REFERENCE: N/A

PROJECT: 50388

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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LINE	STATION	PLAN
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-Y-	10+34.00 - 13+88.74	4

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LINE	STATION	SHEETS
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APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY TEST RESULTS (LKN)	21-22
B	ROCK TEST RESULTS (F&ME)	23-24
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *CLEVELAND*

PROJECT DESCRIPTION *GREENWAY ALONG SR 1004 (CASAR-LAWNDALE RD) BETWEEN GRIGG ST AND MAPLE CREEK*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	50388.1.1	1	33

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 PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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

CG2 EXPLORATION

P. TOMASIC, G.I.T.

INVESTIGATED BY *CG2, PLLC*

DRAWN BY *M. BREWER, PE*

CHECKED BY *R. KRAL, PE*

SUBMITTED BY *CG2, PLLC*

DATE *SEPTEMBER 2024*

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DocuSigned by:
D. Matthew Brewer 9/11/2024
386129C0A4C1462...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550X
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] DIEDRICH D50
- [X] MOBILE B29

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] HAND AUGER
- [X] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
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.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
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.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
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.
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.
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*
VERY 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.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
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.
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 GROVED 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.
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.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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.

TERMS AND DEFINITIONS

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 DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - 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.

BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:

ROADWAY DESIGN AND SURVEY INFORMATION DATED 10/03/23 PROVIDED BY TGS ENGINEERS.

DATE: 8-15-14

See Sheet 1A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

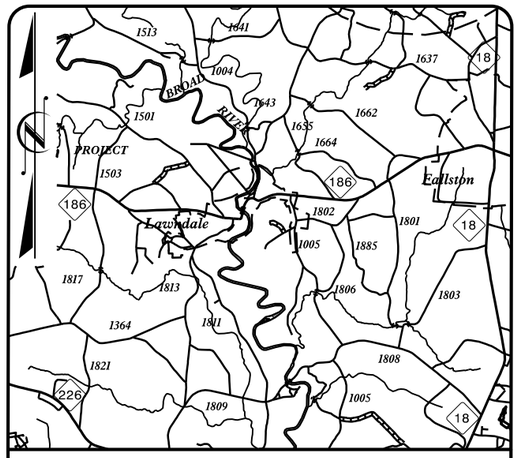
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	50388	3	33

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
50388.1.1		

CLEVELAND COUNTY

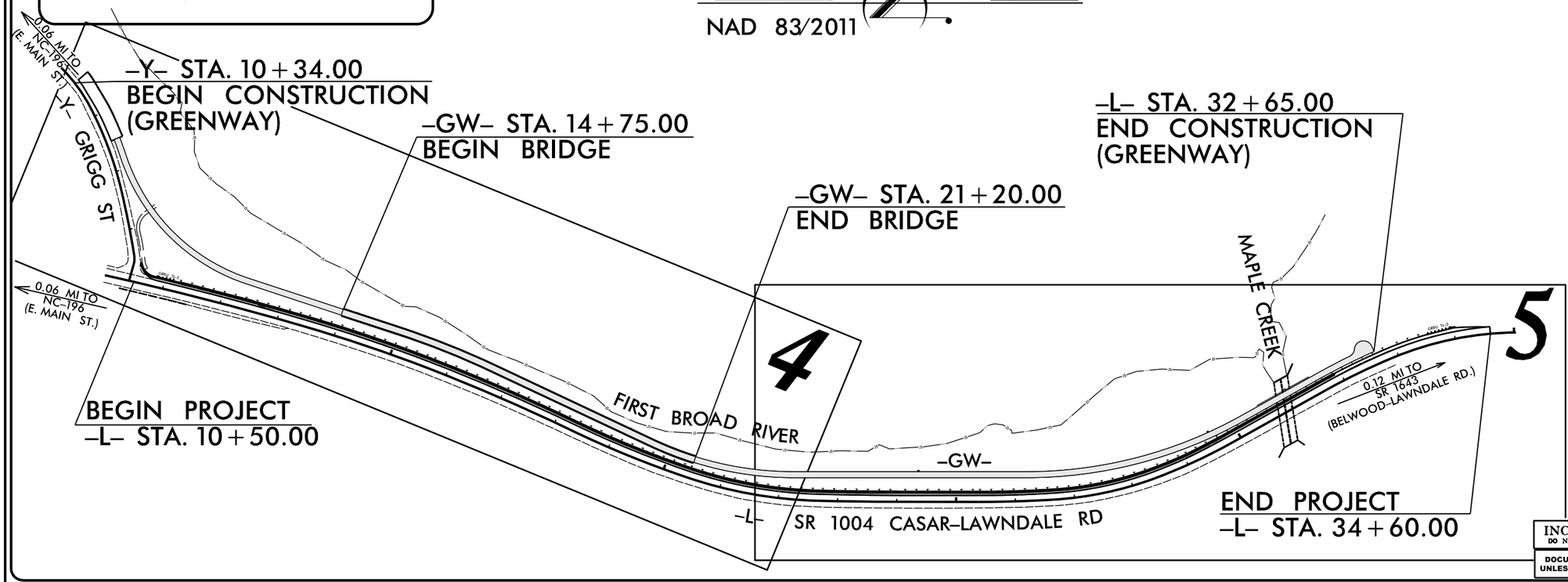
LOCATION: GREENWAY ALONG SR 1004 (CASAR–LAWNDALE RD) BETWEEN GRIGG ST AND MAPLE CREEK

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



VICINITY MAP

NAD 83/2011



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT:

CONTRACT:

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2024 = 3510
ADT 2044 = 4280
V = 40 MPH

FUNC CLASS = MAJOR COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT –L–	=	0.456 MILES
TOTAL LENGTH –L–	=	0.456 MILES
LENGTH OF ROADWAY GREENWAY	=	0.343 MILES
LENGTH OF STRUCTURE GREENWAY	=	0.122 MILES
TOTAL LENGTH GREENWAY	=	0.465 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

PROJECT ENGINEER

LETTING DATE:

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

09/08/99

03-SEP-2024 15:31
C:\Users\MattBrewer\OneDrive - Carolinas GeotechnicalGroup, PLLC\Projects\0202 - Stagecoach Multi-use Trail_TGS\CADD_GEOTECH\PlanProf\SCG_Rdy_tsh.dgn
TylerWenner AT ALIENWARE2

9/3/2024

WBS ELEMENT: 50388.1.1
T.I.P. NO.: STAGECOACH
I.D. NO.: N/A
COUNTY: Cleveland
DESCRIPTION: Greenway along SR 1004 (Casar-Lawndale Rd) between Grigg St and Maple Creek
SUBJECT: Geotechnical Roadway Inventory Report

PROJECT DESCRIPTION

Based on a review of the plans provided to us by TGS Engineers, we understand this project will construct a ten-foot wide multi-use path, designated as -GW-, west of and adjacent to SR 1004 (-L-, Casar-Lawndale Road) in Lawndale, Cleveland County, North Carolina. This project is approximately 0.416 miles in length, measured along -GW- from Station 10+50 to 34+60. The multi-use path will include a gravel parking lot near Station 10+50 and a pedestrian bridge from -GW- Station 14+75 to 21+20. Widening along the left side of -L- will be performed as part of the construction of the greenway.

The provided roadway plans generally indicate cut on the order of up to 5 feet and fill on the order of 5 to 20 feet will be required to achieve proposed grades along -L- and -GW-. Slopes oriented at steeper than 2:1 (horizontal:vertical) geometry are planned from -L- Station 16+25 to 20+25 and -L- Station 30+25 to 31+75. The remaining slopes are planned to be oriented at a 2:1, or flatter.

The following alignments are included as part of this investigation:

Alignment	Stations
-L- (includes -GW-)	10+50 to 34+60
-Y-	10+34 to 13+88

The following structures are included as part of this investigation:

Structure	Stations
New Bridge for Pedestrian Concrete Walkway on -GW-	14+75 to 21+20

A brief summary of the individual alignments is used to describe the change in grades in a more descriptive manner across the entire project. The summary is listed below:

-L- Alignment

This alignment includes improvements to the existing SR 1004 (Casar-Lawndale Road). -L- contains relatively flat grades that slope downward to the First Broad River on the western side of the road. The improvements along -L- include widening to provide curb and gutter. Most of the construction along -L- will consist of at grade improvements. This alignment also contains an existing culvert over Maple Creek that drains into the First Broad River in the vicinity of station 31+00. A greenway trail and ancillary improvements are planned along the entire length of -L-, however, the greenway trail is discussed further below.

-GW- Alignment

The -GW- alignment contains most of the earthwork on the project and the construction of a greenway trail along the left side of the -L- alignment. For the most part, this alignment is separated from the existing roadway except when crossing the existing Maple Creek culvert at approximately -L- Station 30+50. From the beginning of this section of the project, deep fills are planned until approximately 14+50. Following this, sliver cut/fill is planned until approximately 20+25. Fill is proposed from 20+25 to 21+75 and from 28+00 to the end of the project. Cut/fill areas are proposed from 21+75 to 28+00. A concrete pedestrian walkway will be constructed adjacent to the river between Station 14+75 and 21+20.

The geotechnical field investigation was conducted by CG2 during October 2023. Our drill crews were used to drill, sample, and log 18 roadway and structure borings on this project. The drill rigs utilized were a track-mounted Diedrich D-50 and a truck-mounted Mobile B-29 equipped with automatic hammers. Standard Penetration Tests were performed at selected depths for the 18 borings. Hand auger borings with rod-soundings were performed at 8 locations due access conflicts. Representative soil samples were collected for visual-manual classification in the field and selected samples were submitted for laboratory analysis by an approved NCDOT M&T testing facility.

Due to site constraints select areas were inaccessible to drilling equipment where the proposed pedestrian bridge will be constructed. As such, CG2 performed a seismic refraction investigation at various locations along the bridge footprint. We performed a total of 4 seismic refraction lines utilizing a Geometrics Geode Seismograph with up to 24 vertical geophones with a 16-pound sledgehammer as an energy source. The purpose of the seismic refraction investigation was to assist in estimating the top of weathered rock and/or bedrock which may affect the proposed construction. CG2 interpreted the top of weathered rock based on a compressional wave velocity (Vp) of 4,500 ft/sec and the top of bedrock based on a Vp of 7,500 ft/sec.

PHYSIOGRAPHY AND GEOLOGY

The project corridor is located within the Piedmont Physiographic Province of North Carolina. The Piedmont Physiographic Province generally consists of hills and ridges which are intertwined with an established system of draws, streams, and valleys. According to the 1985 Geologic Map of North Carolina, the bedrock under the site consists of Biotite Gneiss and Schist. Crystalline rock and weathered rock encountered during this investigation consisted of Schist.

The project footprint is in an area that contains near surface soils with recent alluvial deposits from the First Broad River overlying residual soils. These alluvial deposits were encountered immediately adjacent to existing river. The sandy nature of these soils has likely contributed to several areas with observed surficial slope stability issues. One larger area was observed in the vicinity of the culvert at Maple Creek.

Residual soils are derived from the continued in-situ chemical and physical weathering of the rocks in the area. Residual soils are typically finer grained and have higher clay content near the surface because of the

advanced weathering. Similarly, the soils typically become coarser grained with increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance and fabric of the parent rock. The boundary between soil and rock is not always sharply defined. A transitional zone termed "weathered rock" is normally found overlying the parent bedrock.

SOIL PROPERTIES

Approximately 0.3 to 0.4 feet of organic topsoil was encountered at the ground surface in 11 of the 26 test locations. An asphalt pavement layer of approximately 0.7 to 1.0 foot was encountered along SR-1004 (Casar-Lawndale Road) at Borings BR-1, BR-3, BR-4, BR-5, and BR-6.

Roadway embankment materials were encountered underlying the surficial materials or at the ground surface in test locations BR-1 through BR-7, GW-1 through GW-8, GW-10, GW-11, and RS-1 through RS-7. Roadway embankment (RE) soils are similar in nature to residual soils and may be derived from nearby sources. The fine-grained RE materials generally consist of very soft to very stiff, fine to coarse sandy, silty clay (A-6), fine sandy, clayey silt (A-5), and fine to coarse sandy silt (A-4). The coarse-grained RE materials generally consist of loose to medium dense silty fine to coarse sand (A-2-4). The RE materials contain varying amounts of mica, organics, boulders, gravel, asphalt fragments, and quartz fragments.

Artificial Fill soils were encountered in Boring GW-1. The artificial fill soils consist of medium stiff clayey fine sandy silt (A-4) and contain trace amounts of organics, gravel, and asphalt fragments.

Alluvial soils were encountered in test locations GW-1, GW-2, GW-9, GW-10, and GW-12. The fine-grained alluvial soils consist of very soft to medium stiff fine to coarse sandy clay (A-6), fine sandy, clayey silt (A-5), and fine sandy silt (A-4). The coarse-grained soils consist of very loose to loose silty fine sand (A-2-4), clayey fine sand (A-2-6), and fine to coarse sand (A-3). The alluvial soils contain varying amounts of mica, quartz fragments, organics, rootlets, and gravel.

Residual soils are derived from the weathering of underlying bedrock in the area. The fine-grained residual soils consist of soft to hard silt (A-5), fine to coarse sandy silt (A-4), and fine sandy clay (A-6). The coarse-grained materials consist of loose to dense silty fine to coarse sand (A-2-4). The residual soils contain varying amounts of gravel-sized rock fragments, mica, and quartz fragments.

Weathered rock was encountered in Borings BR-1, BR-2, BR-3, GW-4, and GW-11. The weathered rock, classified as Schist, was encountered at beginning depths ranging from approximately 13.5 to 43.5 feet below the existing grades.

Crystalline rock was encountered at Borings BR-1 through BR-7, GW-5, GW-10, GW-11, and GW-12. The crystalline rock, classified as Schist, was encountered at beginning depths ranging from approximately 6.0 to 52.4 feet below the existing grades.

GROUNDWATER

Groundwater measurements were attempted during our investigation in October 2023. Groundwater measurements were attempted at the completion of drilling in each boring, except Boring BR-7 due to the addition of drilling fluid. At the completion of drilling groundwater was encountered in Borings BR-1, BR-2, BR-6, GW-1, GW-2, and GW-12 at depths ranging from 9.0 to 26.0 feet below existing grades. Subsequent groundwater measurements were attempted after at least 24 hours following the completion of drilling each boring, except for Borings BR-1 and BR-3 through BR-6, which were backfilled upon completion of drilling due to proximity to active roadways. At the time of subsequent measurements, groundwater was encountered in Borings BR-2, BR-7, GW-1, and GW-2 at depths ranging from 8.1 to 21.5 feet below existing grades. The soil encountered in the borings were generally described as moist to wet.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

The following locations encountered very soft to soft or very loose to loose soils which have the potential to cause embankment stability and/or long-term settlement problems:

Alignment	Stations	Offsets (ft)
-L-	10+99 to 16+04	9 LT to 86 LT
-L-	18+01 to 18+99	10 LT
-L-	20+44 to 24+46	39 LT to 43 LT
-L-	28+99 to 32+45	13 LT to 89 LT

Highly Plastic soils are defined as having a PI greater than 25. Highly plastic soils were not encountered on the project.

Shallow groundwater was not encountered within 6 feet of the proposed subgrade in the borings performed on this project.

Artificial Fill soils were observed on the project at the following locations:

Alignment	Stations	Offsets (ft)
-L-	10+99	86 LT

Artificial fill encountered at these locations generally appears to consist of local soils placed to level out low lying areas. These soils do not appear to be a concern.

GEOTECHNICAL TESTING

Eight (8) samples were selected for laboratory testing including Atterberg limits, grain size distribution analysis with hydrometer, and natural moisture content. Three (3) rock core samples were selected for unconfined compressive strength testing. Laboratory test results are included in this report.

Sincerely,
Carolinas Geotechnical Group, PLLC

Signed by:
Robert E. Kral
8AD703B2A8484F4...

Robert E. Kral, PE
Senior Project Engineer

DocuSigned by:
D. Matthew Brewer
386129C0A4C1462...

D. Matthew Brewer, PE
Senior Project Engineer

-Y- CURVE DATA

PI Sta 10+41.32	PI Sta 11+57.21	PI Sta 12+88.05	PI Sta 13+52.42
Δ = 17° 05' 25.9" (RT)	Δ = 14° 16' 59.6" (RT)	Δ = 4° 18' 36.5" (RT)	Δ = 24° 59' 28.7" (RT)
D = 20° 50' 05.4"	D = 9° 32' 57.5"	D = 3° 49' 11.0"	D = 159° 09' 17.8"
L = 82.03'	L = 149.57'	L = 112.84'	L = 15.70'
T = 41.32'	T = 75.18'	T = 56.45'	T = 7.98'
R = 275.00'	R = 600.00'	R = 1,500.00'	R = 36.00'

-L- CURVE DATA

PI Sta 11+72.44	PI Sta 14+56.73	PI Sta 16+98.43	PI Sta 19+34.59	PI Sta 21+54.78
Δ = 3° 43' 37.5" (RT)	Δ = 4° 54' 12.5" (RT)	Δ = 4° 32' 55.5" (RT)	Δ = 6° 54' 03.6" (LT)	Δ = 17° 17' 22.9" (LT)
D = 1° 04' 51.8"	D = 2° 11' 27.8"	D = 1° 45' 07.8"	D = 3° 14' 46.4"	D = 7° 38' 22.0"
L = 344.77'	L = 223.80'	L = 259.61'	L = 212.59'	L = 226.32'
T = 172.44'	T = 111.97'	T = 129.87'	T = 106.42'	T = 114.03'
R = 5,300.00'	R = 2,615.00'	R = 3,270.00'	R = 1,765.00'	R = 750.00'

-GW- CURVE DATA

PI Sta 11+66.35	PI Sta 16+61.60	PI Sta 21+68.67
Δ = 53° 30' 13.8" (LT)	Δ = 7° 01' 31.3" (RT)	Δ = 25° 11' 42.7" (LT)
D = 17° 21' 44.5"	D = 4° 05' 33.2"	D = 10° 08' 27.0"
L = 308.16'	L = 171.66'	L = 248.45'
T = 166.35'	T = 85.94'	T = 126.27'
R = 330.00'	R = 1,400.00'	R = 565.00'

NAD 83/2001

PROJECT REFERENCE NO.	SHEET NO.
STAGECOACH GREENWAY	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST., STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

-Y- PC 10+00.00

-Y- STA 10+34.00
BEGIN CONSTRUCTION

PROP. GRAVEL PARKING LOT

-GW- PC 10+00.00

10' MULTI-USE PATH

-Y- STA 11+49.03
BEGIN MULTI-USE PATH

WOODEN OVERLOOK STRUCTURE

-L- STA 11+25.00
BEGIN SHOULDER BERM GUTTER

-GW- STA. 14+75.00
BEGIN PRECAST CONCRETE BOARDWALK SYSTEM

-GW- PT 13+08.16

-GW- PC 15+75.66

-GW- PT 17+47.33

-GW- PC 20+42.40

-GW- STA. 21+20.00
END PRECAST CONCRETE BOARDWALK SYSTEM

-Y- PCC 10+82.03

-Y- PCC 12+31.60

TIE TO EXIST. BEGIN 2'-6" C&G

-Y- PCC 13+44.44

-Y- PT 13+60.14

10' TRANSITION 2'-6" C&G TO SBG

-L- PC 10+00.00

-L- STA 10+50.00
BEGIN PROJECT

-L- POT 10+41.82 =
-Y- POT 13+88.74

-L- PCC 13+44.77

-L- PCC 15+68.56

-L- PRC 18+28.17

-L- PCC 20+40.76

MATCHLINE STA. -L- 21+50.00
MATCH TO SHEET NO. 5

FOR -GW- PROFILE, SEE SHEET NO. 6

REVISIONS

8/17/99

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MattBrewer

PROJECT REFERENCE NO.	SHEET NO.
STAGECOACH GREENWAY	5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

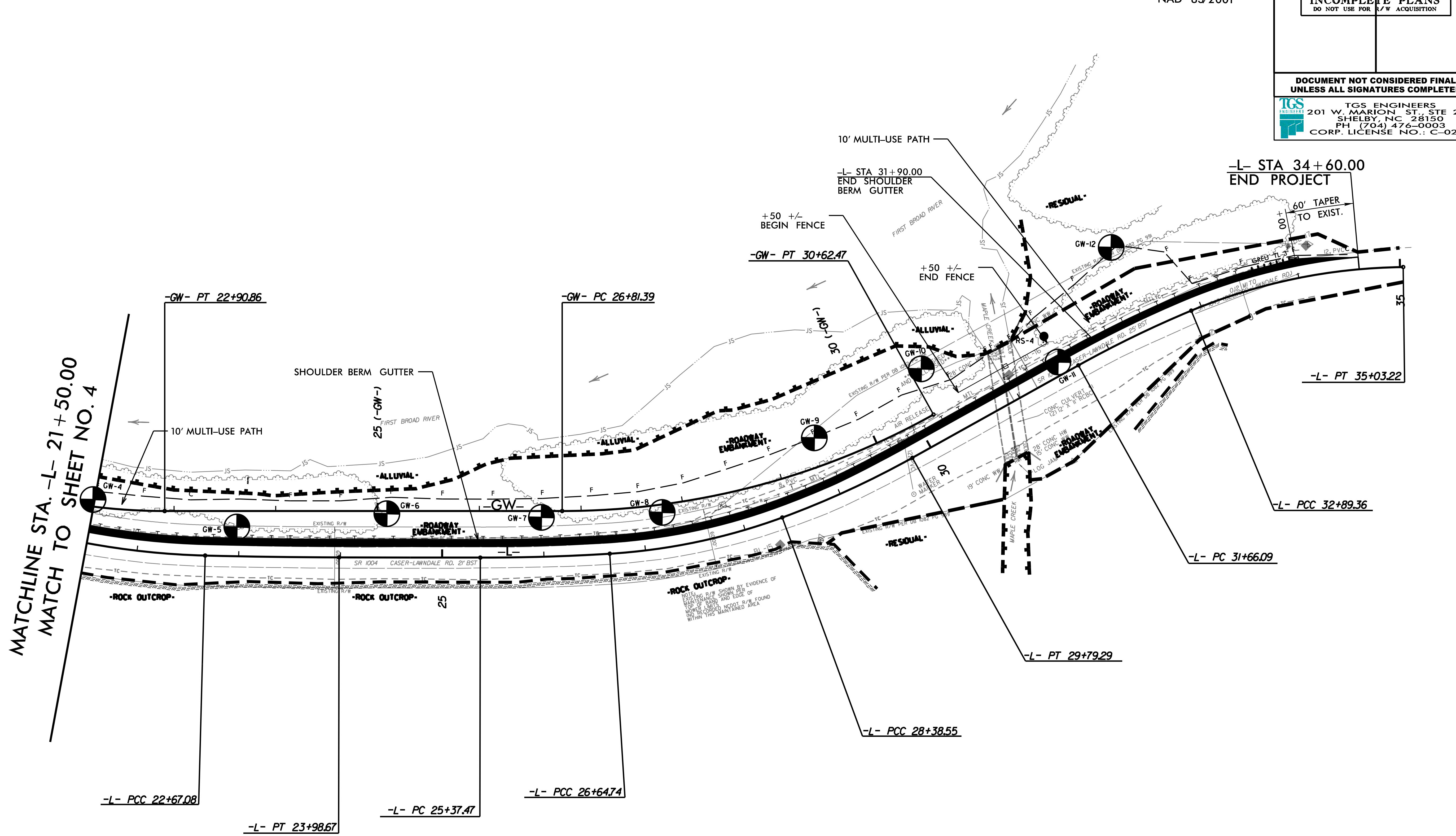
TGS ENGINEERS
201 W. MARION ST., STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

-L- CURVE DATA

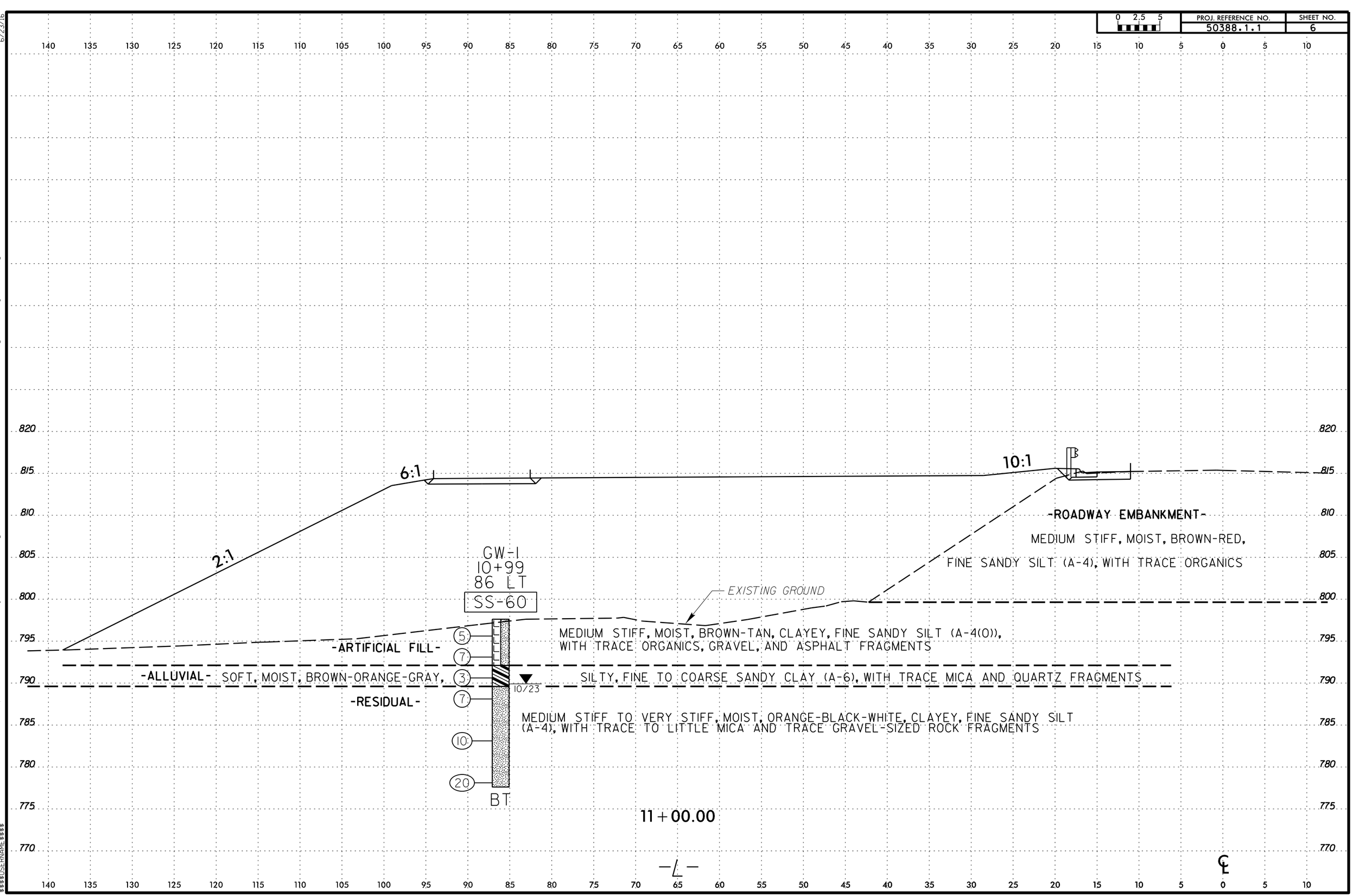
PI Sta 21+54.78	PI Sta 23+32.87	PI Sta 26+01.13	PI Sta 27+52.26	PI Sta 29+09.06	PI Sta 32+27.79	PI Sta 33+97.61
Δ = 17° 17' 22.9" (LT)	Δ = 1° 23' 46.3" (LT)	Δ = 3° 38' 45.3" (LT)	Δ = 16° 35' 50.5" (LT)	Δ = 8° 57' 36.1" (LT)	Δ = 6° 32' 22.8" (RT)	Δ = 21° 52' 51.0" (RT)
D = 7° 38' 22.0"	D = 1° 03' 39.7"	D = 2° 51' 53.2"	D = 9° 32' 57.5"	D = 6° 21' 58.3"	D = 5° 18' 18.6"	D = 10° 13' 53.0"
L = 226.32'	L = 131.59'	L = 127.27'	L = 173.81'	L = 140.74'	L = 123.27'	L = 213.86'
T = 114.03'	T = 65.80'	T = 63.65'	T = 87.52'	T = 70.52'	T = 61.70'	T = 108.25'
R = 750.00'	R = 5,400.00'	R = 2,000.00'	R = 600.00'	R = 900.00'	R = 1,080.00'	R = 560.00'

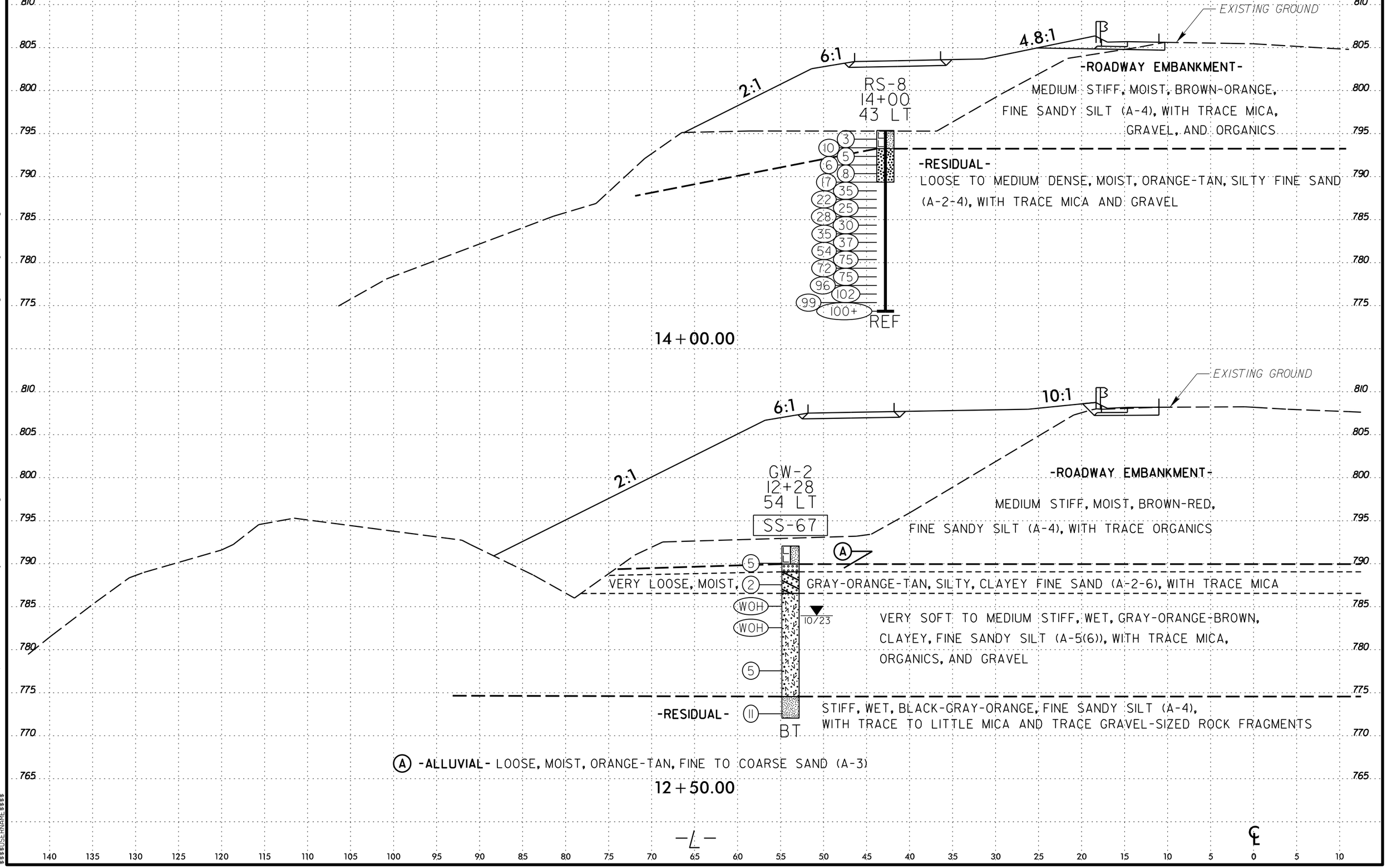
-GW- CURVE DATA

PI Sta 21+68.67	PI Sta 28+76.14
Δ = 25° 11' 42.7" (LT)	Δ = 29° 06' 46.5" (LT)
D = 10° 08' 27.0"	D = 7° 38' 22.0"
L = 248.45'	L = 381.09'
T = 126.27'	T = 194.75'
R = 565.00'	R = 750.00'



FOR -GW- PROFILE, SEE SHEET NO. 6





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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	50388.1.1	8

BR-1
15+01
9 LT

EXISTING GROUND

PAVEMENT

BRIDGE

RS-7
14+99
43 LT

2:1

40:1

-ROADWAY EMBANKMENT-

SOFT TO RED-BROWN- COARSE SANDY MICA, GRAVEL, (18) (11) (19) (10) (3)

VERY STIFF, MOIST, GRAY-ORANGE, FINE TO SILT (A-4), WITH TRACE AND ORGANICS

VERY SOFT TO STIFF, MOIST FINE TO COARSE SANDY CLAY (5) (4) (7) (6) (18) (18) (23) (23) (46) (42) (85) (88) (100+)

REF

(7) TO WET, RED, SILTY (A-6), WITH TRACE MICA AND GRAVEL (WOH)

10/23

(7) STIFF TO VERY STIFF, MOIST TO WET, BROWN-GRAY-RED, CLAYEY SILT (A-5), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS (14) (39)

-RESIDUAL-

-CRYSTALLINE ROCK-
(SCHIST)

(100/0.8) (100/0.6) (60/0.0)

-WEATHERED ROCK-
(SCHIST)

REF
FIAD

15+00.00

℄

815 810 805 800 795 790 785 780 775 770 765 760 755 750 745

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

6/23/16

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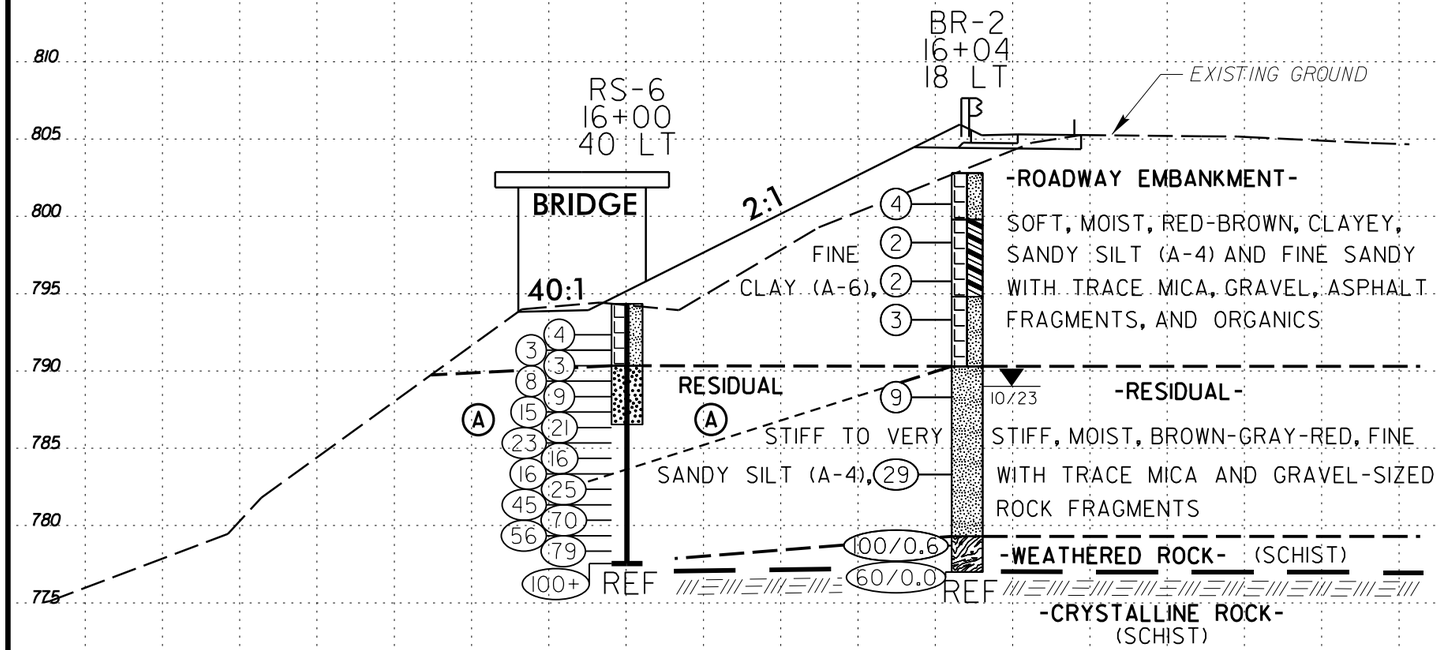

Ⓐ -RESIDUAL- LOOSE TO MEDIUM DENSE, MOIST, ORANGE-TAN-BROWN, SILTY FINE SAND (A-2-4), WITH TRACE MICA AND ORGANICS

16+00.00

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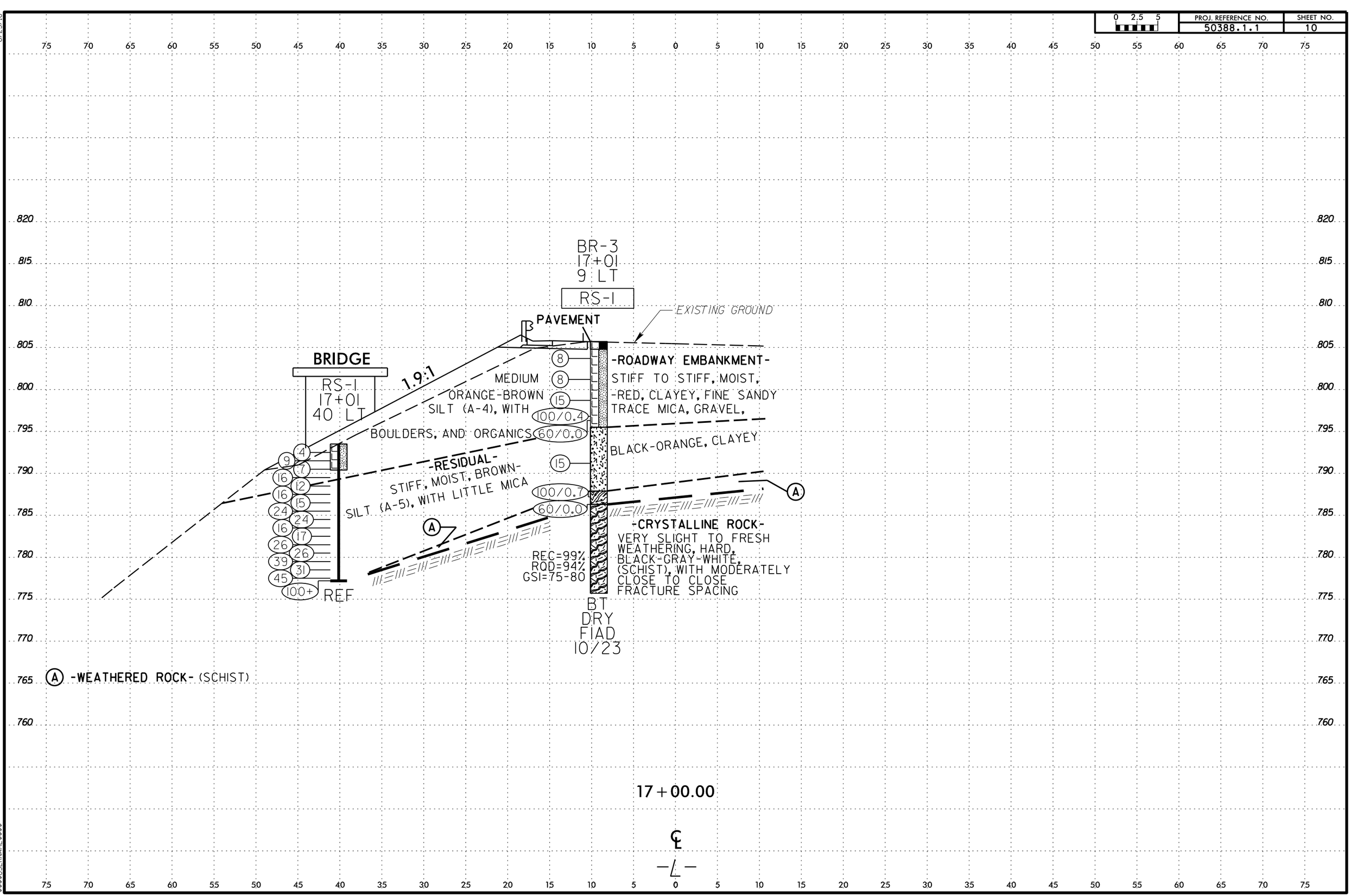

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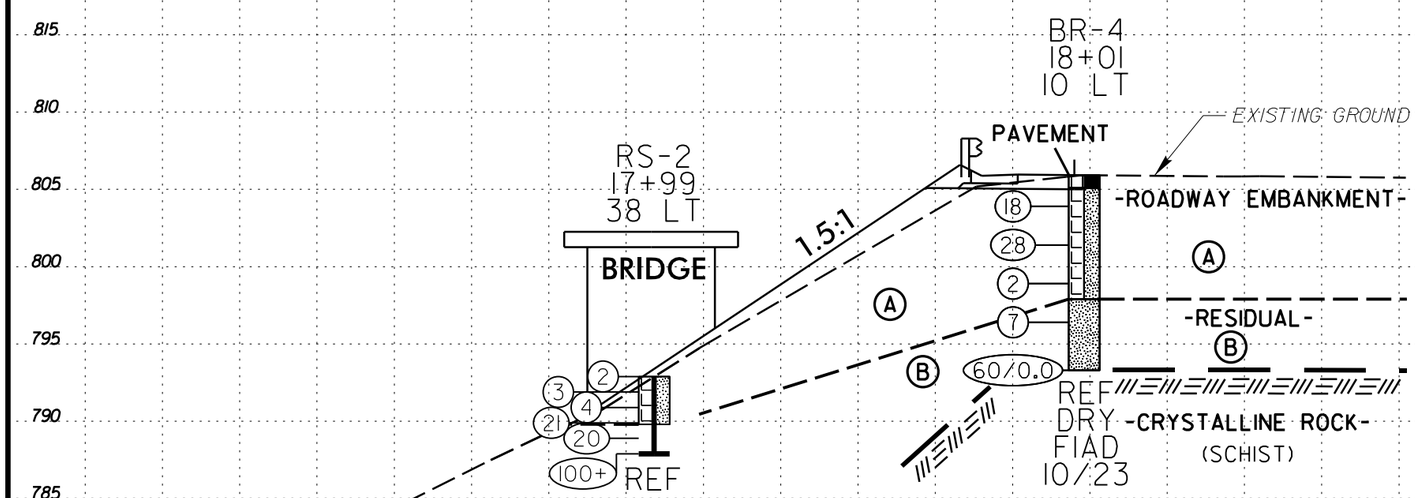

(A) **-ROADWAY EMBANKMENT-** SOFT TO VERY STIFF, MOIST, BROWN-ORANGE-BLACK-WHITE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA, GRAVEL, ORGAINICS, AND QUARTZ FRAGMENTS

(B) **-RESIDUAL-** STIFF, MOIST, ORANGE-BLACK-TAN, FINE SANDY SILT (A-4), WITH TRACE TO LITTLE MICA

18+00.00

℄

6/23/16

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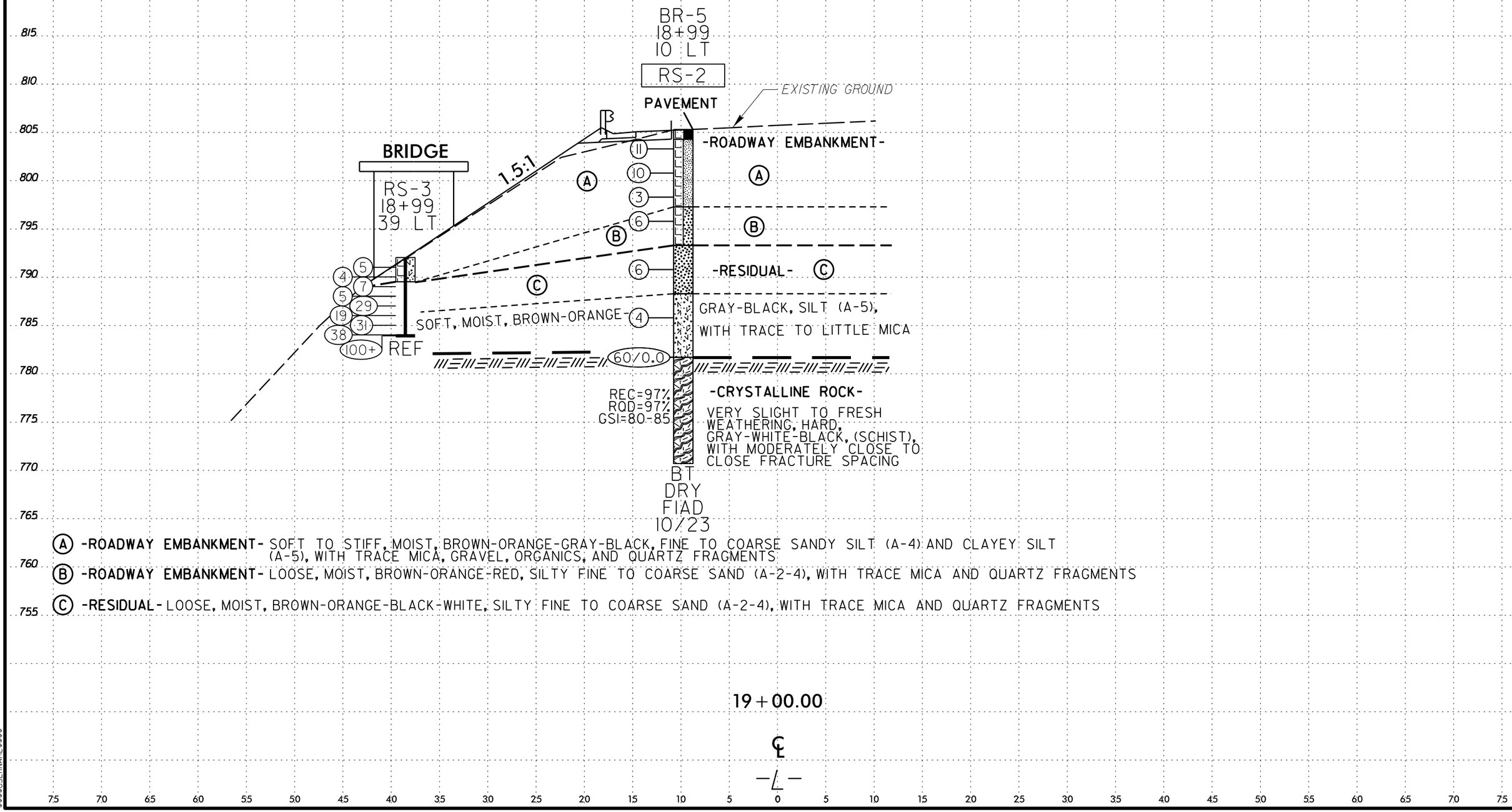

(A) -ROADWAY EMBANKMENT- SOFT TO STIFF, MOIST, BROWN-ORANGE-GRAY-BLACK, FINE TO COARSE SANDY SILT (A-4) AND CLAYEY SILT (A-5), WITH TRACE MICA, GRAVEL, ORGANICS, AND QUARTZ FRAGMENTS

(B) -ROADWAY EMBANKMENT- LOOSE, MOIST, BROWN-ORANGE-RED, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND QUARTZ FRAGMENTS

(C) -RESIDUAL- LOOSE, MOIST, BROWN-ORANGE-BLACK-WHITE, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND QUARTZ FRAGMENTS

19+00.00

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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
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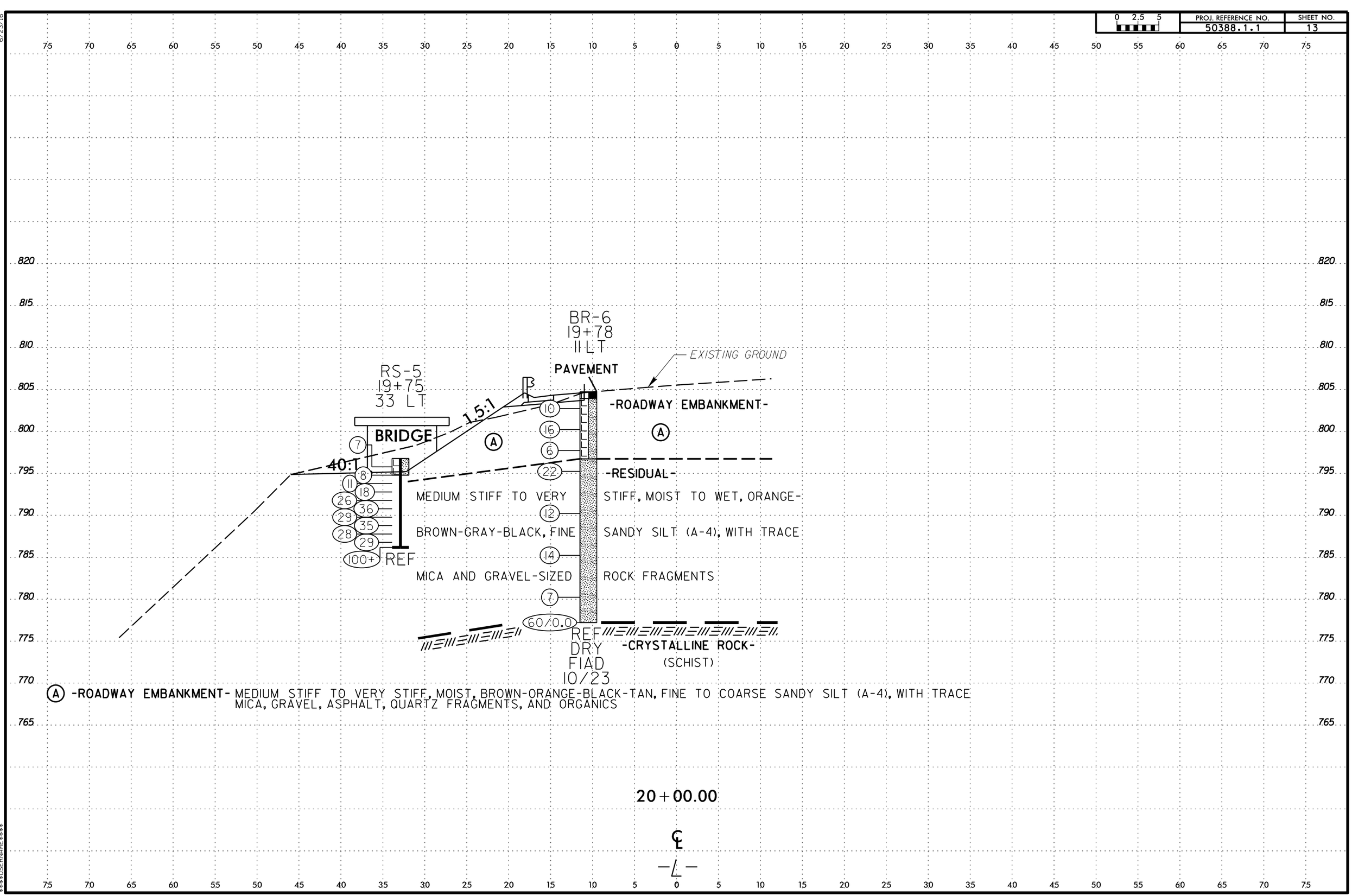

(A) **-ROADWAY EMBANKMENT-** MEDIUM STIFF TO VERY STIFF, MOIST, BROWN-ORANGE-BLACK-TAN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA, GRAVEL, ASPHALT, QUARTZ FRAGMENTS, AND ORGANICS

20+00.00

℄

6/23/16

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$$$$USERNAME$$$$

BR-7
20+44
39 LT
RS-3

EXISTING GROUND

6:1
1.7:1
2:1

-ROADWAY EMBANKMENT-

(7) (4) 100/0.3 — SOFT TO MEDIUM STIFF, MOIST, BROWN-RED, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA, GRAVEL, BOULDERS, AND ORGANICS

-RESIDUAL-

(12) — STIFF TO VERY STIFF, WITH TRACE MICA, (28) — MOIST, BROWN-WHITE-RED, FINE TO COARSE SANDY SILT (A-4), QUARTZ, AND GRAVEL-SIZED ROCK FRAGMENTS

(35) — DENSE, MOIST, BLACK-GRAY-ORANGE, SILTY FINE SAND (A-2-4), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS

10/23

60/0.0

-CRYSTALLINE ROCK-

REC=96%
RQD=79%
GSI=60-65

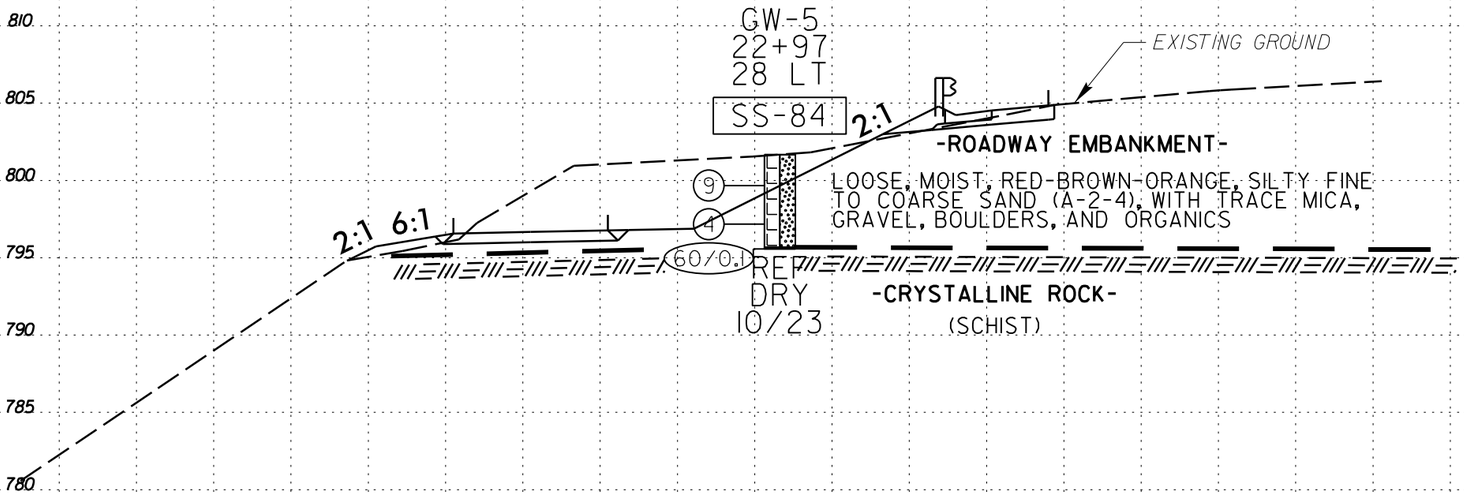
MODERATELY SEVERE TO FRESH WEATHERING, MODERATELY HARD TO HARD, BLACK-GRAY-WHITE, (SCHIST), WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING

BT

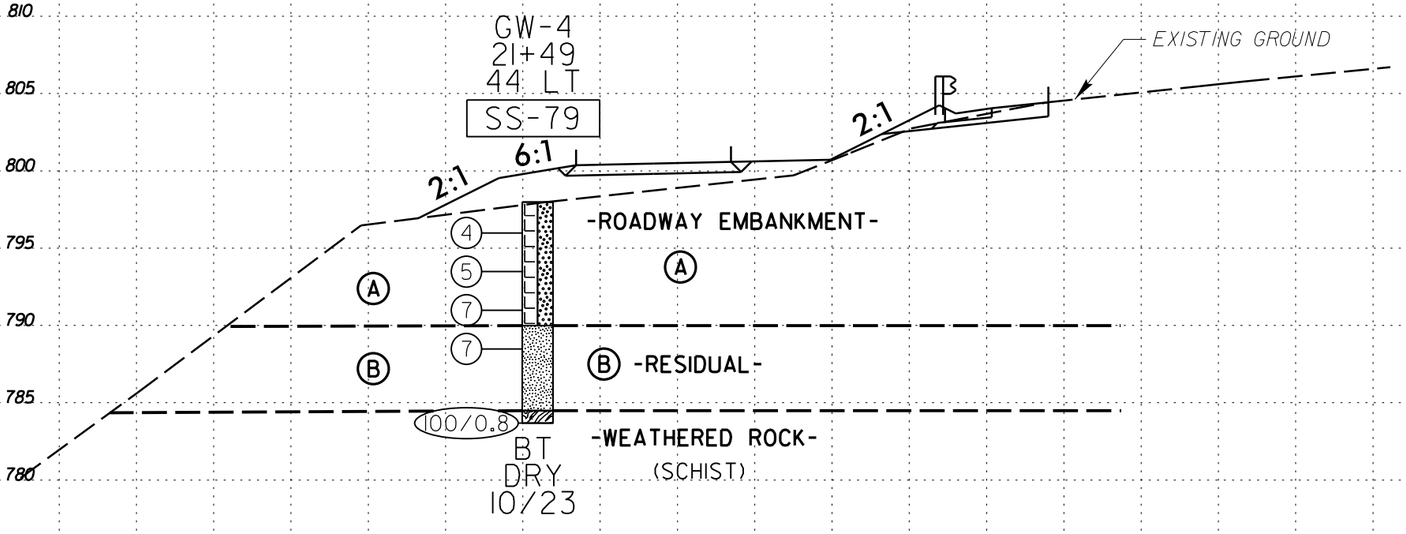
20+50.00
℄
—L—

815 810 805 800 795 790 785 780 775 770 765 760 755

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



23+00.00

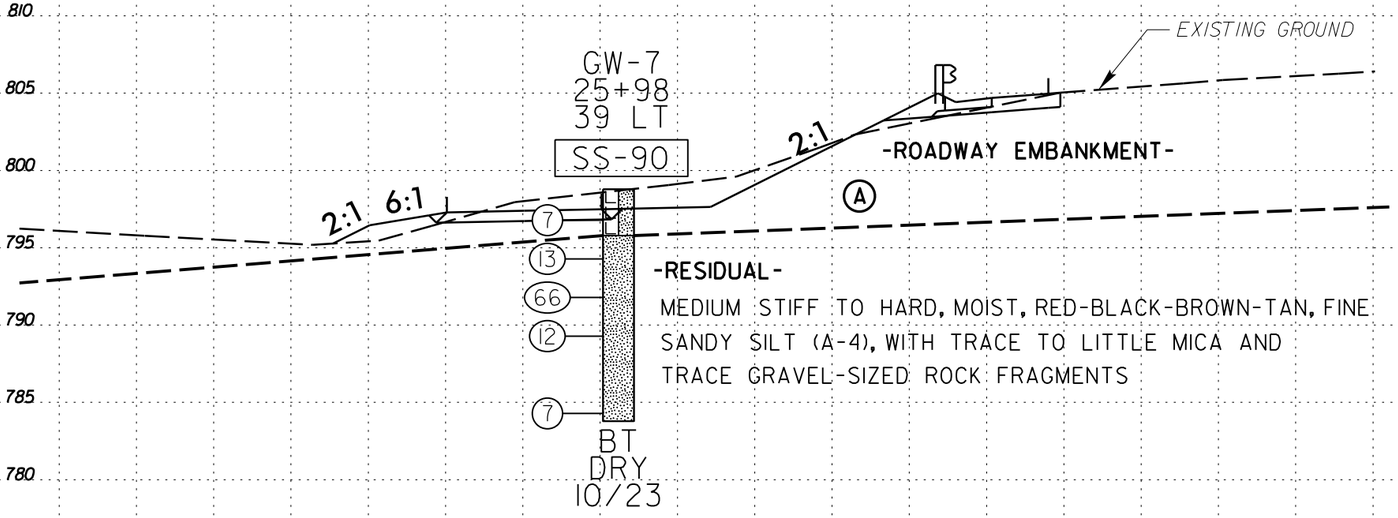


A -ROADWAY EMBANKMENT- LOOSE, MOIST, RED-BROWN-ORANGE, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA, GRAVEL, AND ORGANICS

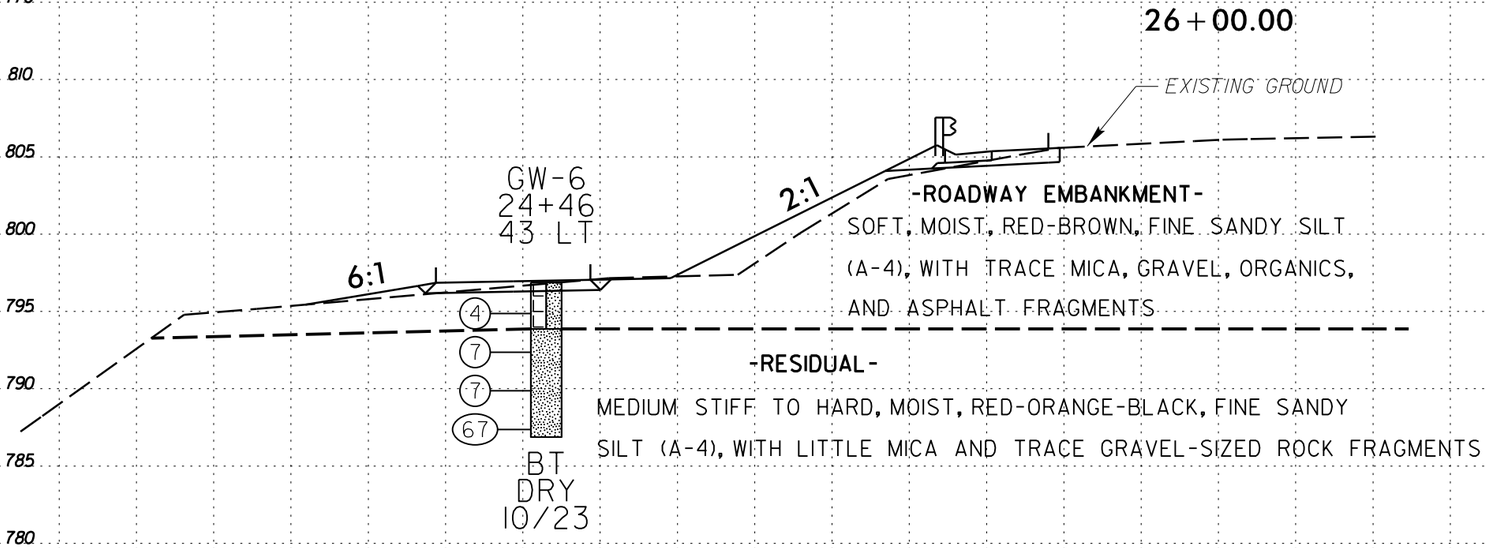
B -RESIDUAL- MEDIUM STIFF, MOIST, BROWN-BLACK-RED-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS

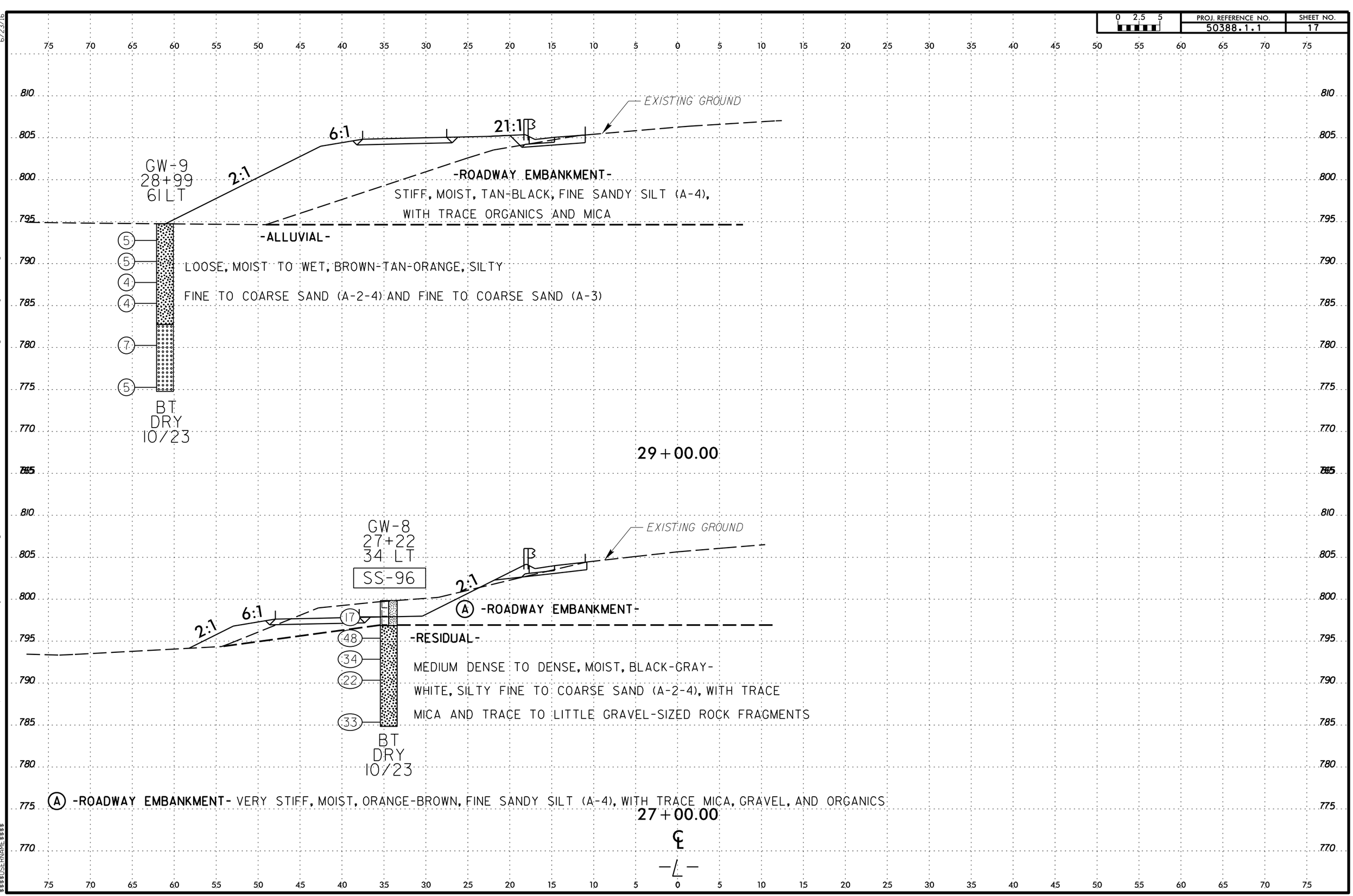
21+50.00

℄



Ⓐ **-ROADWAY EMBANKMENT-** MEDIUM STIFF, MOIST, RED-BROWN, FINE TO COARSE SANDY SILT (A-4(0)), WITH TRACE MICA, GRAVEL, AND ORGANICS





6/23/16

04-SEP-2024 14:10
C:\Users\TylerWenner\Carolinas Geotechnical Group, PLLC\Matt Brewer - Projects\0202 - Stagecoach Multi-use Trail_TGS\
$$$$USERNAME$$$$

90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

815 810 805 800 795 790 785 780 775 770 765

FENCE

6:1

1.5:1

-ROADWAY EMBANKMENT-

STIFF, MOIST, TAN-BLACK, FINE SANDY SILT (A-4),
WITH TRACE ORGANICS AND MICA

EXISTING GROUND

GW-10
30+30
72 LT

10
5
5
5
5
4

-ALLUVIAL-

LOOSE, MOIST, ORANGE-BROWN, CLAYEY, SILTY FINE
SAND (A-2-4) AND FINE TO COARSE SAND (A-3), WITH TRACE ORGANICS

60/0.0

REF
DRY
10/23

-CRYSTALLINE ROCK-
(SCHIST)

30+50.00

℄

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	50388.1.1	19

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

825 820 815 810 805 800 795 790 785 780 775 770

FENCE

RS-4
31+50
42 LT

6:1

1.5:1

GW-II
31+50
13 LT

SS-02

EXISTING GROUND

-ROADWAY EMBANKMENT-
SOFT TO STIFF, MOIST, BROWN-ORANGE-RED-GRAY, FINE TO COARSE SANDY SILT (A-4(0)), WITH TRACE TO LITTLE MICA AND TRACE GRAVEL, QUARTZ FRAGMENTS, AND ORGANICS

5 20 14 15 18 46 100+ 32 49 7.0 100+ REF

5 12 6 7 2 7

-RESIDUAL-
SOFT, MOIST, BROWN- 4 BLACK, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS

Ⓐ

100/0.6
60/0.0
REF
DRY
10/23

-CRYSTALLINE ROCK-
(SCHIST)

Ⓐ -WEATHERED ROCK- (SCHIST)

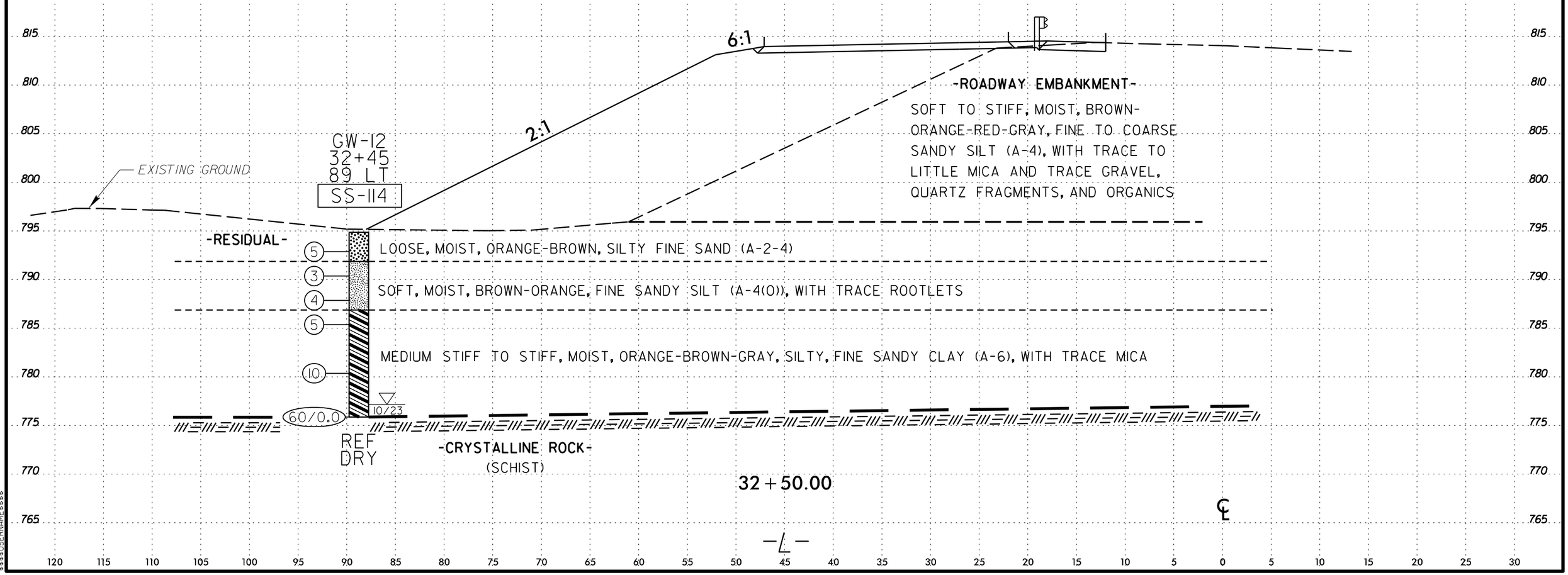
31+50.00

℄

6/23/16

Multi-use Trail_TGS\CADD_GEOTECH\xsc\Stagecoach_Rdy_GEO_XSI.dgn

04-SEP-2024 14:10
C:\Users\TylerWenner\Carolinas Geotechnical Group, PLLC\Matt Brewer - Projects\0202 - Stagecoach Multi-use
$$$$USERNAME$$$$



PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	21

REFERENCE: N/A

PROJECT: 50388

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A
SOIL TEST RESULTS

Prepared in the Office of:

LKN ENGINEERING AND TESTING

LKN ENGINEERING AND TESTING,PC
207 S.BROAD STREET UNIT 3
MOORESVILLE.NC 28115
NCDOT LAB CERT.NO.
148-0723

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	22

SOIL TEST RESULTS

SAMPLE NO.	BORING NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-60	GW-1	86' LT	10+99 -L-	3.5 - 5.0'	A-4(0)	33	2	22.5	41.2	11.6	24.7	90.9	85.0	36.9	23.9	-
SS-67	GW-2	54' LT	12+28 -L-	6.0 - 7.5'	A-5(6)	41	6	5.8	21.0	40.5	32.7	99.3	97.4	77.3	56.2	-
SS-79	GW-4	44' LT	21+49 -L-	3.5 - 5.0'	A-2-4	29	3	30.0	28.7	19.4	21.9	75.8	60.1	34.1	15.7	-
SS-84	GW-5	28' LT	22+97 -L-	3.5 - 5.0'	A-2-4	30	3	31.8	30.4	15.7	22.1	81.7	65.9	34.3	17.9	-
SS-90	GW-7	39' LT	25+98 -L-	1.0 - 2.5'	A-4(0)	37	8	30.6	30.4	11.9	27.1	85.0	70.0	35.9	20.7	-
SS-96	GW-8	34' LT	27+22 -L-	3.5 - 5.0'	A-2-4	27	0	31.8	50.1	7.6	10.5	71.3	63.9	16.8	14.5	-
SS-02	GW-11	13' LT	31+50 -L-	6.0 - 7.5'	A-4(0)	33	2	27.9	34.9	11.0	26.2	90.4	77.0	37.4	15.3	-
SS-114	GW-12	89' LT	32+45 -L-	3.5 - 5.0'	A-4(0)	25	0	19.0	39.1	19.5	22.4	99.0	90.3	45.9	25.1	-

Steven Putnam

AUTHORIZED SIGNATURE
NCDOT CERT NO. 148-01-0723

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	23

REFERENCE: N/A

PROJECT: 50388

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX B
ROCK TEST RESULTS

Prepared in the Office of:

F&ME CONSULTANTS, INC.
1825 BLANDING STREET
COLUMBIA, SC 29201
NCDOT LAB CERT. NO. 130-0212

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	24

ROCK TEST RESULTS

SAMPLE NO.	*BORING*	*STATION*	*OFFSET*	*DEPTH INTERVAL*	*ROCK TYPE*	*UNIT WEIGHT (PCF)*	*UNCONFINED COMPRESSIVE STRENGTH*
RS–1	*BR–3*	*17+01 –L–*	*9' LT*	*21.7' – 22.4'*	*SCHIST*	*169.4*	*11,980 psi (1,725 ksf)*
RS–2	*BR–5*	*18+99 –L–*	*10' LT*	*27.8' – 28.6'*	*SCHIST*	*170.7*	*12,570 psi (1,810 ksf)*
RS–3	*BR–7*	*20+43 –L–*	*39' LT*	*25.6' – 26.4'*	*SCHIST*	*171.0*	*13,700 psi (1,973 ksf)*

AUTHORIZED SIGNATURE
NCDOT CERT NO. 130–04–0212

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	25

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX C
ROCK CORE PHOTOGRAPHS

REFERENCE: N/A

PROJECT: 50388

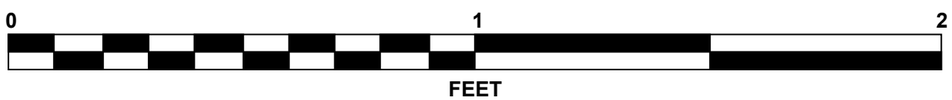
CAROLINAS GEOTECHNICAL GROUP

Greenway Along SR 1004 (Casar-Lawndale Rd) Between Grigg St and Maple Creek

Rock Core Photographs

BR-3

9.4 to 10.2 and 19.4 to 30.0 Feet



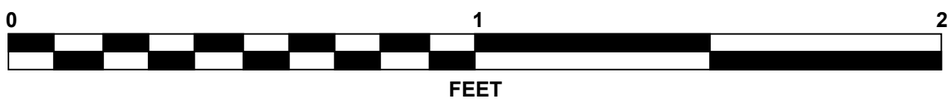
CAROLINAS GEOTECHNICAL GROUP

Greenway Along SR 1004 (Casar-Lawndale Rd) Between Grigg St and Maple Creek

Rock Core Photographs

BR-5

23.6 to 34.6 Feet



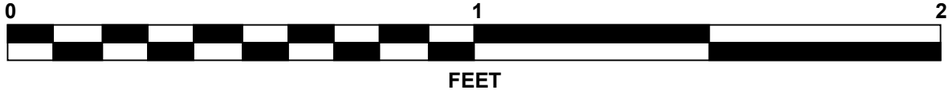
CAROLINAS GEOTECHNICAL GROUP

Greenway Along SR 1004 (Casar-Lawndale Rd) Between Grigg St and Maple Creek

Rock Core Photographs

BR-7

22.6 to 34.8 Feet



PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

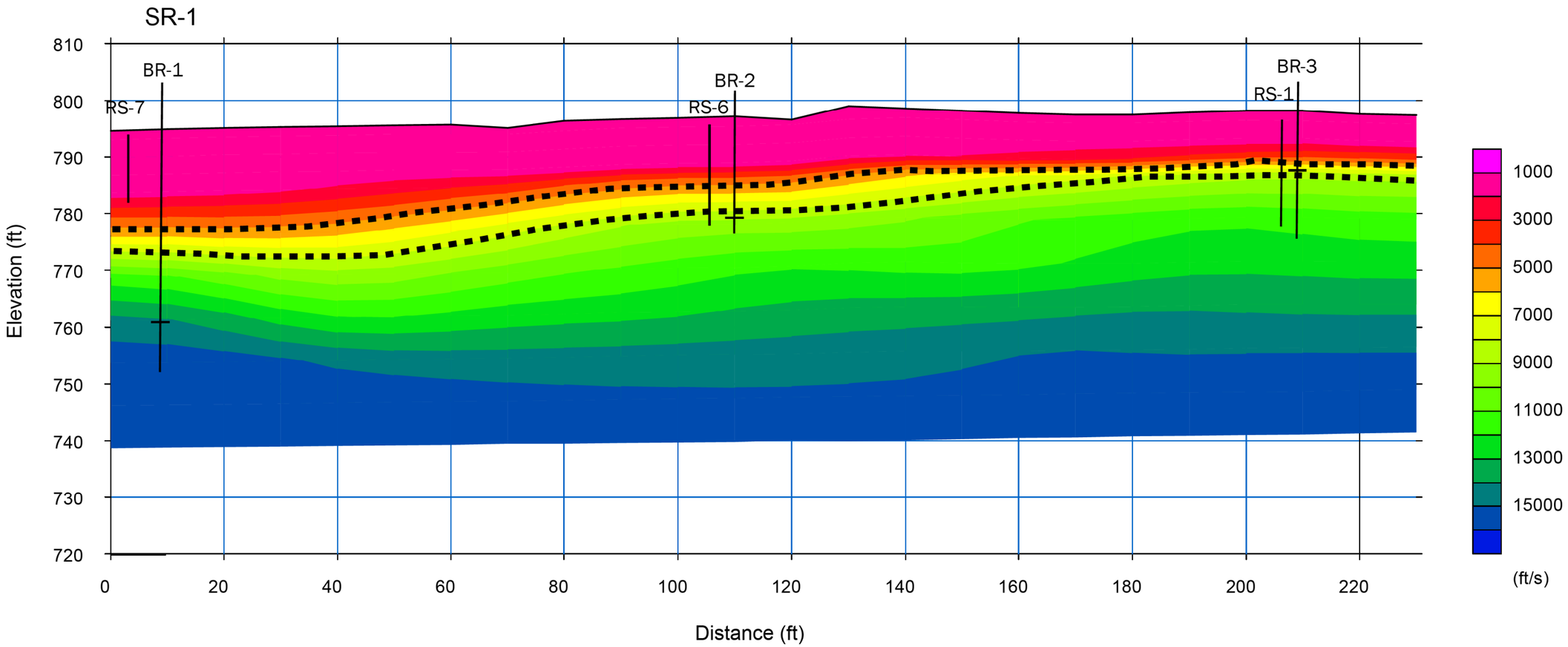
APPENDIX D
SEISMIC REFRACTION TEST RESULTS

REFERENCE: N/A

PROJECT: 50388

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	30

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE SR–1

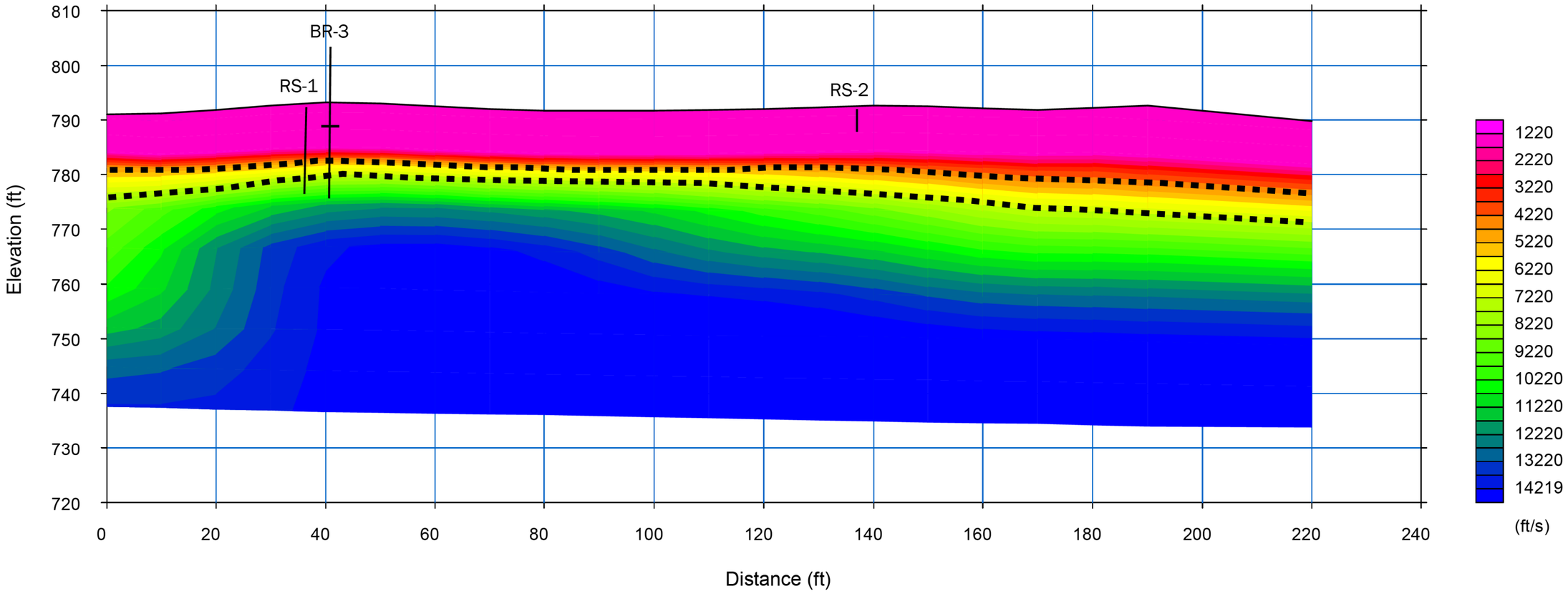


CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	31

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE SR–2



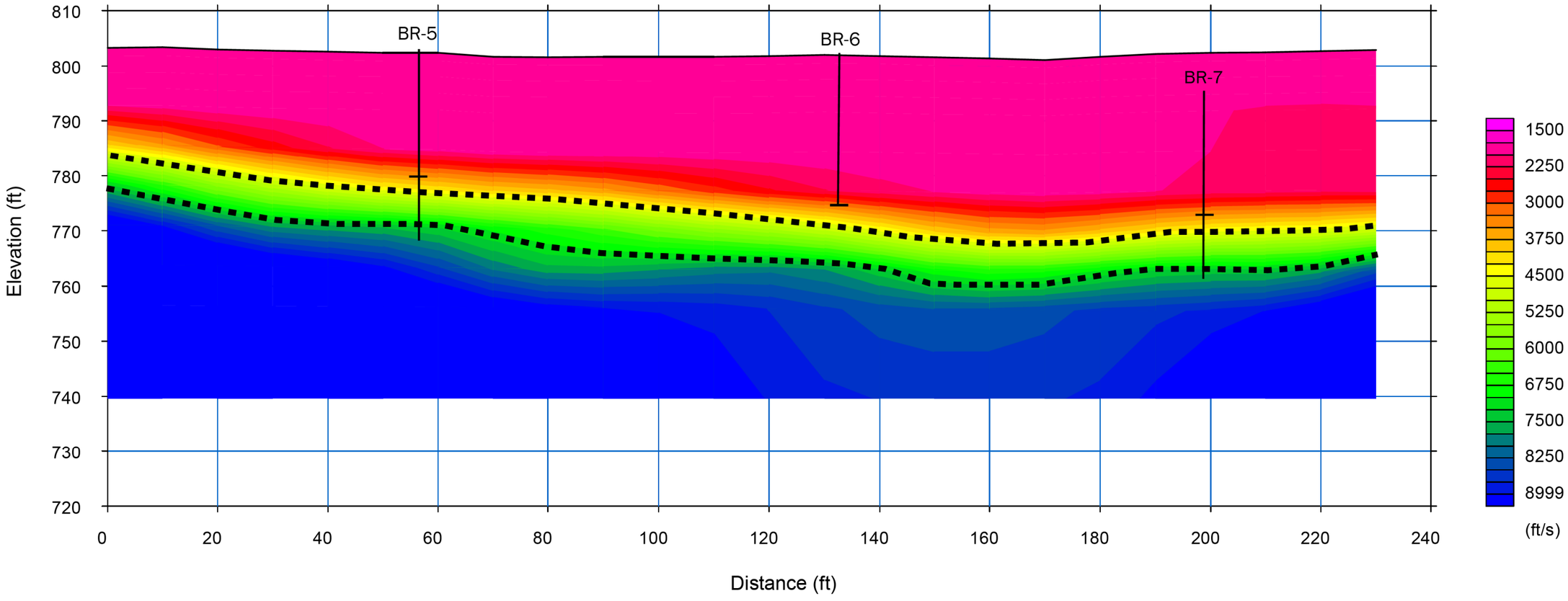
Scale = 1 / 1000

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	32

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE SR–3



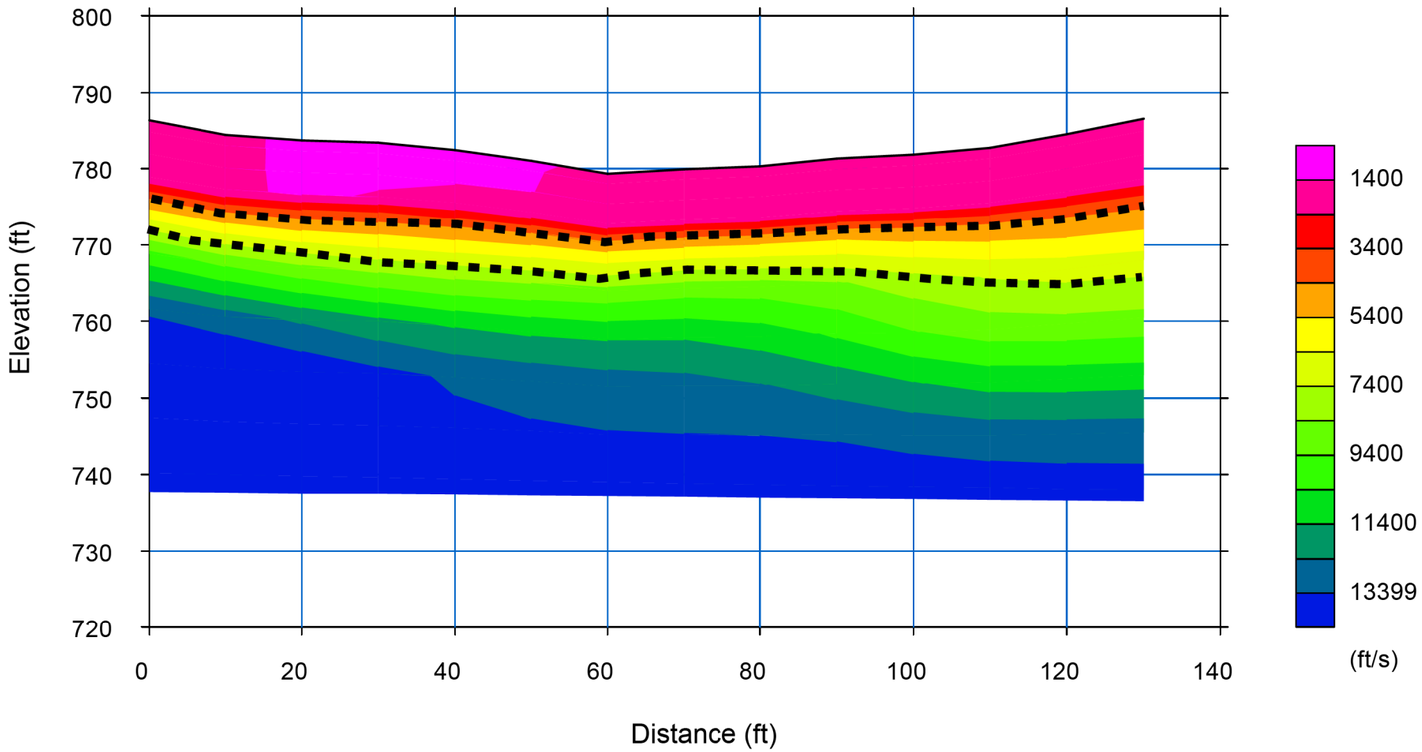
Scale = 1 / 1000

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

PROJECT REFERENCE NO.	SHEET NO.
50388.1.1	33

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE SR–4



Scale = 1 / 1000

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC