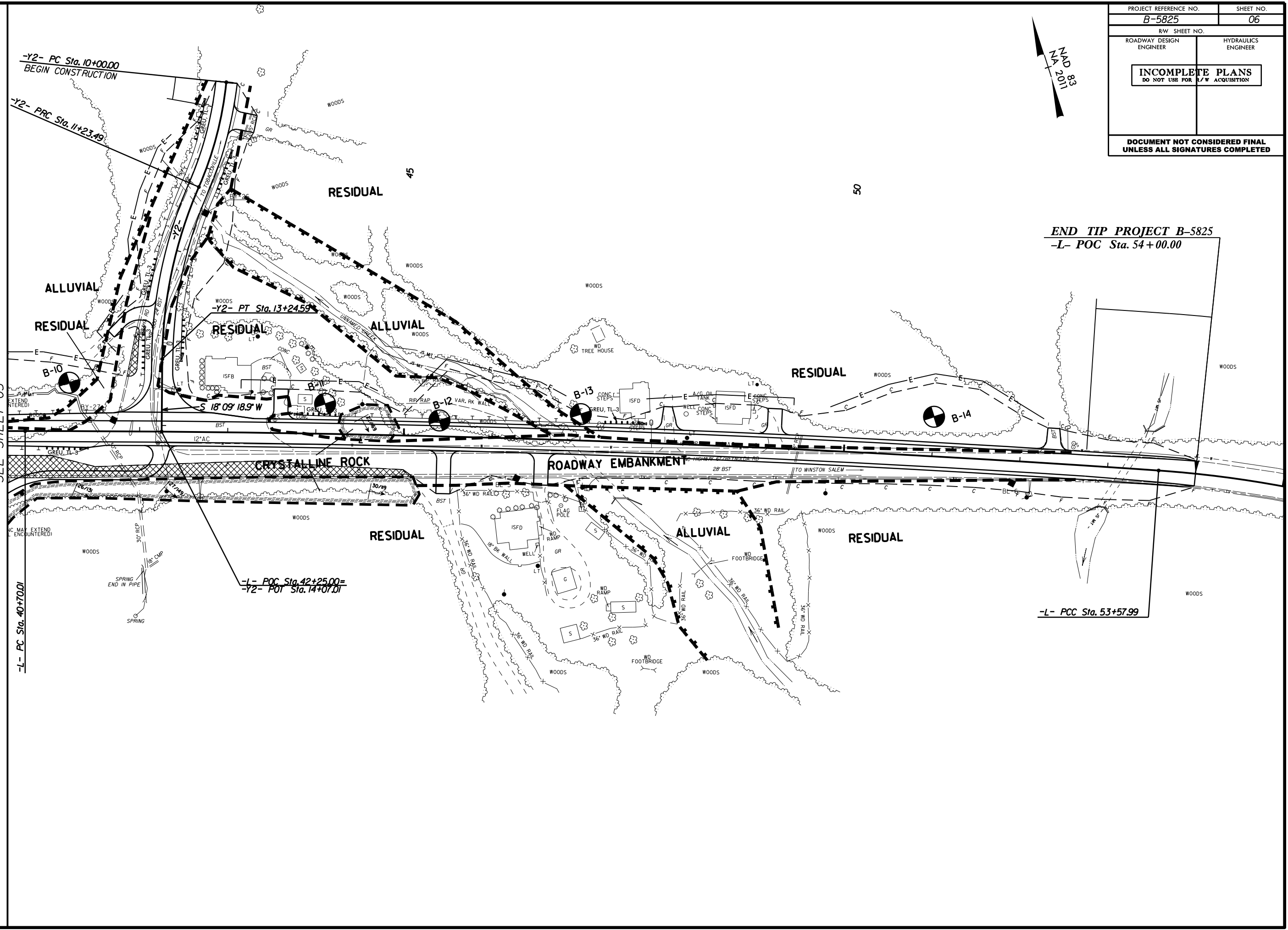
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SEE SHEET 04

MATCHLINE -L- STA. 40+50.00
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| DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED | |



END TIP PROJECT B-5825
-L- POC Sta. 54+00.00

MATCHLINE -L- STA. 40+50.00
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-Y2- PC Sta. 10+00.00
BEGIN CONSTRUCTION

-Y2- PRC Sta. 11+23.49

-Y2- PT Sta. 13+24.59

-L- POC Sta. 42+25.00=
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-L- PC Sta. 40+10.01

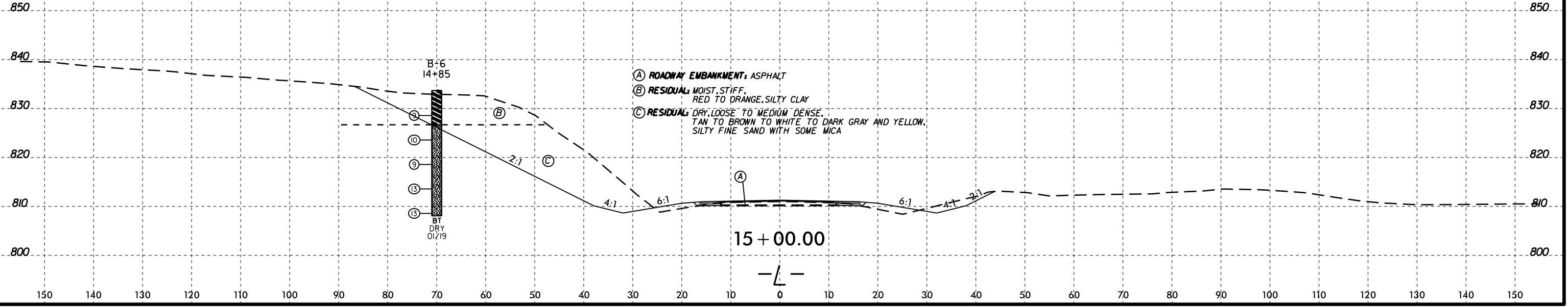
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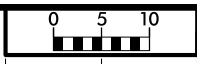


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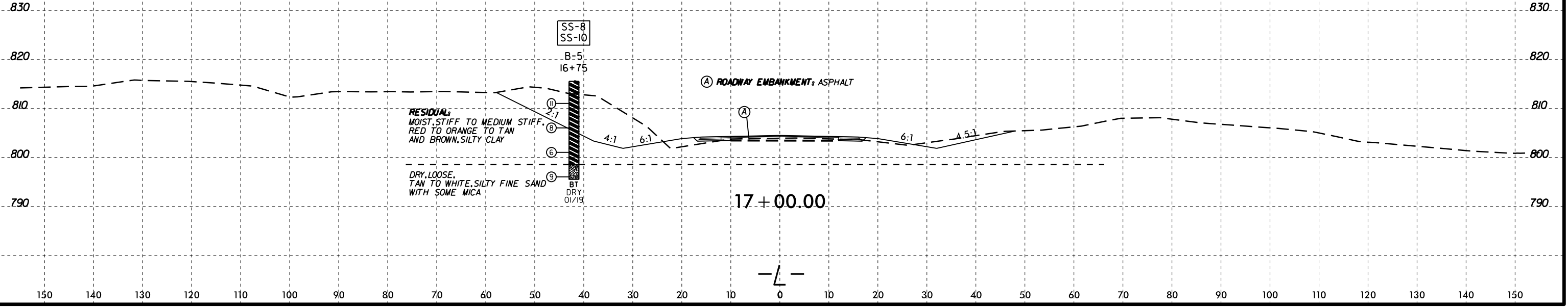
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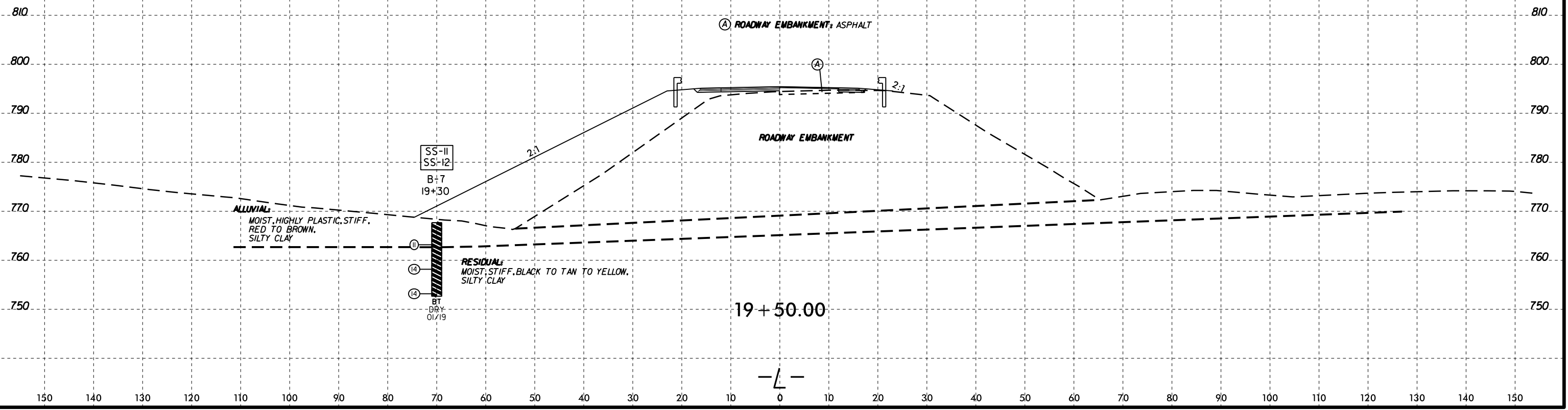
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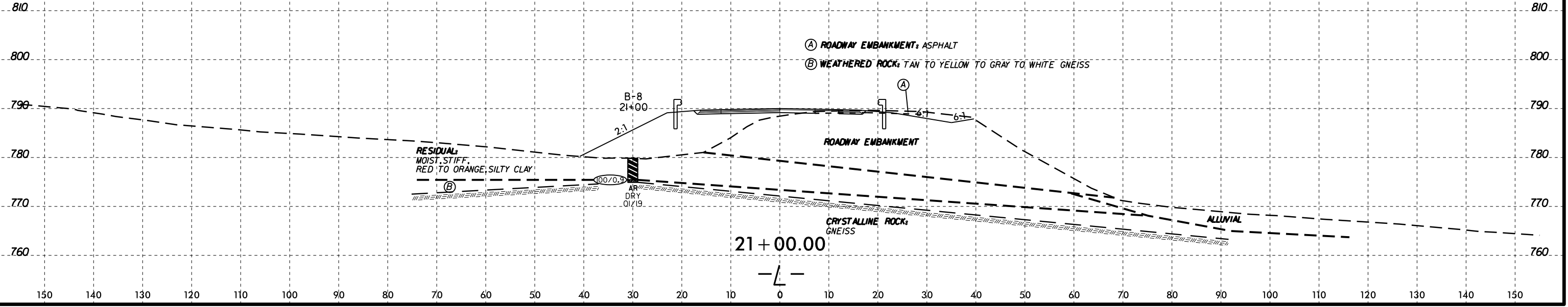
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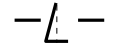
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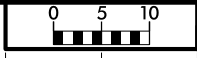


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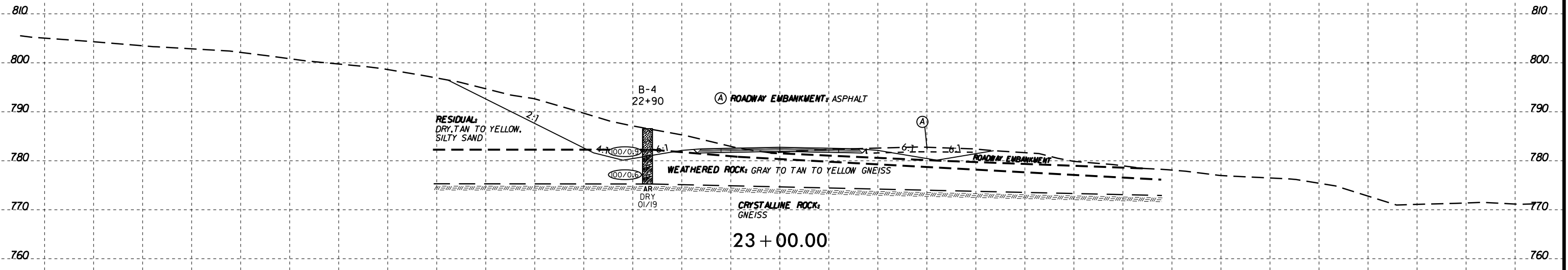


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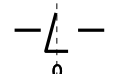


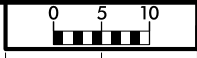
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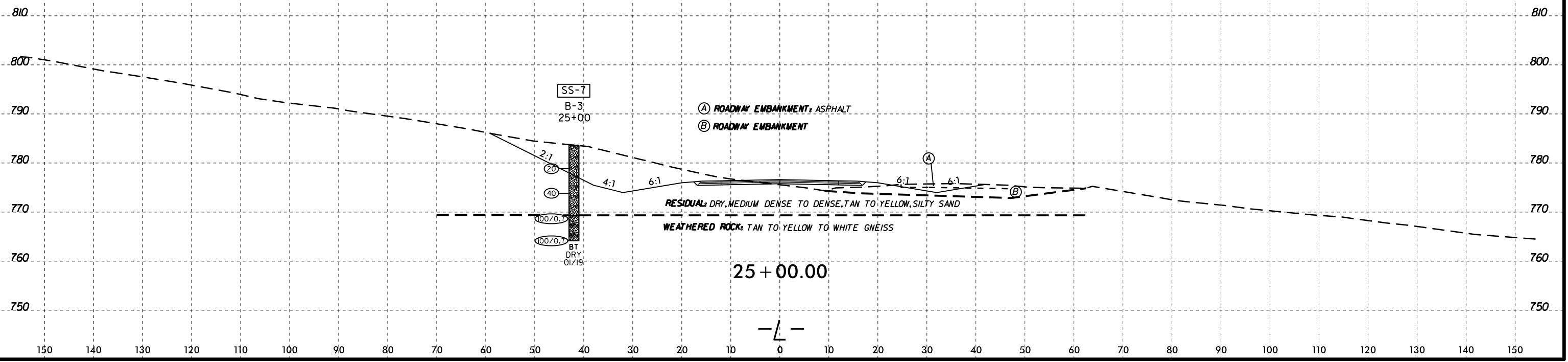
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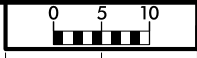


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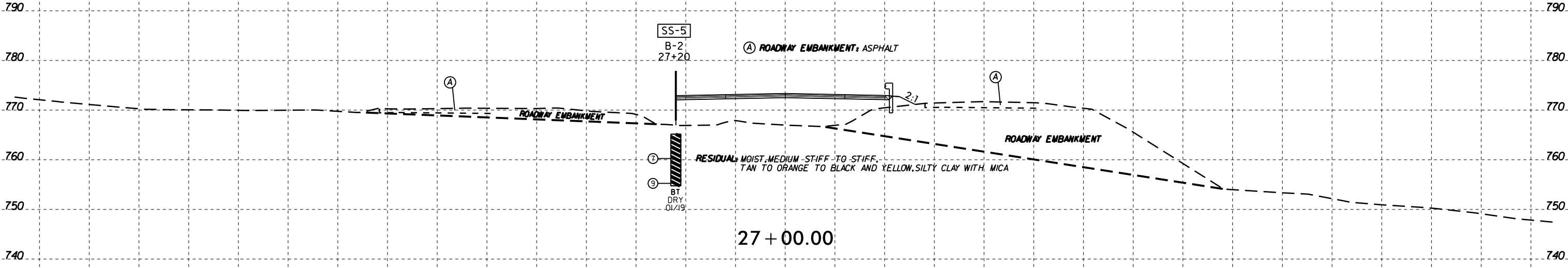


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B-5825

SHEET NO.
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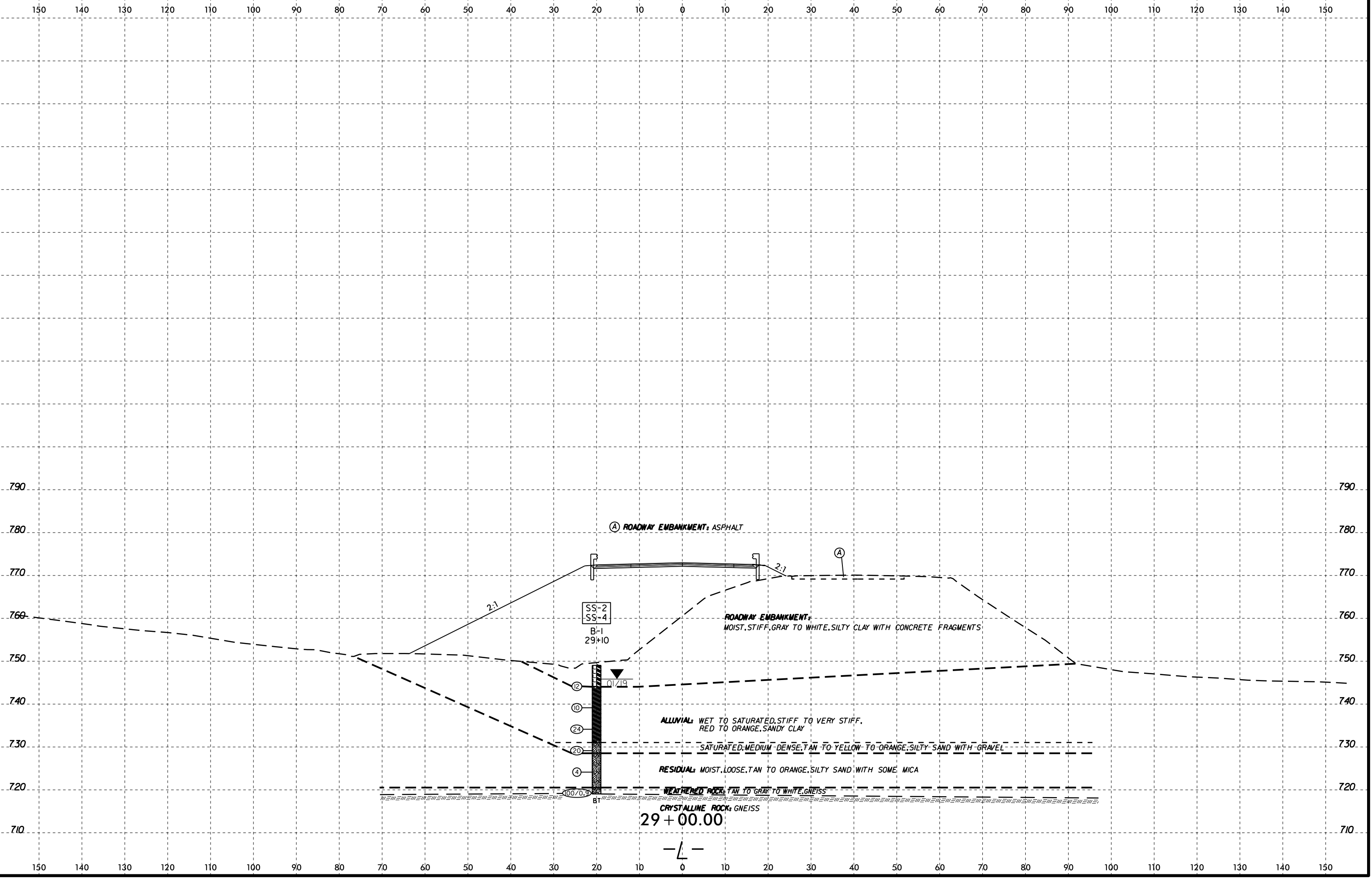
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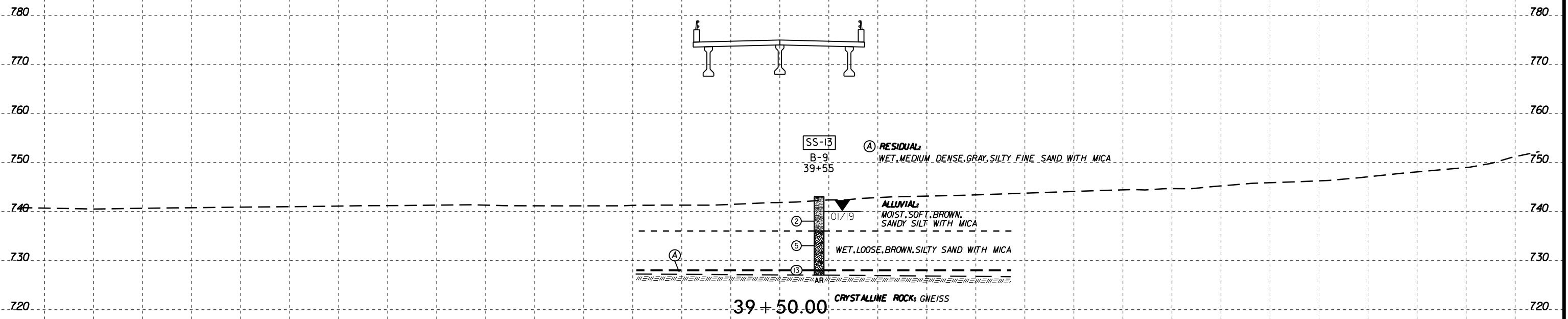


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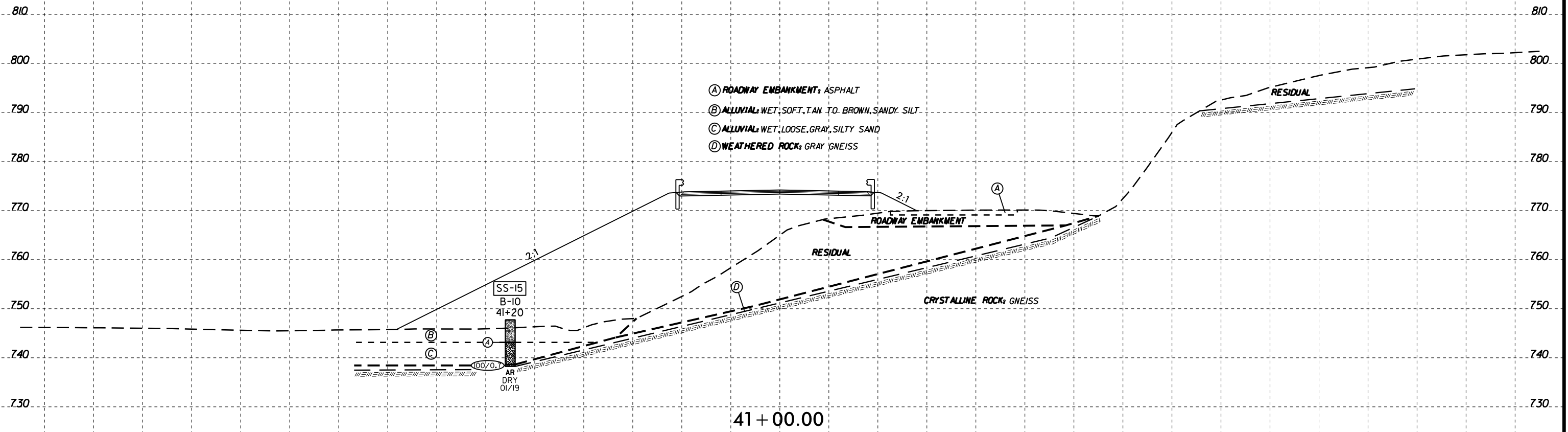
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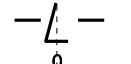
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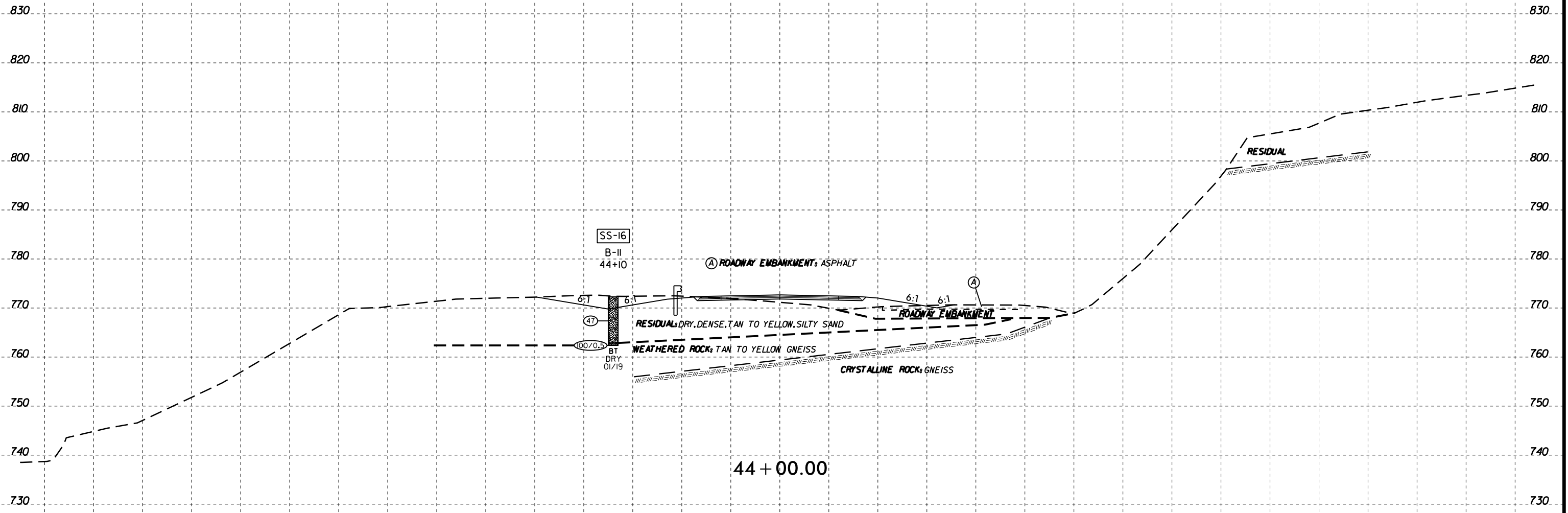
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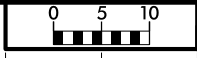
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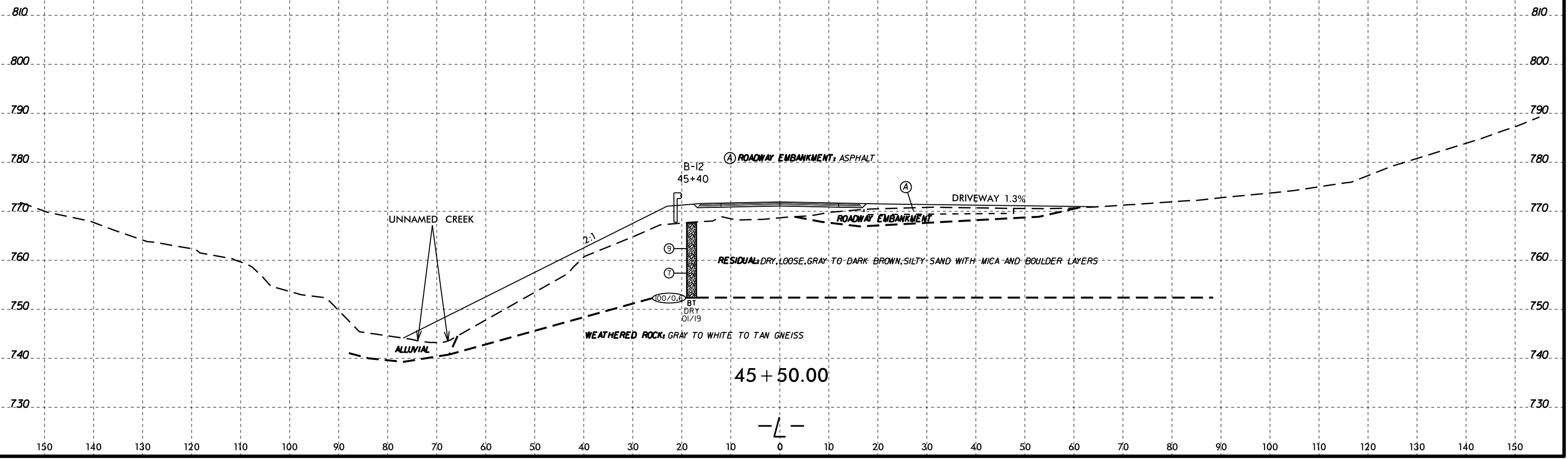
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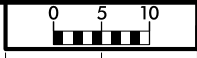
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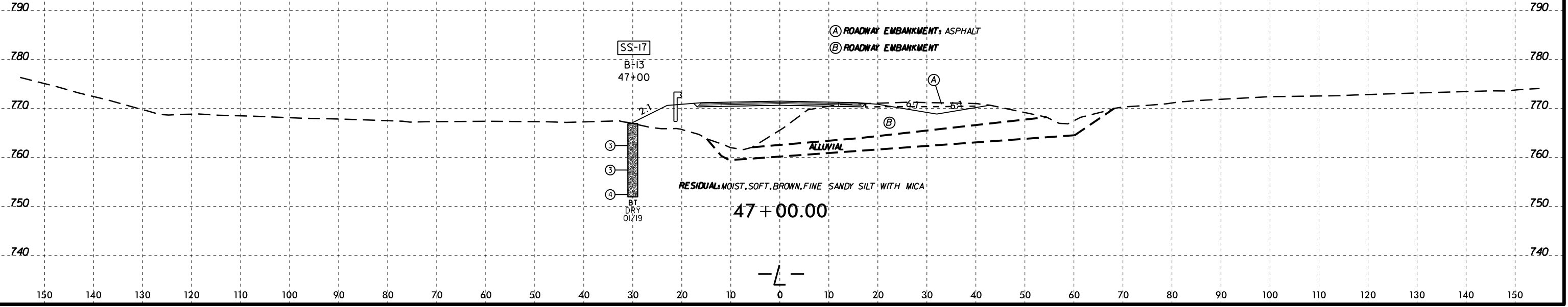


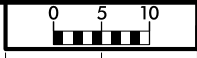
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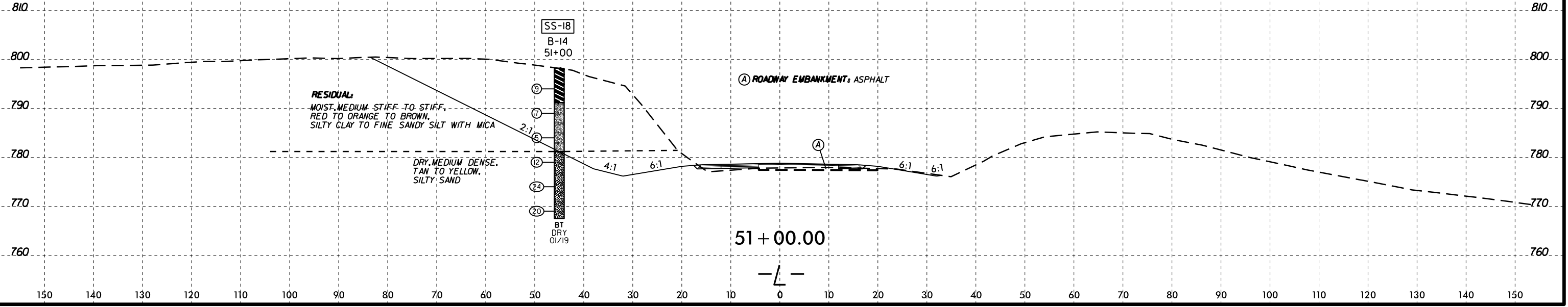
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
APPENDIX A
LABORATORY RESULTS

REFERENCE: B-5825

PROJECT: 45778

