

REFERENCE: HE-0001B

PROJECT: 49742

SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION

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| <u>LINE</u> | <u>STATION</u> | <u>PLAN</u> |
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| -Y-         | I9+50 TO 48+60 | 4 - 6       |

CROSS SECTIONS

| <u>LINE</u> | <u>STATION</u> | <u>SHEETS</u> |
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

ROADWAY  
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE  
PROJECT DESCRIPTION ACCESS ROAD CONNECTING  
FROM I-26 TO NC 191 (BREVARD RD)

INVENTORY

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | HE-0001B                    | 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:
- 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

J. MANNING

M. SERZEGA

INVESTIGATED BY M. SNYDER

DRAWN BY M. SNYDER

CHECKED BY J. GARDNER

SUBMITTED BY M. SNYDER

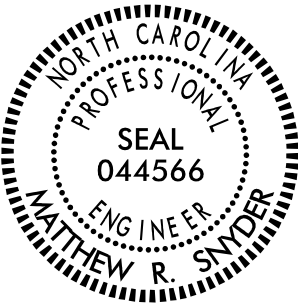
DATE MAY 2023

Prepared in the Office of:



**GANNETT  
FLEMING**

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NC Lic. No. F-0270



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5/25/2023

DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

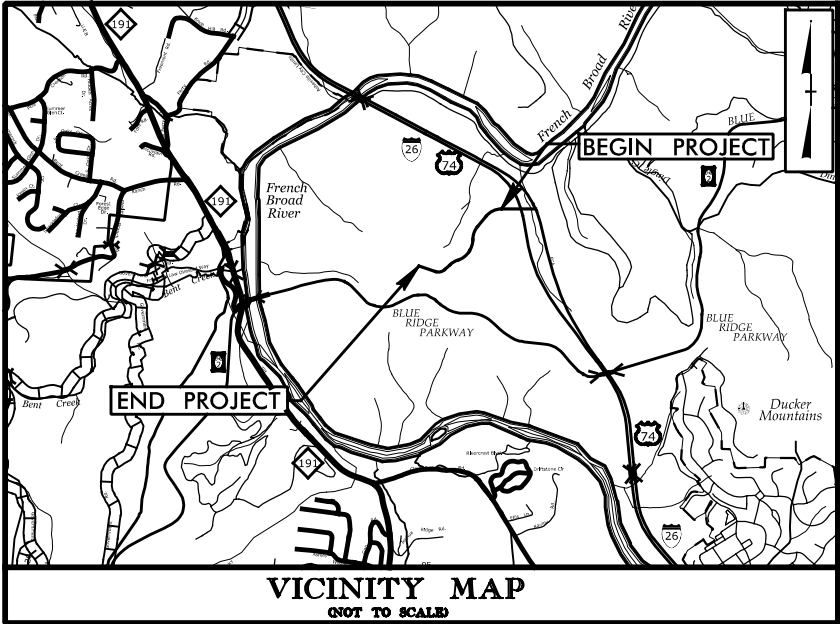
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |  |  | GRADATION                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  | ROCK DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  |  |  |  |  |  |  |  |  | TERMS AND DEFINITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| 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.<br>AQUIFER - A WATER BEARING FORMATION OR STRATA.<br>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.<br>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.<br>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.<br>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.<br>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.<br>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.<br>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.<br>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.<br>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.<br>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.<br>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.<br>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.<br>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.<br>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.<br>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.<br>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.<br>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.<br>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.<br>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.<br>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.<br>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.<br>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.<br>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.<br>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.<br>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.<br>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.<br>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.<br>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |  |  |  |  |  |  |  |  |  |  |  |
| SOIL LEGEND AND AASHTO CLASSIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |  |  |  | MINERALOGICAL COMPOSITION                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  | WEATHERING                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| GENERAL CLASS. 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.                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  | FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  |
| GROUP CLASS. A-1 A-3 A-2 A-2-5 A-2-6 A-2-7 A-4 A-5 A-6 A-7 A-1, A-2 A-3 A-4, A-5 A-6, A-7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |  |  | COMPRESSIBILITY                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  | CRYSTALLINE ROCK (CR)                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| SYMBOL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  | PERCENTAGE OF MATERIAL                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  | NON-CRYSTALLINE ROCK (NCR)                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  | ORGANIC MATERIAL                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  |  |  | COASTAL PLAIN SEDIMENTARY ROCK (CP)                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| MATERIAL PASSING #40 LL PI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  | GROUND WATER                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  | VERY SLIGHT (V SLI.)                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| GROUP INDEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  | MISCELLANEOUS SYMBOLS                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |  |  |  | SLIGHT (SLI.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| USUAL TYPES OF MAJOR MATERIALS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  |  |  | RECOMMENDATION SYMBOLS                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  | MODERATE (MOD.)                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| GEN. RATING AS SUBGRADE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  | ABBREVIATIONS                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  | MODERATELY SEVERE (MOD. SEV.)                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  |
| PI OF A-7-5 SUBGROUP IS < LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  | SEVERE (SEV.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| CONSISTENCY OR DENSENESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  | VERY SEVERE (V SEV.)                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| PRIMARY SOIL TYPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  | COMPLETE                                   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| GENERAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| GENERAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| TEXTURE OR GRAIN SIZE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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SIEVE SIZE OPENING (MM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                                        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| BOULDER (BLDR.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| GRAIN SIZE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| SOIL MOISTURE - CORRELATION OF TERMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| SOIL MOISTURE SCALE (ATTERBERG LIMITS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| LL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| PLASTIC RANGE (PI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| OM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| SL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| PLASTICITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| NON PLASTIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| SLIGHTLY PLASTIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| MODERATELY PLASTIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| HIGHLY PLASTIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| COLOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                            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| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                      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TIP PROJECT: HE-0001B

CONTRACT:

See Sheet 1B For Conventional Symbols



30% ROADWAY PLANS

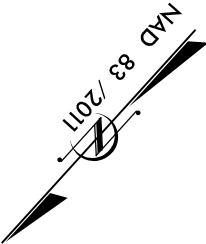
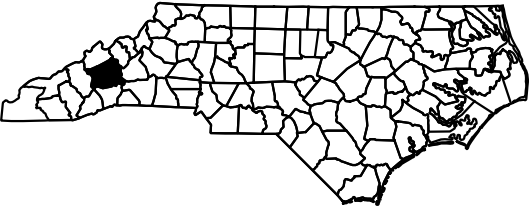
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

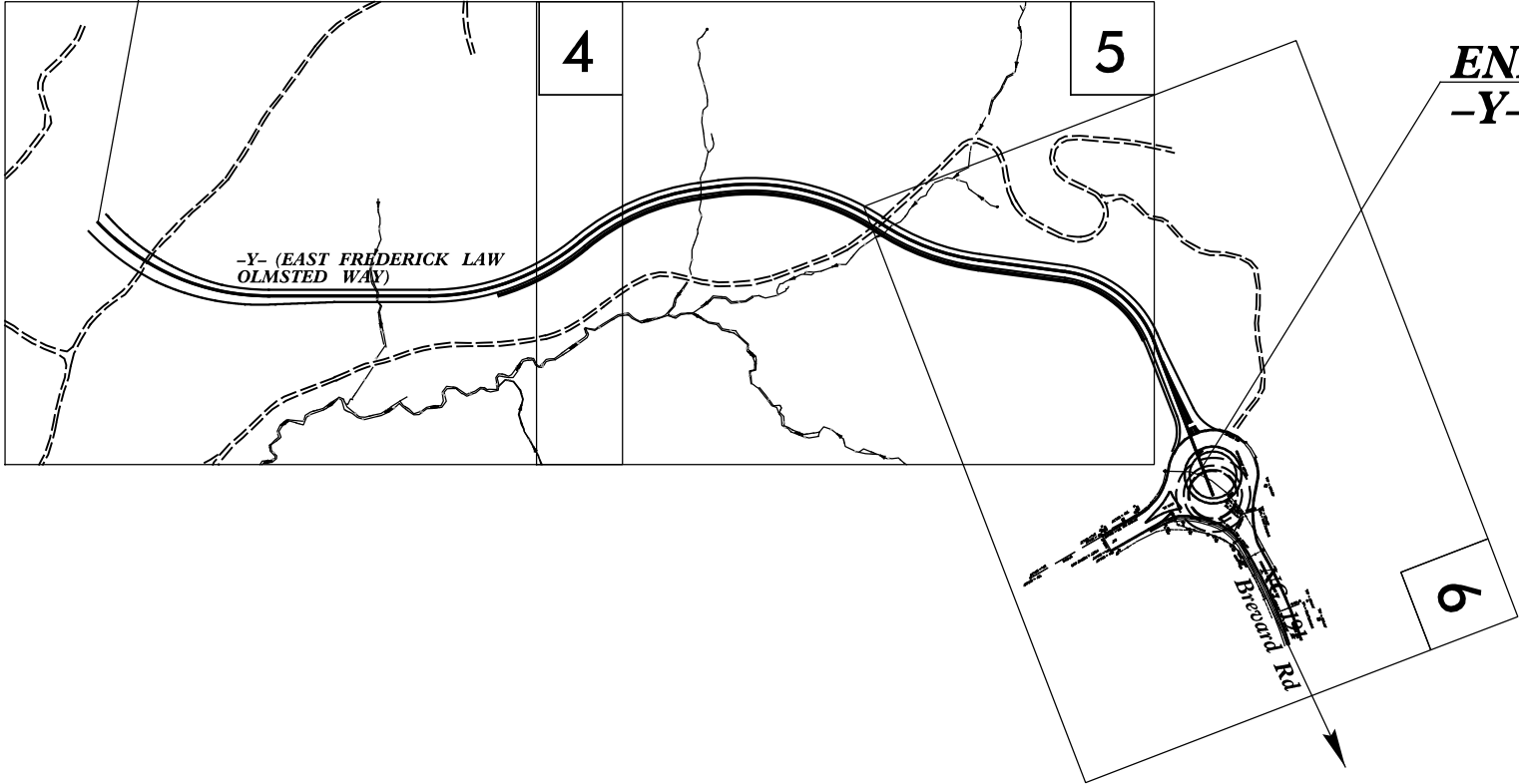
LOCATION: ACCESS ROAD CONNECTING FROM I-26  
TO NC 191 (BREVARD RD)

TYPE OF WORK: GRADING, PAVING, AND DRAINAGE

| STATE          | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
|----------------|-----------------------------|-------------|--------------|
| N.C.           | HE-0001B                    | 3           | 22           |
| STATE PROJ.NO. | F.A.PROJ.NO.                | DESCRIPTION |              |
| 49742.3        |                             | PE          |              |
|                |                             |             |              |
|                |                             |             |              |
|                |                             |             |              |
|                |                             |             |              |
|                |                             |             |              |



BEGIN TIP PROJECT HE-0001B  
-Y- STA. 19 + 50.00



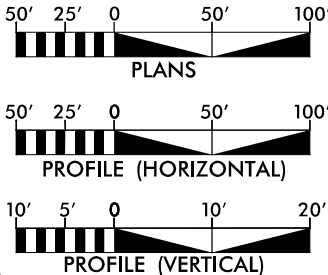
END TIP PROJECT HE-0001B  
-Y- STA. 48 + 57.94

NOTES:  
CLEARING ON THIS PROJECT WILL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_.

INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2021 = 9,100  
ADT 2045 = 18,600  
K = 9 %  
D = 55 %  
T = 10%  
V = 40 MPH  
\* TTST = 1% DUAL 4%

FUNC CLASS = MINOR  
ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT HE-0001B = 0.550 Miles

TOTAL LENGTH TIP PROJECT HE-0001B = 0.550 Miles

NCDOT CONTACT: MCCRAY COATES, PE  
DIVISION 13 PROJECT MANAGER

Prepared for the North Carolina Department of Transportation  
In the Office of:



One Glenwood Avenue  
Suite 900  
Raleigh, NC 27603  
919-420-7660  
NC Lic. No. F-0270

2018 STANDARD SPECIFICATIONS  
RIGHT OF WAY DATE:  
N/A

LETTING DATE:  
N/A

RICKY A. TIPTON, PE  
PROJECT ENGINEER

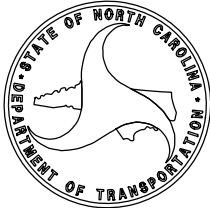
ANGELA B. PRIDGEN, PE  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN  
ENGINEER

SIGNATURE: P.E.





One Glenwood Avenue  
Suite 900  
Raleigh, NC 27603  
P 919.420.7660 | F 919.999.3632

[gannettfleming.com](http://gannettfleming.com)

May 12, 2023

**State Project:** 49742.3  
**TIP No.:** HE-0001B  
**County:** Buncombe  
**Description:** Access Road Connecting I-26 to NC 191 (Brevard Rd)

**Subject:** Roadway Subsurface Inventory Report

PROJECT DESCRIPTION

The proposed project (HE-0001B) consists of approximately 0.55-miles of new alignment roadway (-Y-) to connect a future diverging diamond interchange (DDI) to Frederick Law Olmstead Way East and NC 191 (Brevard Rd). The new alignment roadway will be a two-lane typical section with embankments up to 25 feet and cut sections as deep as 85 feet.

The geotechnical investigation for HE-0001B was performed from August to September of 2022. Seventeen (17) Standard Penetration test (SPT) borings were performed with CME 550X ATV-mounted drill rigs equipped with automatic hammers. Representative soil samples were collected from split spoon samples and soil cuttings for field visual classification and laboratory analysis and classification.

The following alignments, totaling 0.6 miles, were investigated. Selected cross sections of these alignments are included in this report.

| <u>Line</u> | <u>Stations (+/-)</u> |
|-------------|-----------------------|
| -Y-         | 19+50 – 48+60         |

PHYSIOGRAPHY AND GEOLOGY

The proposed project is located within the Blue Ridge Physiographic Province. The terrain within the project corridor consists of rolling hills and mountainsides.

The proposed project is underlain by Late Proterozoic Mica Schist and Biotite Gneiss. The occurrence of these rock types is indicated by the weathered and crystalline rock samples recovered during the geotechnical investigation, as well as the composition of the local residual soils. The overlying residual soils are a result of physical and chemical weathering of the underlying parent bedrock.

SOIL PROPERTIES

The soils encountered during the geotechnical investigation consisted of alluvial and residual soils.

**Alluvial Soils:** Alluvial soils are assumed to be present within existing streams crossing the proposed alignment.

**Residual Soils:** Soils classified as residual soils generally consisted of silty and clayey sand (A-2-4, A-2-5, A-2-6), sandy and clayey silt (A-4, A-5), and sandy and silty clay (A-6, A-7-5, A-7-6). Varying amounts of mica, manganese, and rock fragments were noted within soils interpreted as residual soils.

ROCK PROPERTIES

**Weathered Rock:** Weathered Rock is defined by penetration by split spoon of less than 1.0 foot per 100 blows. Weathered Rock was encountered in ten (10) borings. Four (4) of these borings encountered intermediate lenses of Weathered Rock that transitioned back to residual soils at greater depths. These lenses ranged in thickness from 0.8 to 7.5 feet. Weathered Rock was encountered at elevations ranging from 2,064 to 2,128 feet, excluding the intermediate lenses.

**Crystalline Rock:** Crystalline Rock is defined by auger refusal and/or SPT refusal with penetration by split spoon of less than or equal to 0.1 feet per 60 blows. Crystalline Rock was encountered in eight (8) borings at elevations ranging from 2,050 to 2,125 feet. Crystalline Rock encountered at the site is visually identified as Mica Schist and Biotite Gneiss.

GROUNDWATER

Groundwater measurements were attempted in most of the borings immediately upon completion of drilling and/or a minimum of 24-hr after completion of drilling. Groundwater was encountered during drilling operations (0-hr) in one (1) boring at a depth of 56.9 feet and elevation of 2,096 feet. Stabilized groundwater table (24-hr) measurements were recorded in two (2) borings at depths ranging from 4.0 to 51.5 feet and elevations ranging from 2,087 to 2,102 feet. Groundwater was not encountered in the remaining borings.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

**Alluvial Soils:** The following areas are assumed to contain alluvial soils associated with existing streams crossing the proposed alignment:

| <u>Line</u> | <u>Stations (+/-)</u> | <u>Offset</u> |
|-------------|-----------------------|---------------|
| -Y-         | 26+10 – 26+45         | LT & RT       |
| -Y-         | 34+10 – 34+30         | LT & RT       |
| -Y-         | 38+40 – 38+90         | LT & RT       |

**Cohesive Soils:** The following areas contain cohesive soils at existing subgrade in fill areas or near proposed subgrade in cut areas and have the potential to cause subgrade problems during construction:

| <u>Line</u> | <u>Stations (+/-)</u> | <u>Offset</u> |
|-------------|-----------------------|---------------|
| -Y-         | 25+75 – 30+50         | LT & RT       |
| -Y-         | 38+25 – 42+00         | LT & RT       |
| -Y-         | 44+00 – 46+00         | LT & RT       |

**Highly Plastic Soils:** Highly plastic soils with plasticity indices (PI) greater than 25 within proposed cut sections or greater than 35 within 3-ft of subgrade were not encountered.



**Weathered Rock:** The following areas contain weathered rock above or within six (6) feet of proposed grade and have the potential to require ripping or blasting for removal:

| <u>Line</u> | <u>Stations (+/-)</u> | <u>Offset</u> |
|-------------|-----------------------|---------------|
| -Y-         | 19+50 – 25+00         | LT & RT       |
| -Y-         | 35+00 – 37+50         | LT & RT       |

**Crystalline Rock:** The following areas contain crystalline rock above or within six (6) feet of proposed grade and will likely require ripping or blasting for removal:

| <u>Line</u> | <u>Stations (+/-)</u> | <u>Offset</u> |
|-------------|-----------------------|---------------|
| -Y-         | 19+50 – 21+50         | LT & CT       |
| -Y-         | 36+50 – 37+50         | CT            |

**Groundwater:** Groundwater was not encountered within proposed cut sections.

The following areas exhibited groundwater within six (6) feet of the proposed grade:

| <u>Line</u> | <u>Stations (+/-)</u> | <u>Offset</u> |
|-------------|-----------------------|---------------|
| -Y-         | 36+50 – 37+50         | LT            |

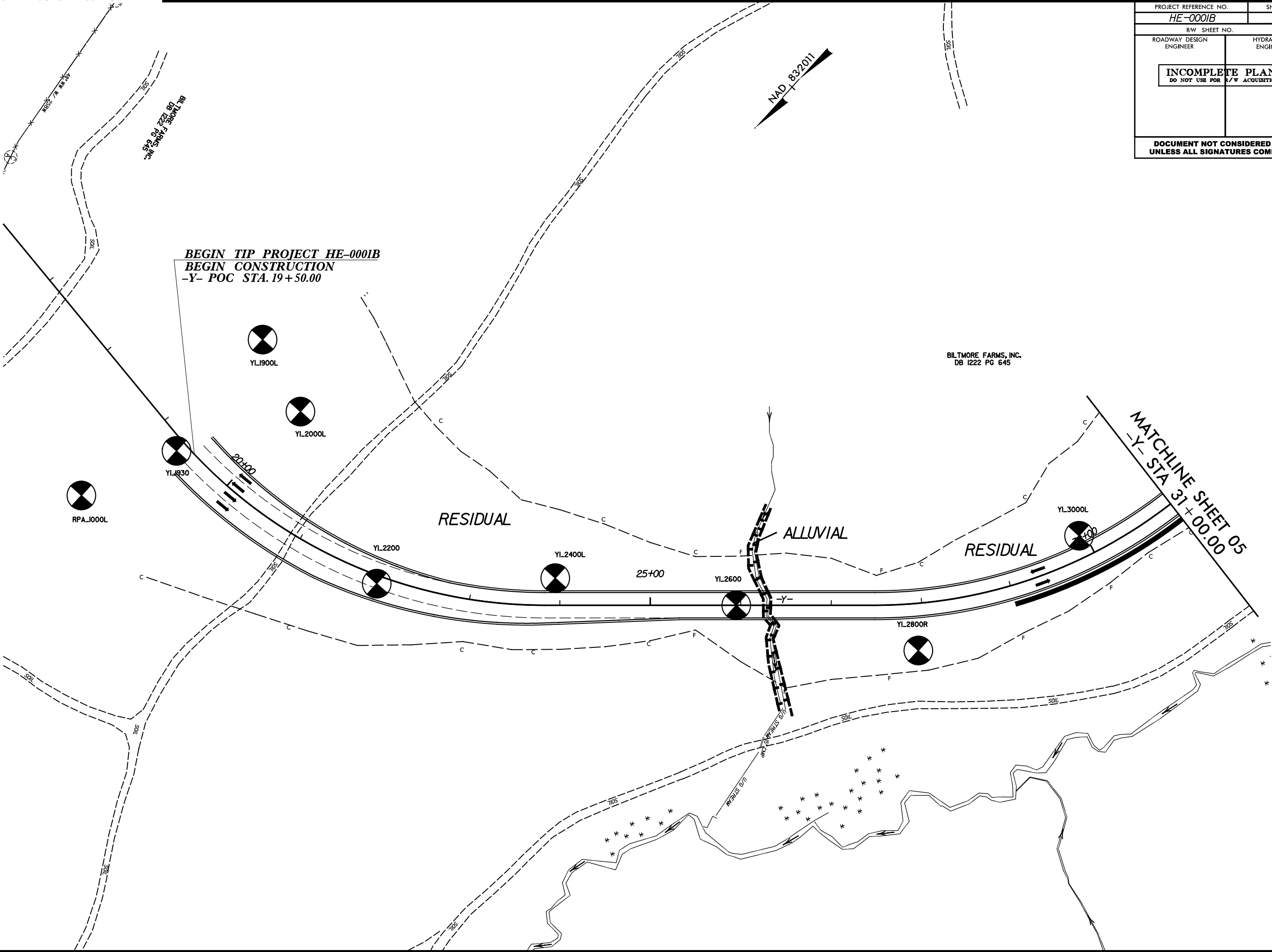
Sincerely,  
**Gannett Fleming, Inc.**



Matthew Snyder, P.E.  
Senior Project Geotechnical Engineer

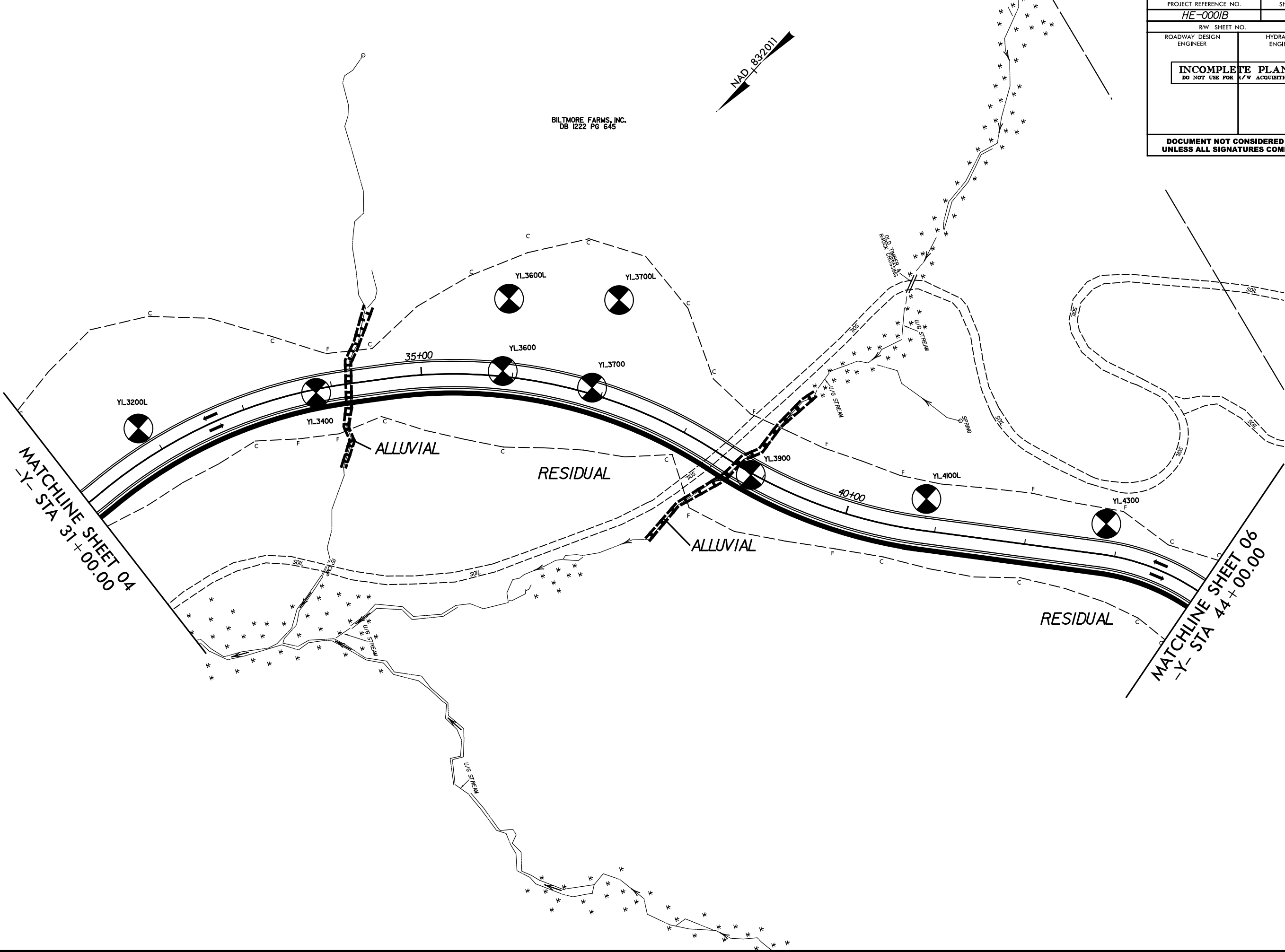
8/17/99

|                                                                  |  |                     |
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| PROJECT REFERENCE NO.                                            |  | SHEET NO.           |
| HE-0001B                                                         |  | 4                   |
| R/W SHEET NO.                                                    |  |                     |
| ROADWAY DESIGN ENGINEER                                          |  | HYDRAULICS ENGINEER |
| INCOMPLETE PLANS<br>DO NOT USE FOR A/W ACQUISITION               |  |                     |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |  |                     |



8/17/99

|                                                                       |  |                        |  |
|-----------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.                                                 |  | SHEET NO.              |  |
| HE-0001B                                                              |  | 5                      |  |
| R/W SHEET NO.                                                         |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER                                            |  | HYDRAULICS<br>ENGINEER |  |
| <div>INCOMPLETE PLANS</div> <div>DO NOT USE FOR R/W ACQUISITION</div> |  |                        |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED      |  |                        |  |



8/17/99

|                                                                       |  |                        |  |
|-----------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.                                                 |  | SHEET NO.              |  |
| HE-0001B                                                              |  | 6                      |  |
| R/W SHEET NO.                                                         |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER                                            |  | HYDRAULICS<br>ENGINEER |  |
| <div>INCOMPLETE PLANS</div> <div>DO NOT USE FOR R/W ACQUISITION</div> |  |                        |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED      |  |                        |  |

NOTE: ROUNDABOUT DESIGN TO BE COMPLETED BY OTHERS



BILTMORE FARMS, INC.  
DB I222 PG 645

END TIP PROJECT HE-0001B  
END CONSTRUCTION  
-Y- POT Sta. 48 + 59.99

MATCHLINE SHEET 5  
-Y- STA 44 + 00.00

RESIDUAL

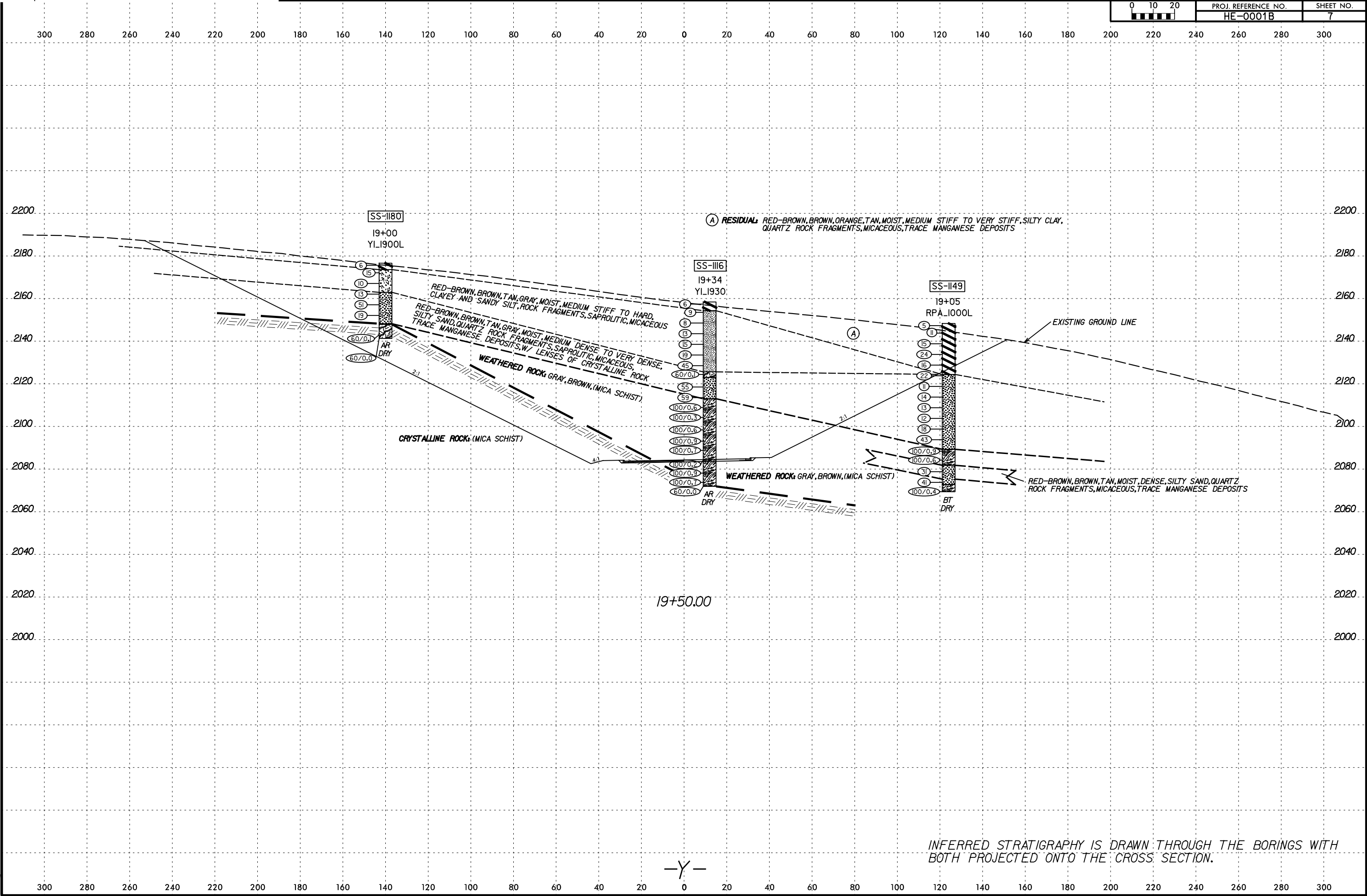
BILTMORE FARMS, INC.  
DB I222 PG 645

RAYTHEON TE  
CORPOR.  
DB 6057 F

6/23/16



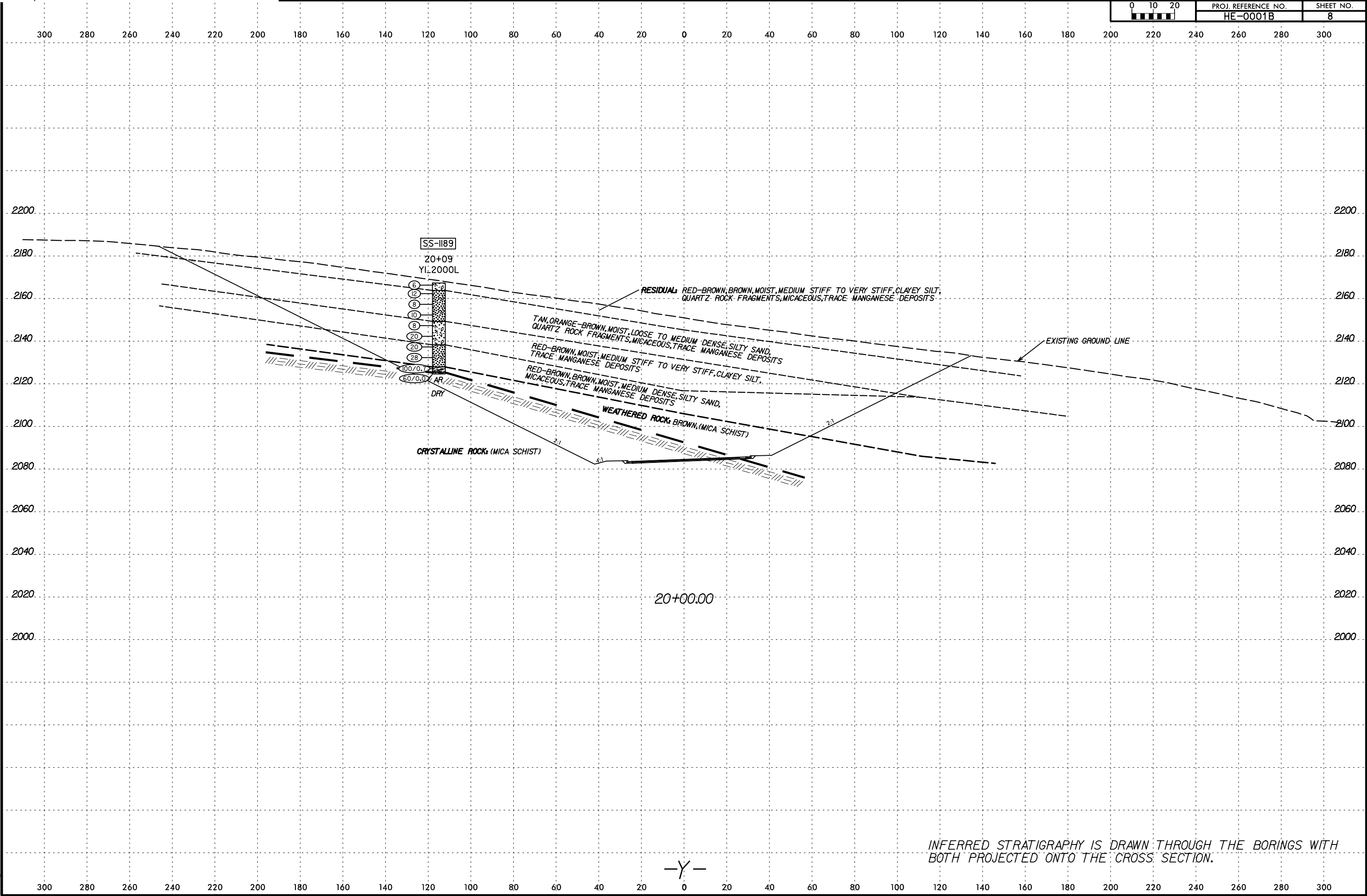
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| HE-0001B            | 7         |



6/23/16

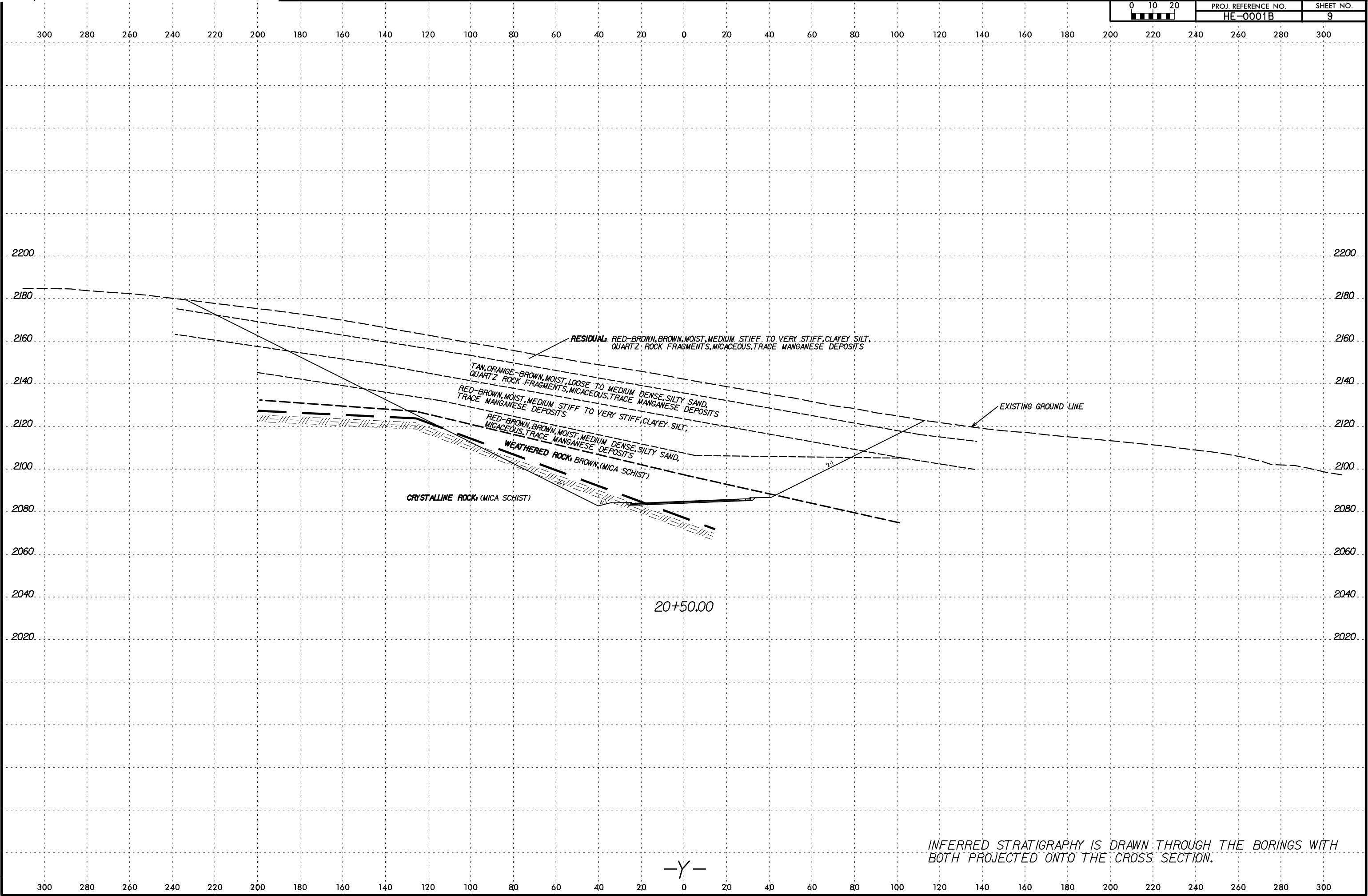


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| HE-0001B            | 8         |



6/23/16

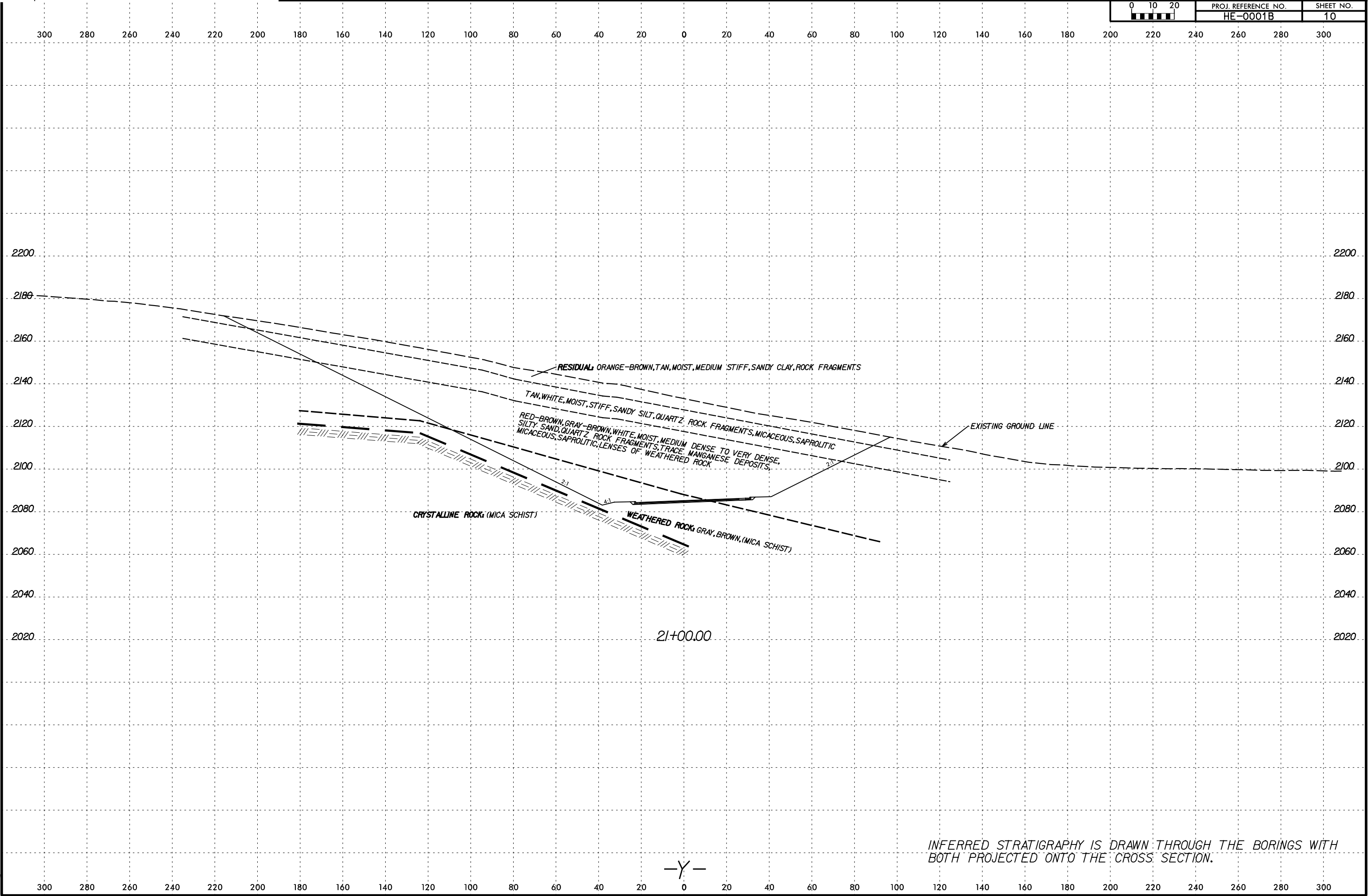
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6/23/16



| PROJ. REFERENCE NO. | SHEET NO. |
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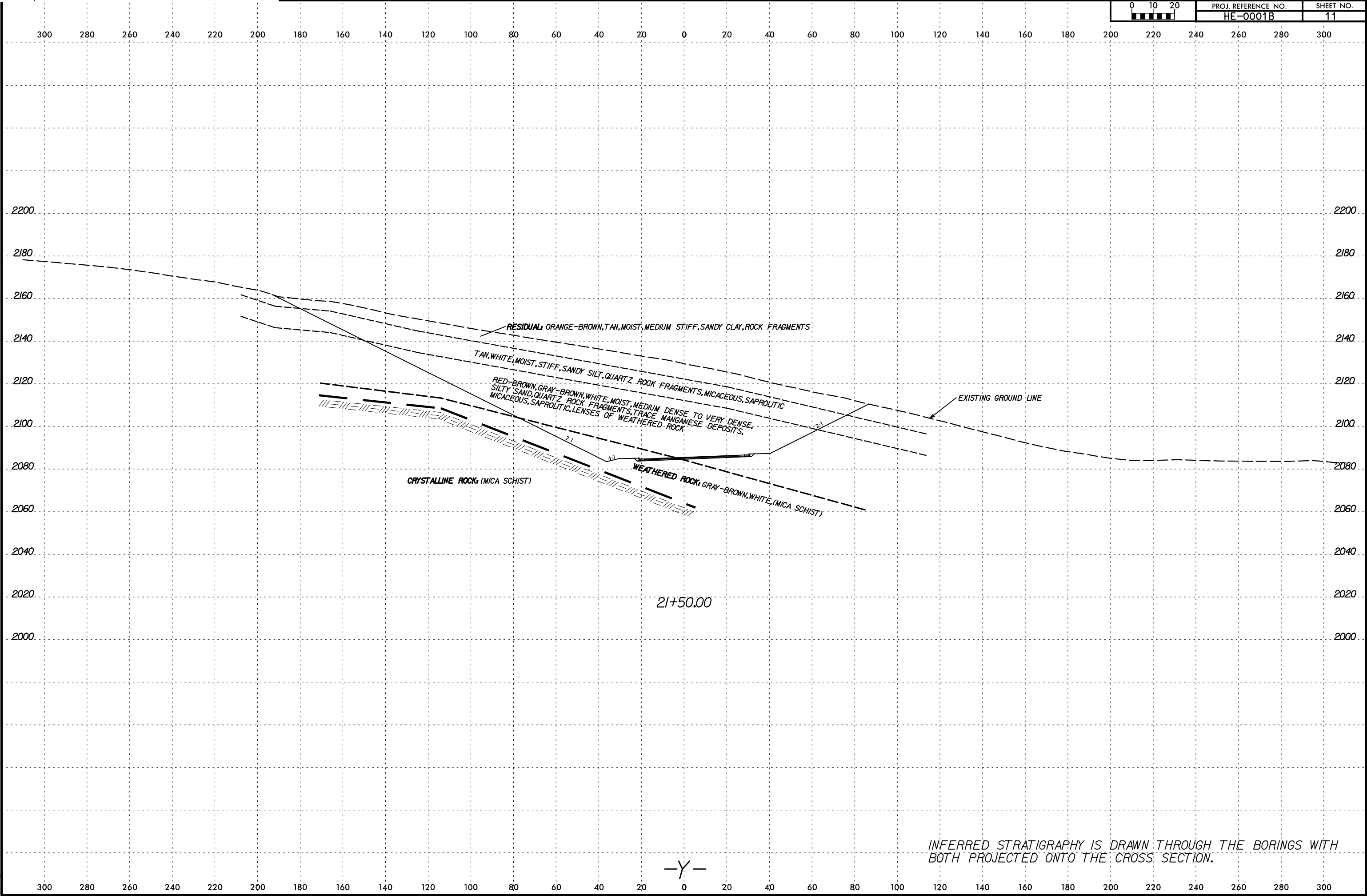


INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

6/23/16

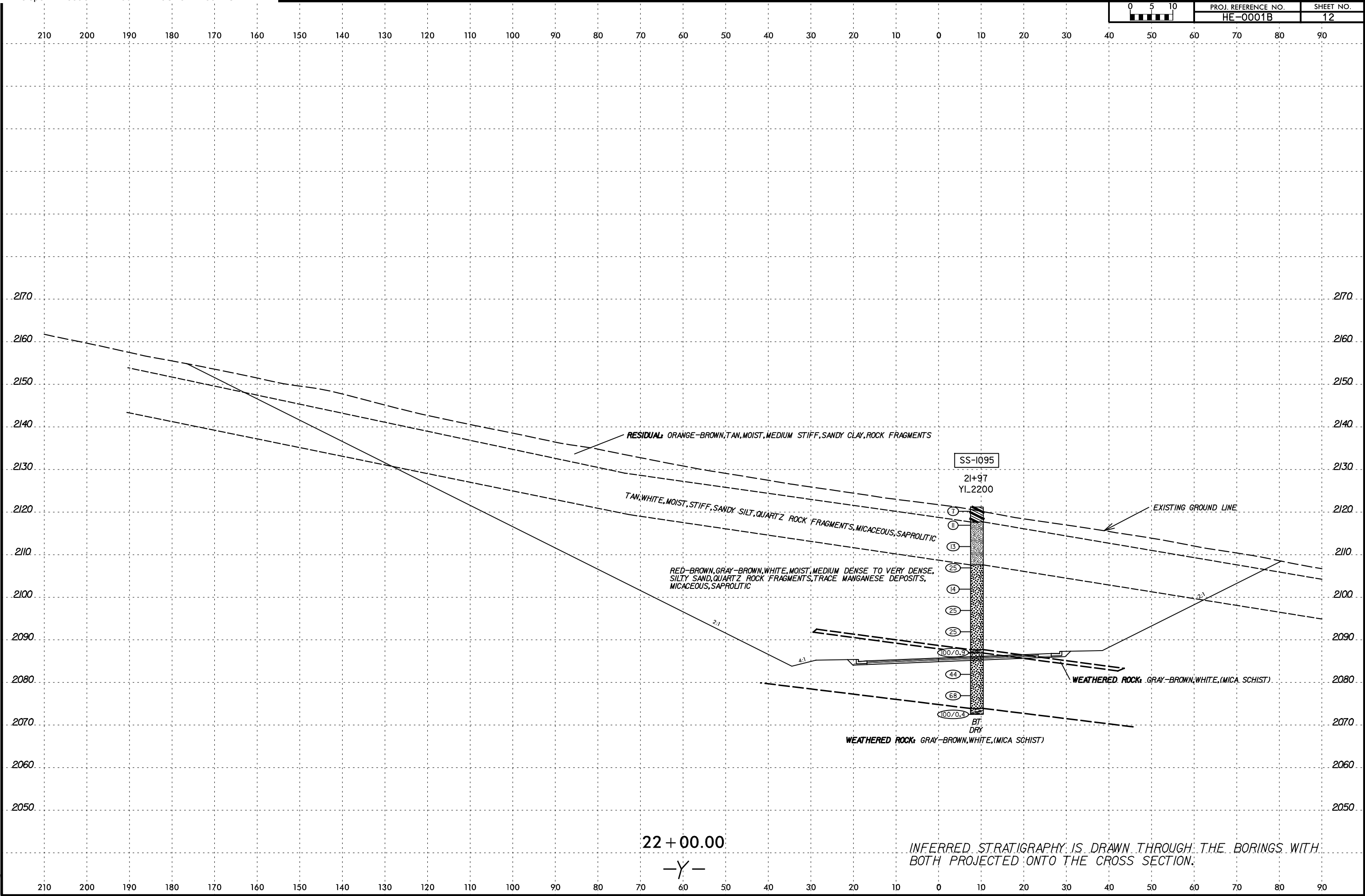


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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

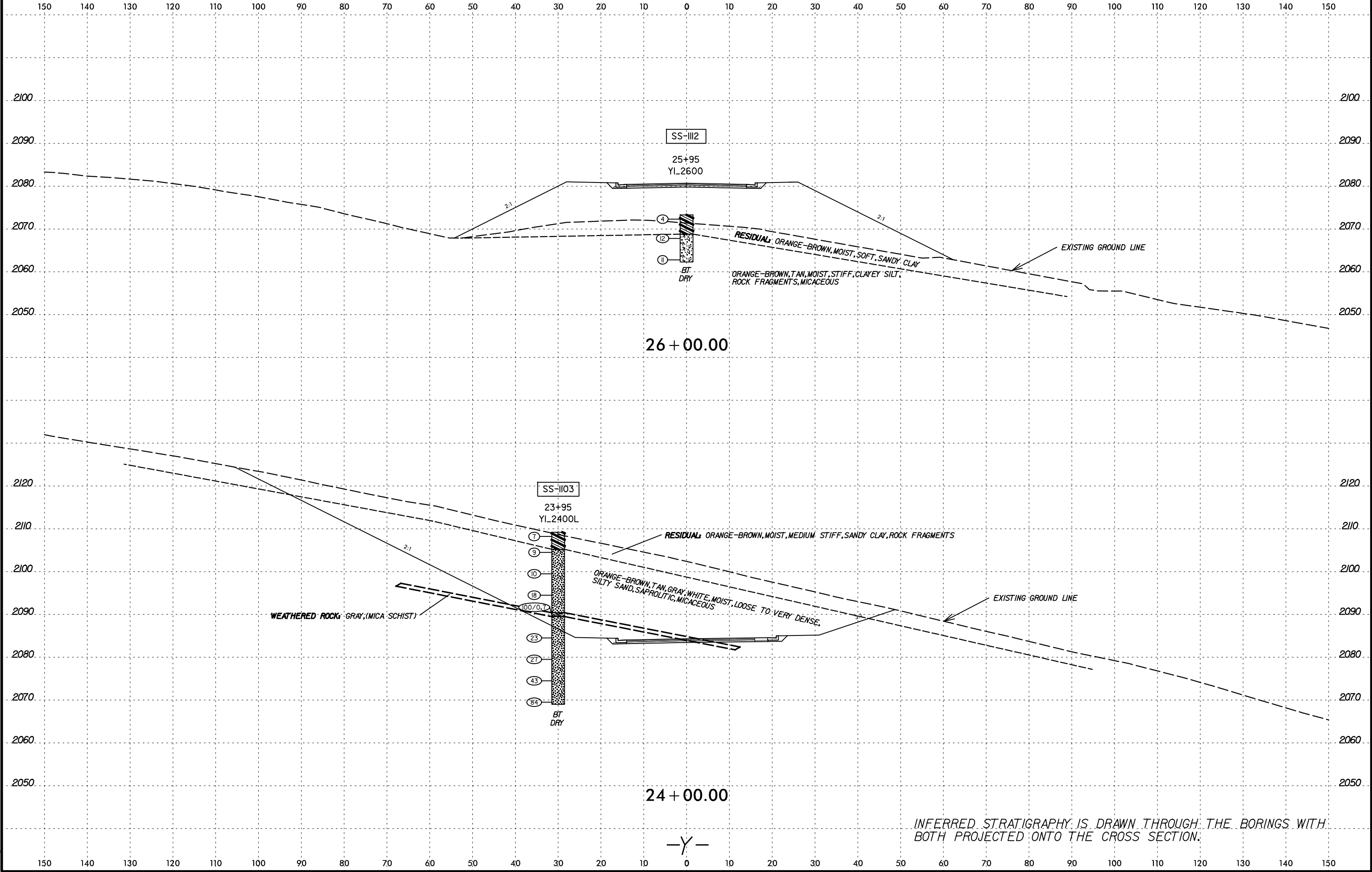
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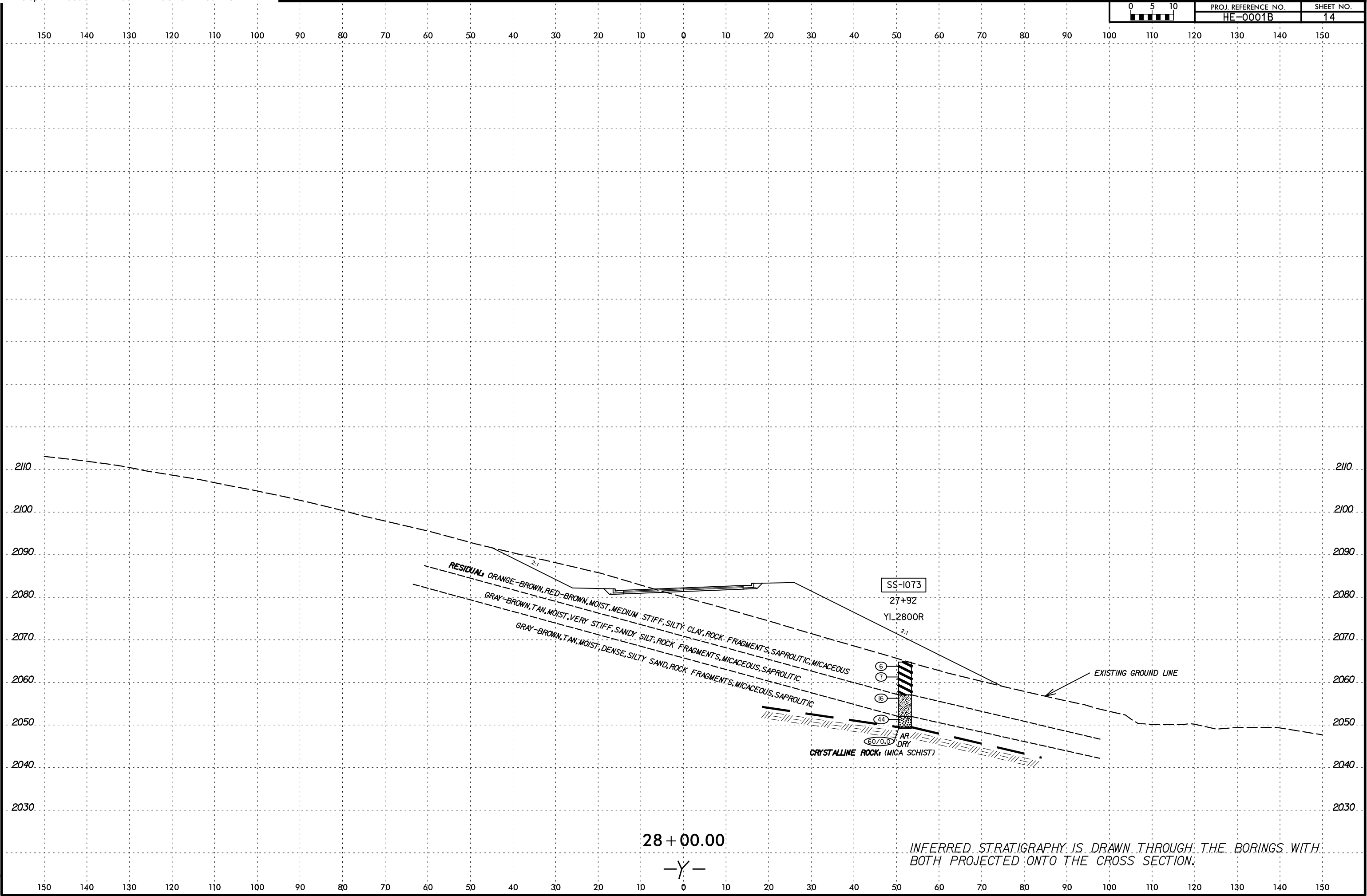
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| HE-0001B            | 13        |



6/23/16



| PROJ. REFERENCE NO. | SHEET NO. |
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| HE-0001B            | 14        |

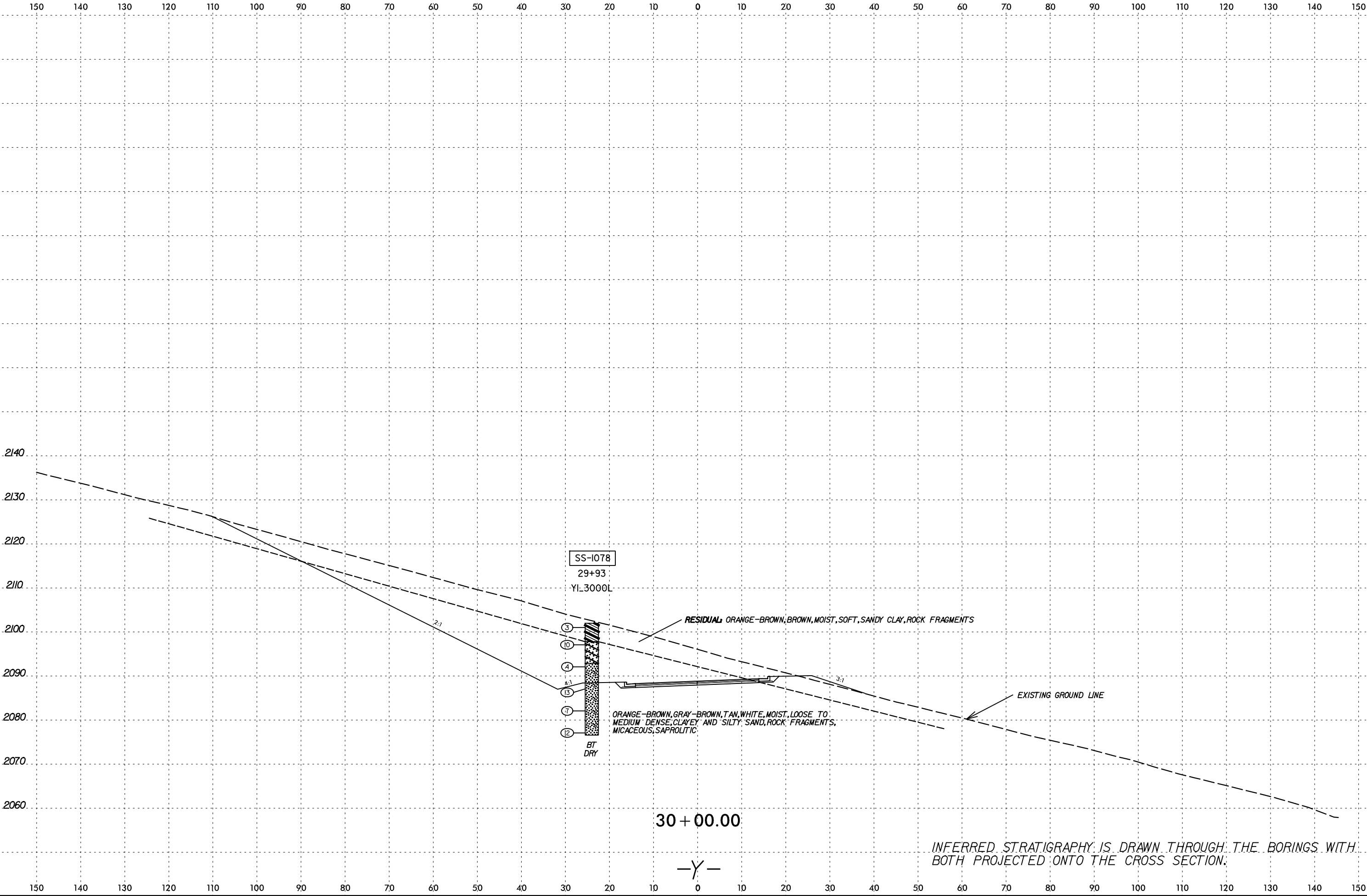


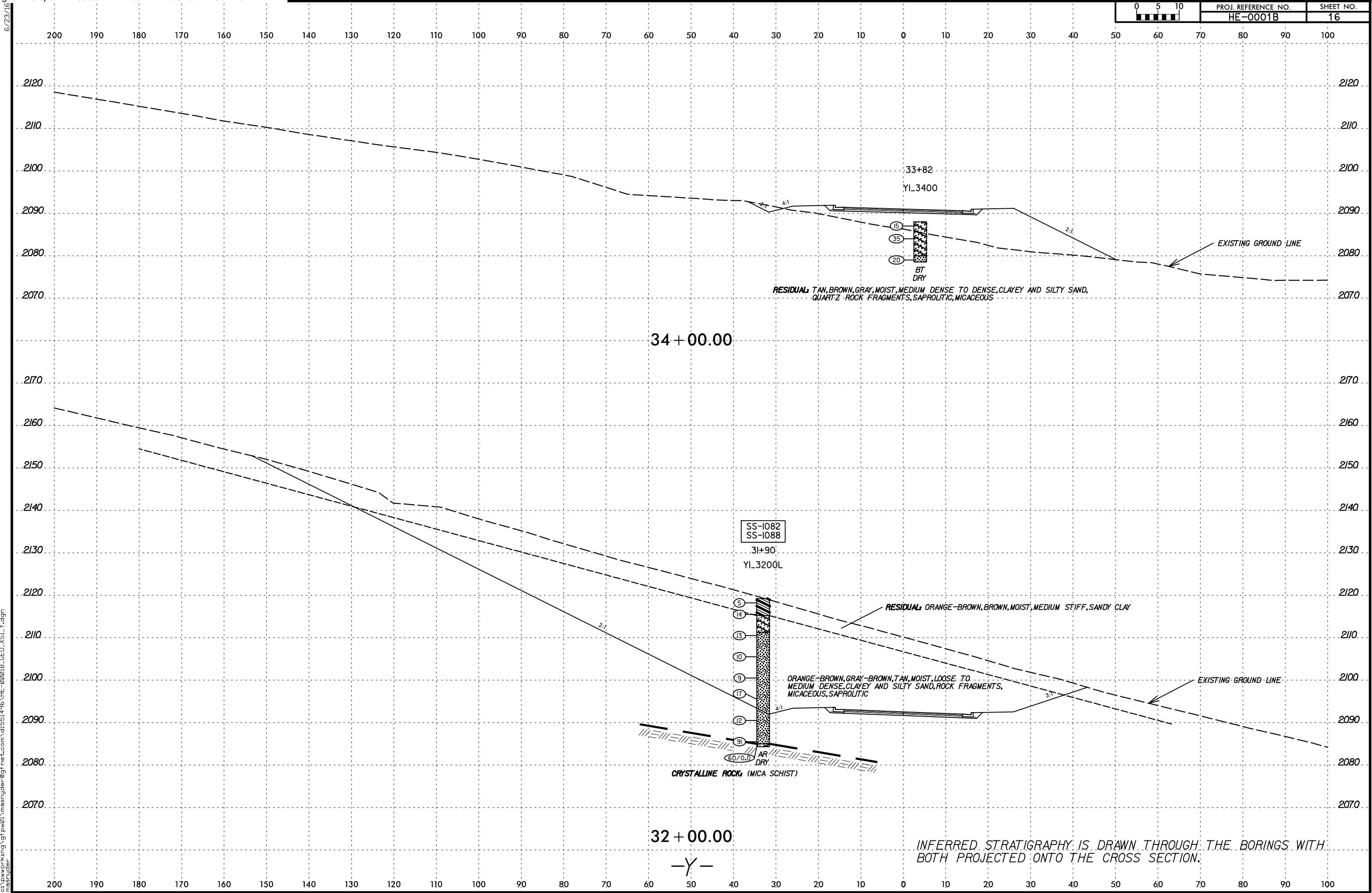
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PROJ. REFERENCE NO.  
HE-0001B

SHEET NO.  
15

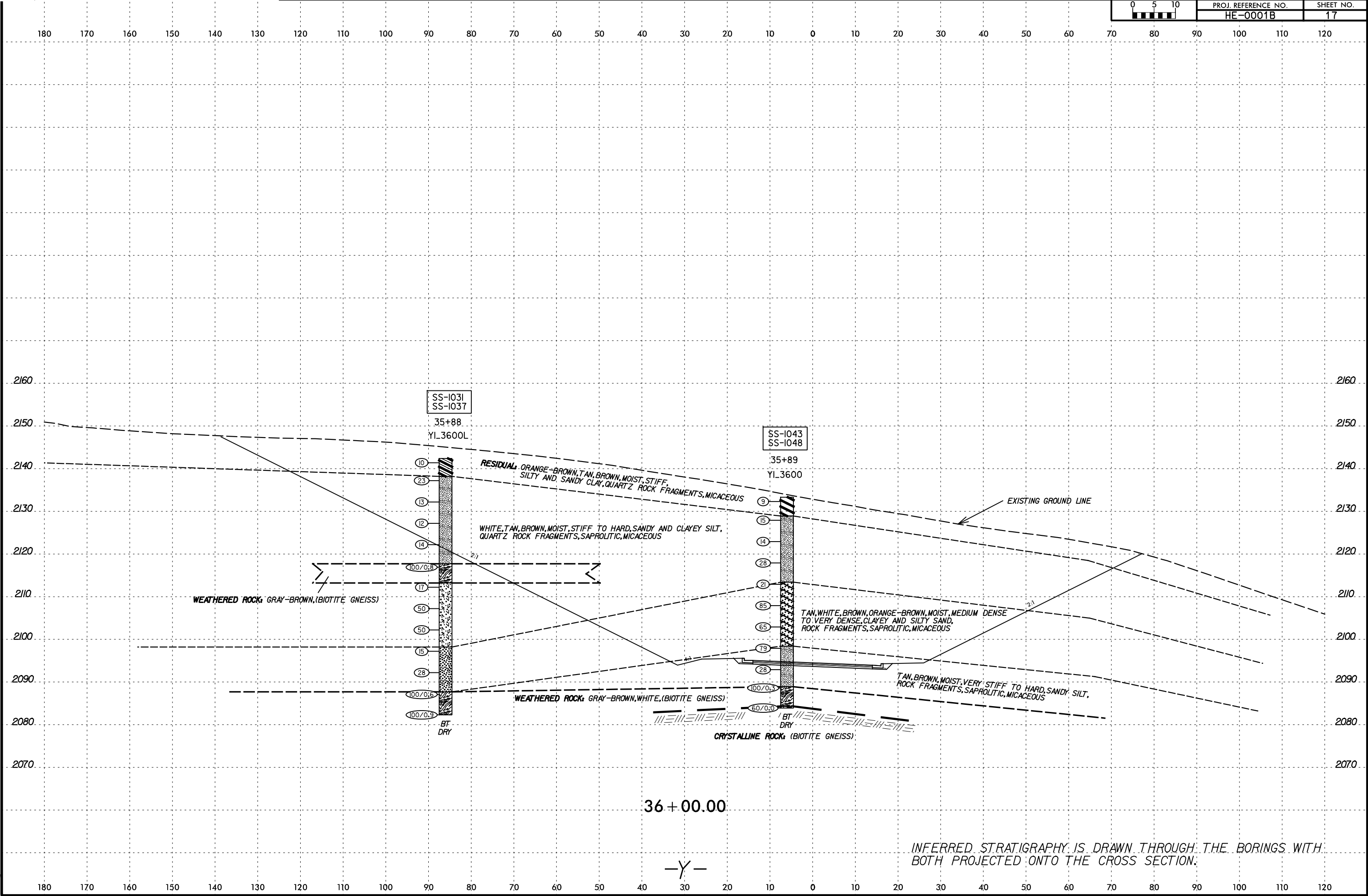




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|---------------------|-----------|
| HE-0001B            | 17        |



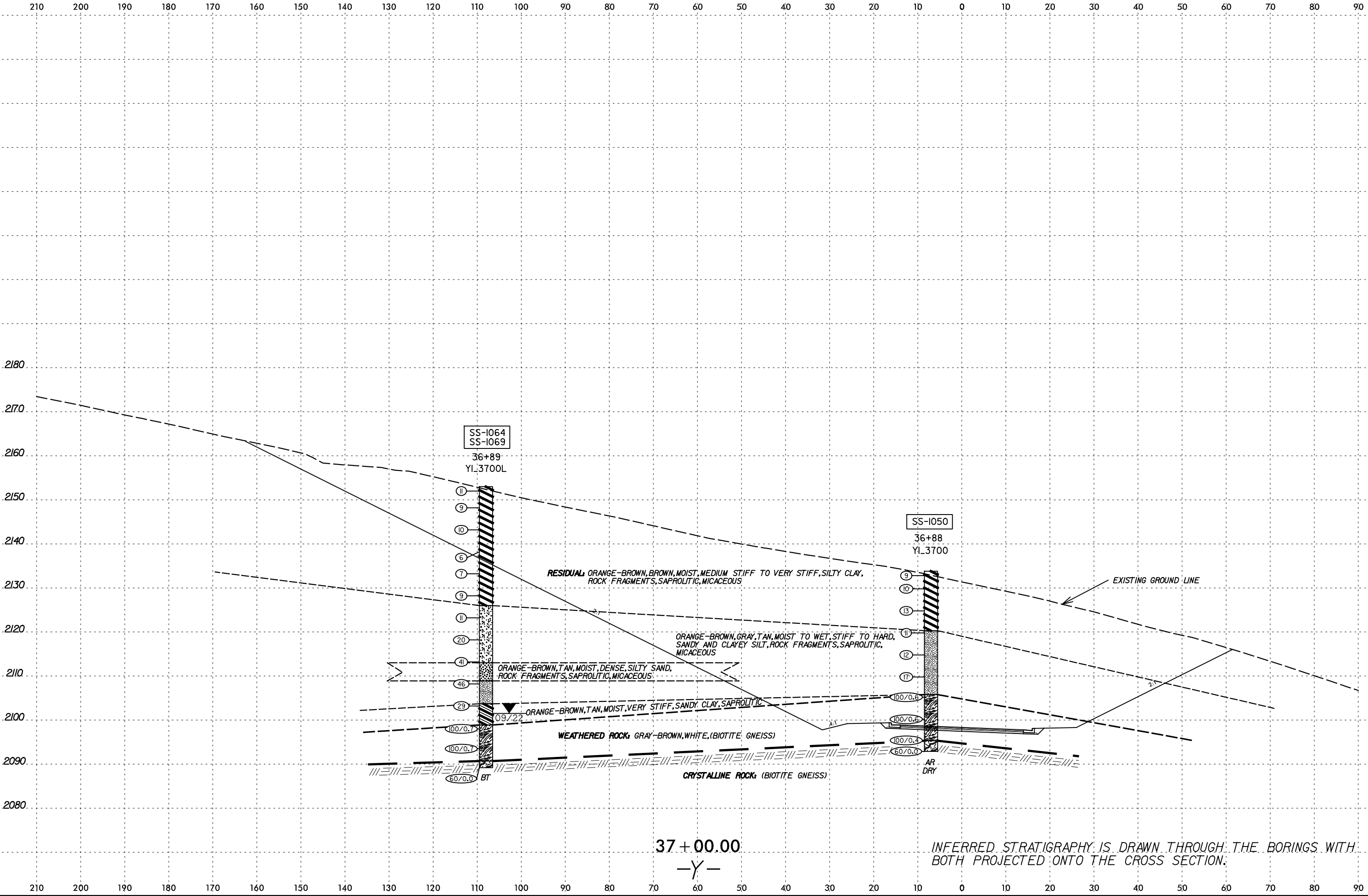
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masnyder

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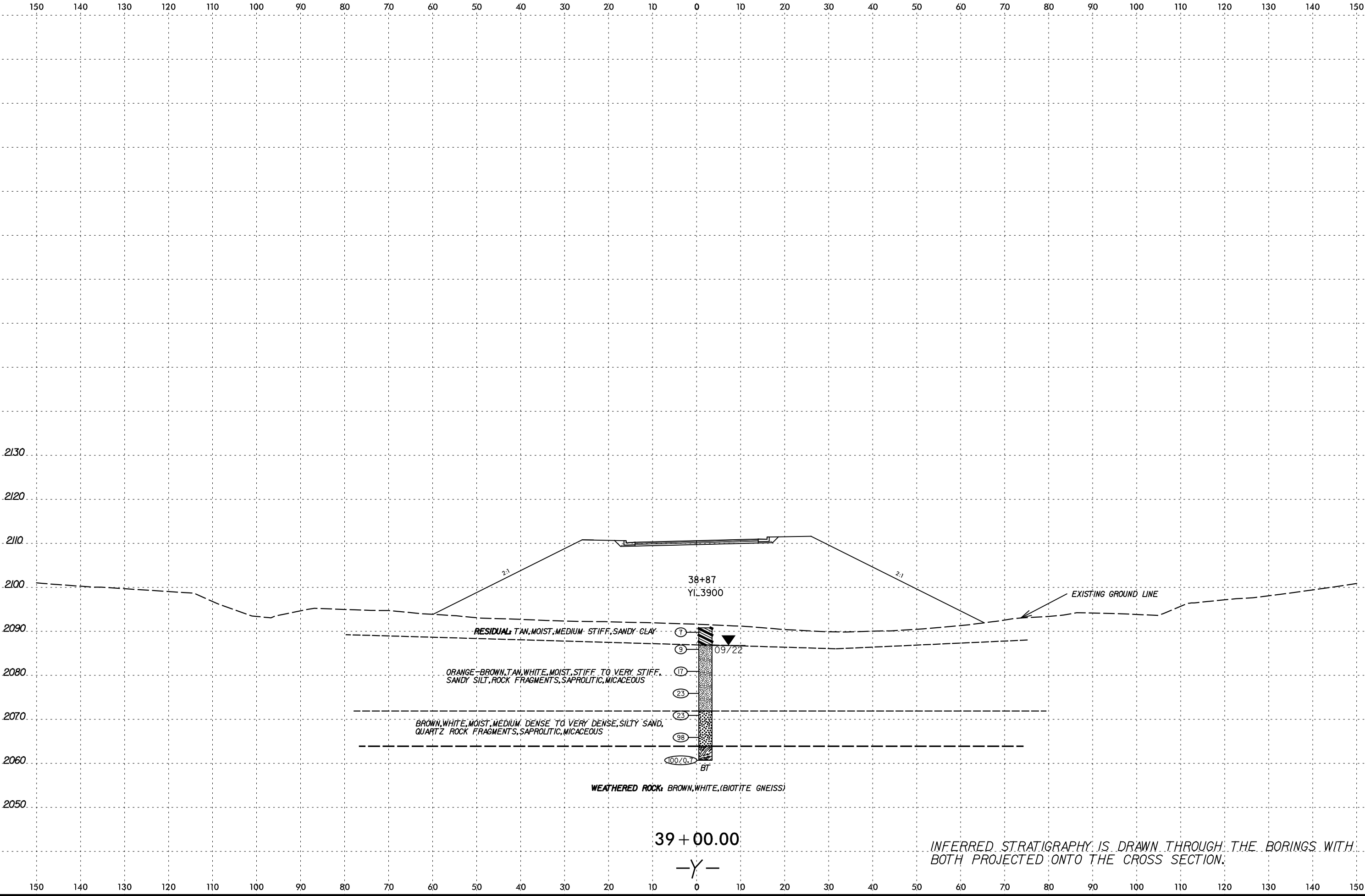
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SHEET NO.  
18



6/23/16

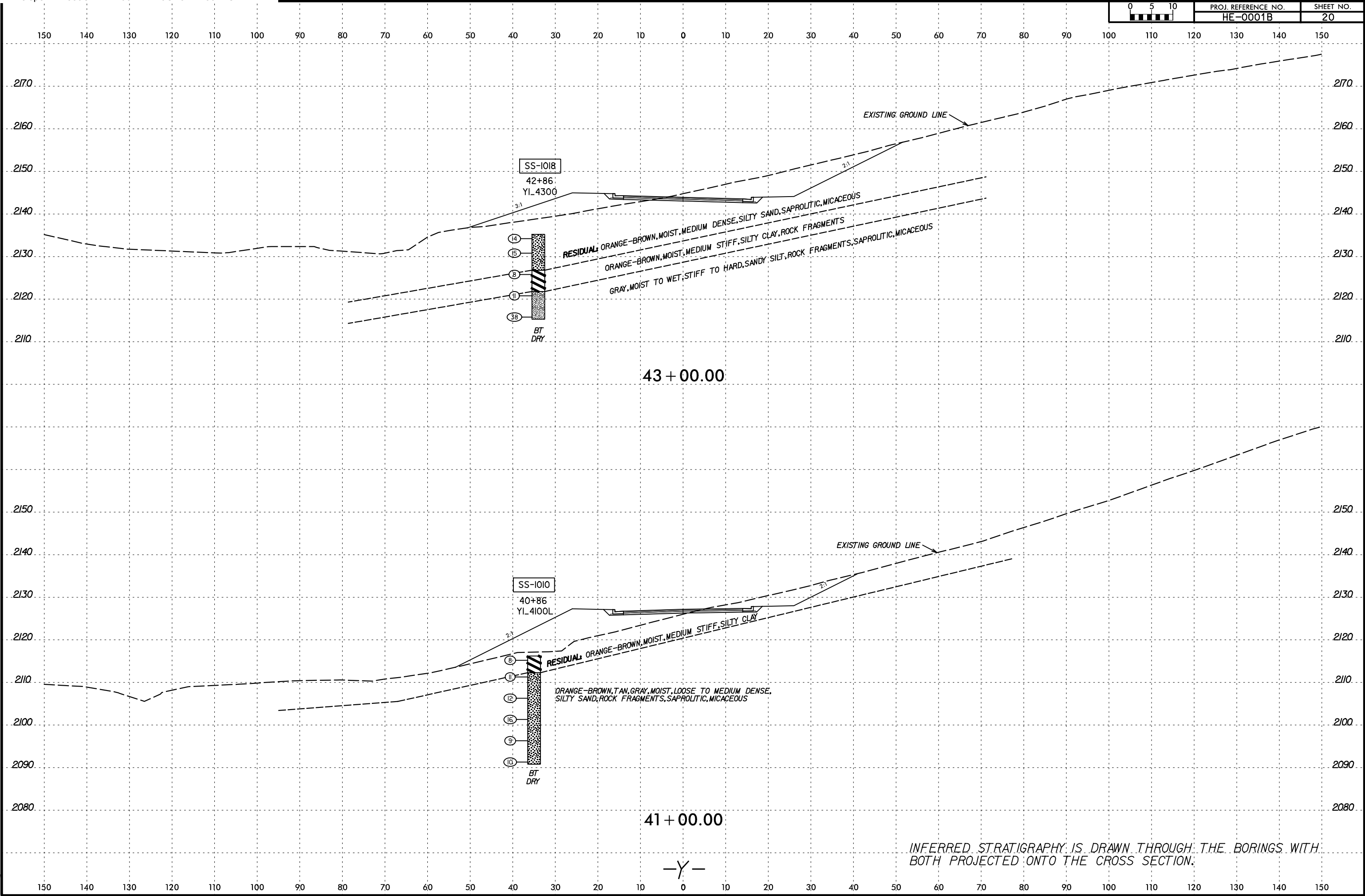
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| HE-0001B            | 19        |



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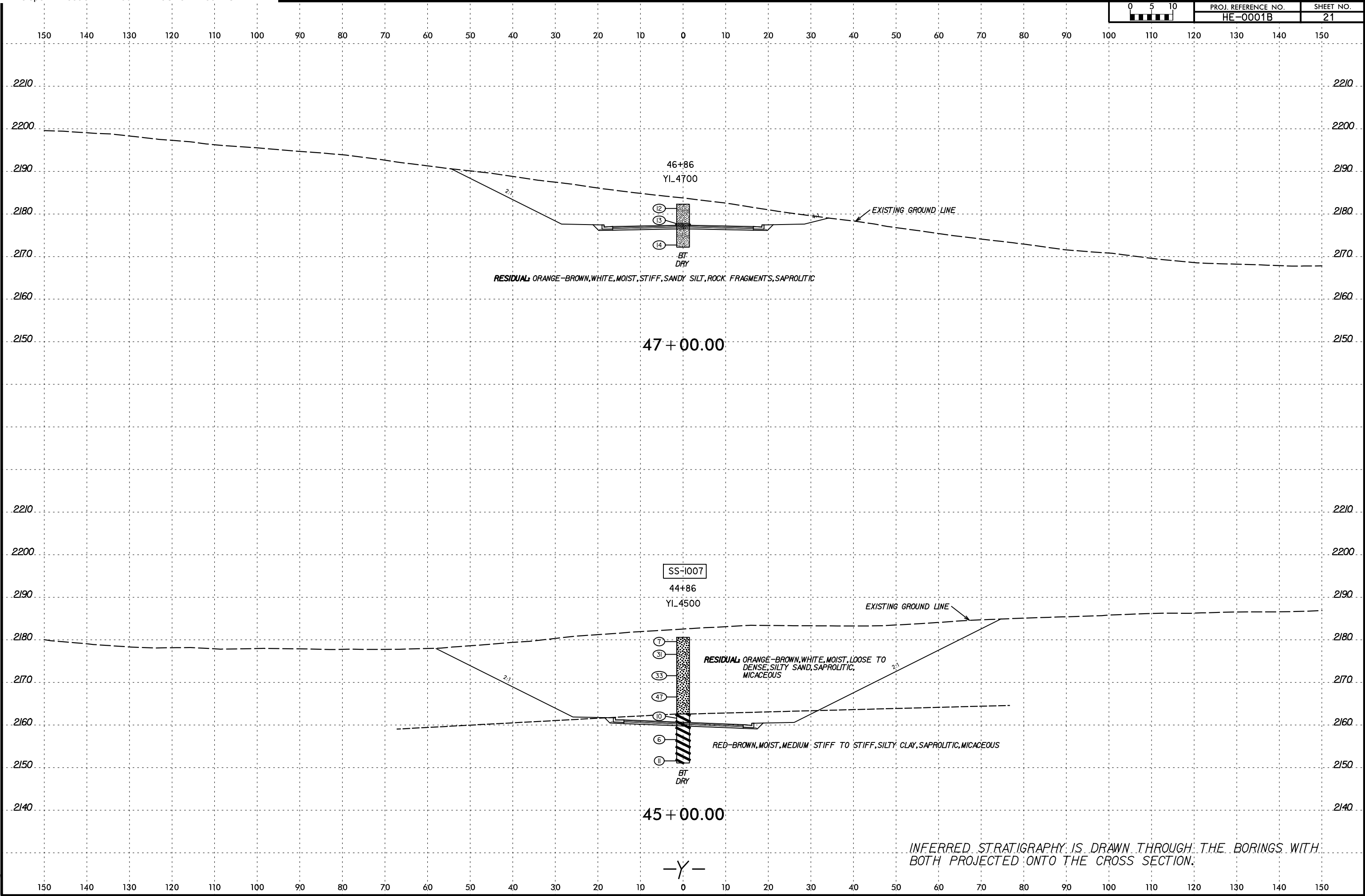
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6/23/16



| PROJ. REFERENCE NO. | SHEET NO. |
|---------------------|-----------|
| HE-0001B            | 21        |



WBS 49742.3  
TIP HE-0001B  
Buncombe County

| SOIL TEST RESULTS |           |         |         |                |               |      |      |             |         |      |      |                 |     |     |            |           |
|-------------------|-----------|---------|---------|----------------|---------------|------|------|-------------|---------|------|------|-----------------|-----|-----|------------|-----------|
| SAMPLE NO.        | ALIGNMENT | STATION | OFFSET  | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT |         |      |      | % PASSING SIEVE |     |     | % MOISTURE | % ORGANIC |
|                   |           |         |         |                |               |      |      | C. SAND     | F. SAND | SILT | CLAY | 10              | 40  | 200 |            |           |
| SS-1180           | -Y-       | 19+00   | 140' LT | 8.5-10.0       | A-5(0)        | 41   | 1    | 5.6         | 66.2    | 26.1 | 2.1  | 99              | 98  | 41  | 13.7       | -         |
| SS-1149           | -Y-       | 19+05   | 124' RT | 18.5-20.0      | A-7-5(6)      | 61   | 12   | 7.9         | 29.0    | 25.8 | 37.3 | 79              | 75  | 54  | 20.6       | -         |
| SS-1116           | -Y-       | 19+34   | 12' RT  | 13.9-15.4      | A-4(0)        | 35   | 0    | 12.1        | 54.7    | 26.3 | 6.9  | 100             | 95  | 45  | 30.5       | -         |
| SS-1189           | -Y-       | 20+09   | 115' LT | 19.0-20.5      | A-5(10)       | 74   | 6    | 7.2         | 28.2    | 53.2 | 11.4 | 100             | 98  | 69  | 53.5       | -         |
| SS-1095           | -Y-       | 21+97   | 9' RT   | 23.3-24.8      | A-2-5(0)      | 41   | 6    | 21.2        | 62.7    | 11.6 | 4.5  | 100             | 91  | 30  | 10.4       | -         |
| SS-1103           | -Y-       | 23+95   | 30' LT  | 8.7-10.2       | A-2-4(0)      | 37   | 0    | 14.8        | 65.1    | 17.2 | 2.9  | 99              | 94  | 31  | 13.2       | -         |
| SS-1112           | -Y-       | 25+95   | CL      | 9.5-11.0       | A-5(0)        | 55   | 4    | 27.0        | 33.5    | 29.9 | 9.6  | 91              | 76  | 42  | 31.7       | -         |
| SS-1073           | -Y-       | 27+92   | 52' RT  | 2.5-4.0        | A-7-5(5)      | 52   | 12   | 10.1        | 49.4    | 11.8 | 28.7 | 97              | 93  | 52  | 20.6       | -         |
| SS-1078           | -Y-       | 29+93   | 24' LT  | 8.9-10.4       | A-2-5(0)      | 47   | 0    | 15.4        | 62.9    | 17.5 | 4.2  | 98              | 91  | 35  | 14.5       | -         |
| SS-1082           | -Y-       | 31+90   | 33' LT  | 0.0-1.5        | A-6(5)        | 39   | 14   | 8.1         | 38.7    | 14.1 | 39.1 | 88              | 85  | 55  | 18.7       | -         |
| SS-1088           | -Y-       | 31+90   | 33' LT  | 27.7-29.2      | A-2-5(0)      | 54   | 1    | 24.4        | 51.9    | 14.9 | 8.8  | 86              | 79  | 29  | 23.6       | -         |
| SS-1043           | -Y-       | 35+89   | 6' LT   | 14.4-15.9      | A-4(1)        | 30   | 4    | 7.6         | 50.8    | 31.7 | 9.9  | 100             | 98  | 57  | 12.8       | -         |
| SS-1048           | -Y-       | 35+89   | 6' LT   | 39.4-40.9      | A-4(0)        | 37   | 2    | 9.3         | 55.6    | 31.3 | 3.8  | 100             | 98  | 52  | 19.9       | -         |
| SS-1031           | -Y-       | 35+88   | 86' LT  | 9.2-10.7       | A-4(0)        | 38   | 2    | 11.4        | 62.6    | 22.2 | 3.8  | 100             | 97  | 45  | 12.4       | -         |
| SS-1037           | -Y-       | 35+88   | 86' LT  | 44.2-45.7      | A-5(1)        | 48   | 5    | 16.8        | 51.3    | 24.0 | 7.9  | 99              | 92  | 45  | 27.0       | -         |
| SS-1050           | -Y-       | 36+88   | 7' LT   | 0.0-1.5        | A-7-5(13)     | 53   | 19   | 10.9        | 27.3    | 19.1 | 42.7 | 99              | 94  | 68  | 20.2       | -         |
| SS-1064           | -Y-       | 36+89   | 108' LT | 23.8-25.3      | A-7-5(3)      | 53   | 12   | 21.6        | 37.9    | 24.2 | 16.3 | 88              | 80  | 44  | 31.7       | -         |
| SS-1069           | -Y-       | 36+89   | 108' LT | 48.8-50.3      | A-4(1)        | 30   | 4    | 14.6        | 40.8    | 32.7 | 11.9 | 99              | 94  | 55  | 20.1       | -         |
| SS-1010           | -Y-       | 40+86   | 35' LT  | 0.0-1.5        | A-7-6(12)     | 47   | 21   | 9.9         | 29.6    | 20.3 | 40.2 | 96              | 93  | 63  | 22.6       | -         |
| SS-1018           | -Y-       | 42+86   | 34' LT  | 8.4-9.9        | A-7-5(15)     | 65   | 26   | 11.0        | 33.3    | 15.2 | 40.5 | 92              | 86  | 60  | 32.6       | -         |
| SS-1007           | -Y-       | 44+86   | CL      | 18.0-19.5      | A-7-5(21)     | 66   | 16   | 1.1         | 22.8    | 47.2 | 28.9 | 100             | 100 | 87  | 47.2       | -         |