

REFERENCE: U-2525C

PROJECT: 34821

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	30

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

SHEET NO.	DESCRIPTION
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2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
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4	PROFILE
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28	ROCK CORE TEST RESULTS
29	SITE PHOTOGRAPHS

COUNTY GUILFORD
PROJECT DESCRIPTION GREENSBORO EASTERN LOOP
I-85 BYPASS (-L-) FROM US 29 NORTH OF
GREENSBORO TO EAST OF LAWDALE DRIVE
SITE DESCRIPTION SITE #3 (STRUCTURE #4 AND #5)
BRIDGE NO. 1243 AND 1244 ON I-85 BYPASS (-L-)
OVER NORFOLK SOUTHERN RAILROAD (-Y2-)

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

D. KUBINSKI

R. TOOTHMAN

W. ALLEN

INVESTIGATED BY D. KUBINSKI

DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

DATE SEPTEMBER 2017

Prepared in the Office of:



DocuSigned by:
Thomas R. Wells

10/10/2017

7DA5D2D0518E480 SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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

SOIL DESCRIPTION					GRADATION			ROCK DESCRIPTION			TERMS AND DEFINITIONS						
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208; 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					WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.			HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:			ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.						
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.			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 YIELD 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.			WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.						
SOIL LEGEND AND AASHTO CLASSIFICATION					COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50			WEATHERING									
PERCENTAGE OF MATERIAL					GROUND WATER												
CONSISTENCY OR DENSENESS					MISCELLANEOUS SYMBOLS			ROCK HARDNESS									
TEXTURE OR GRAIN SIZE					RECOMMENDATION SYMBOLS			ABBREVIATIONS			FRACTURE SPACING			BEDDING			
SOIL MOISTURE - CORRELATION OF TERMS					EQUIPMENT USED ON SUBJECT PROJECT			INDURATION			NOTES: FIAD: FILLED IMMEDIATELY AFTER DRILLING BORINGS EB5-C AND EB6-C WERE OBTAINED FROM THE ROADWAY INVESTIGATION PERFORMED BY S&ME FROM I1-15 TO I2-15.						
PLASTICITY																	
COLOR																	

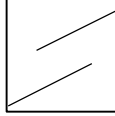
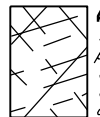
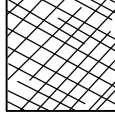
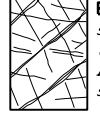
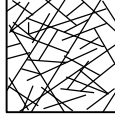


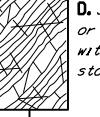
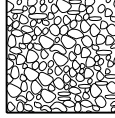
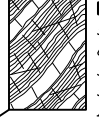
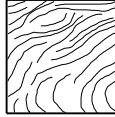

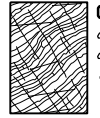

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

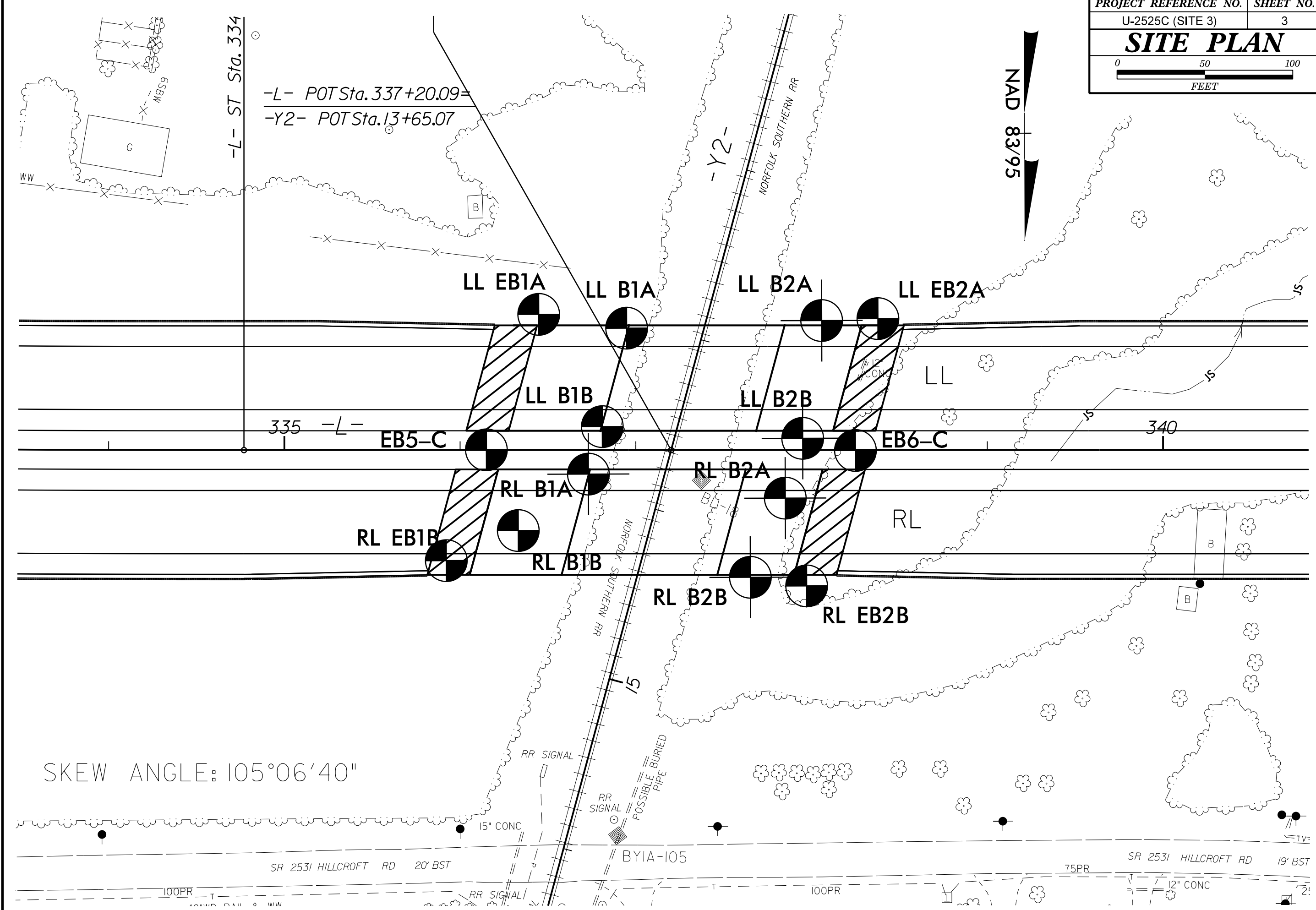
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

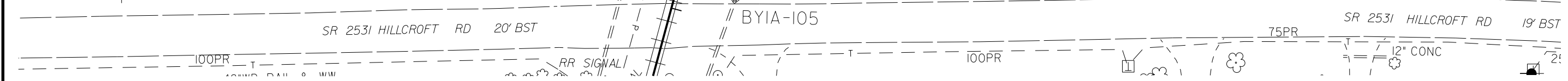
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

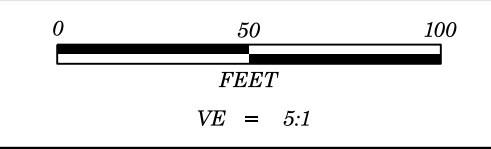
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)					
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE							
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A		A. Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70					
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80	70					B. Sandstone with thin inter-layers of siltstone	60					
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		60					C. Sandstone and siltstone in similar amounts		50				
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			50				D. Siltstone or silty shale with sandstone layers			40			
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				40			E. Weak siltstone or clayey shale with sandstone layers				30		
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes					30		F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
						20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
						10		H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.						
						N/A								
						N/A								

→ Means deformation after tectonic disturbance

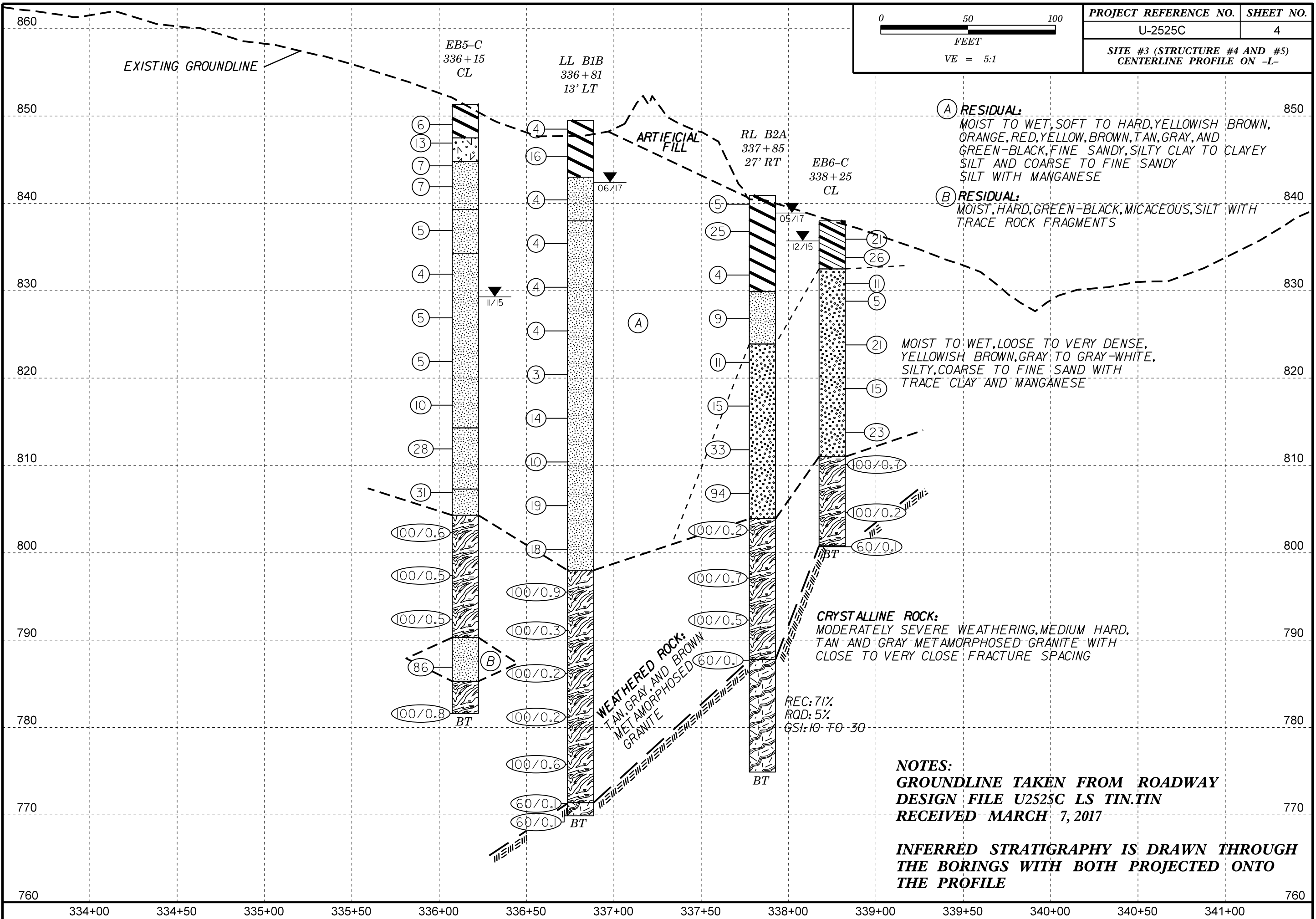


SKEW ANGLE: 105°06'40"





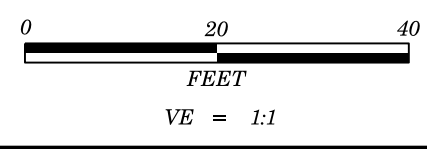
PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4
SITE #3 (STRUCTURE #4 AND #5) CENTERLINE PROFILE ON -L-	



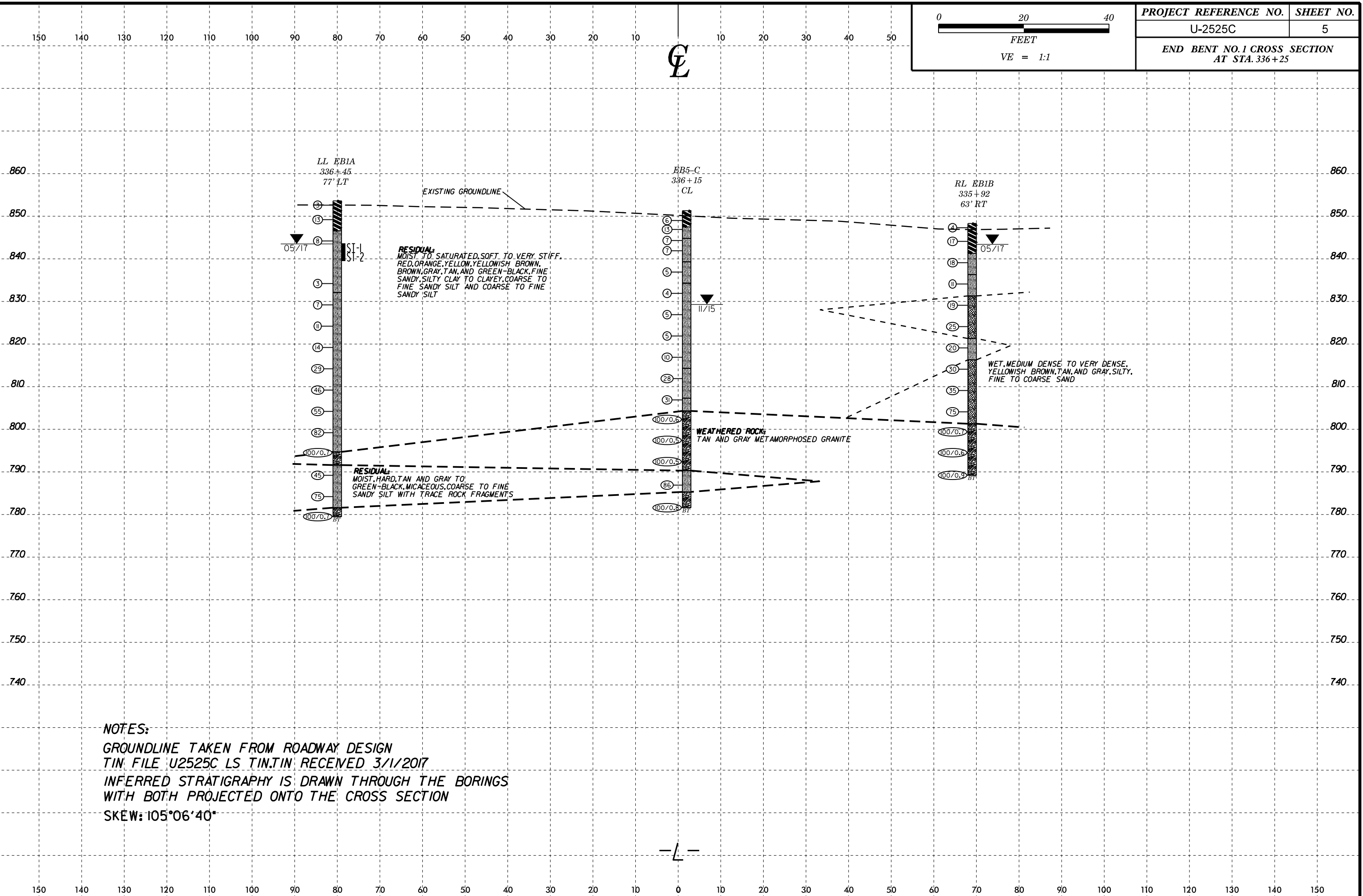
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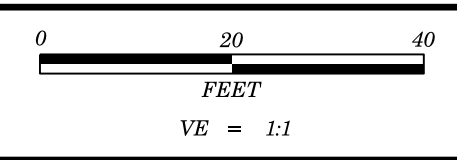
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BAJohnson



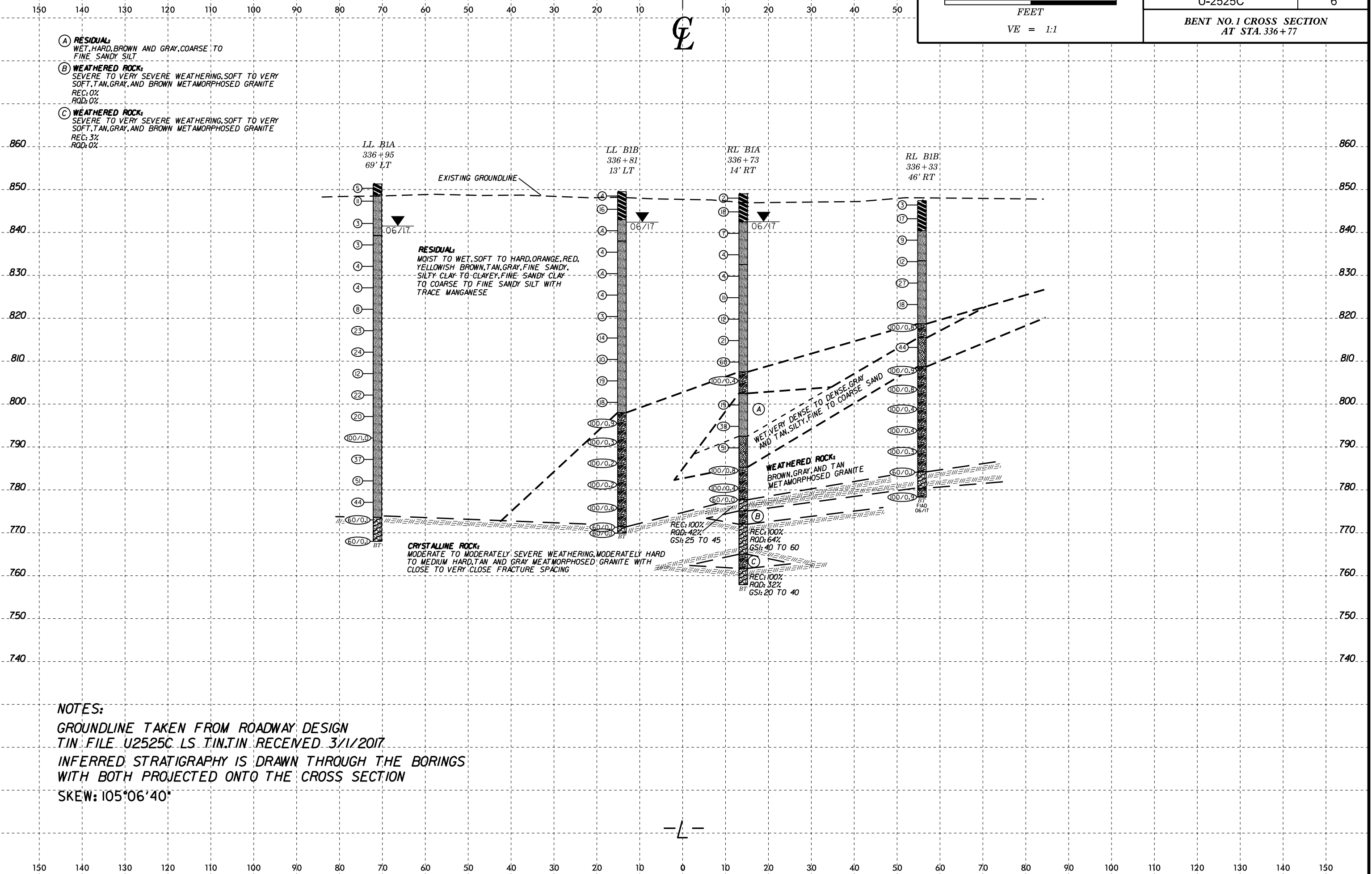
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U-2525C	5
END BENT NO. 1 CROSS SECTION AT STA. 336+25	



NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN
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WITH BOTH PROJECTED ONTO THE CROSS SECTION
SKEW: 105°06'40"



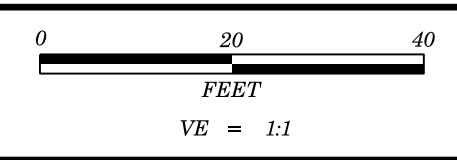
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U-2525C	6
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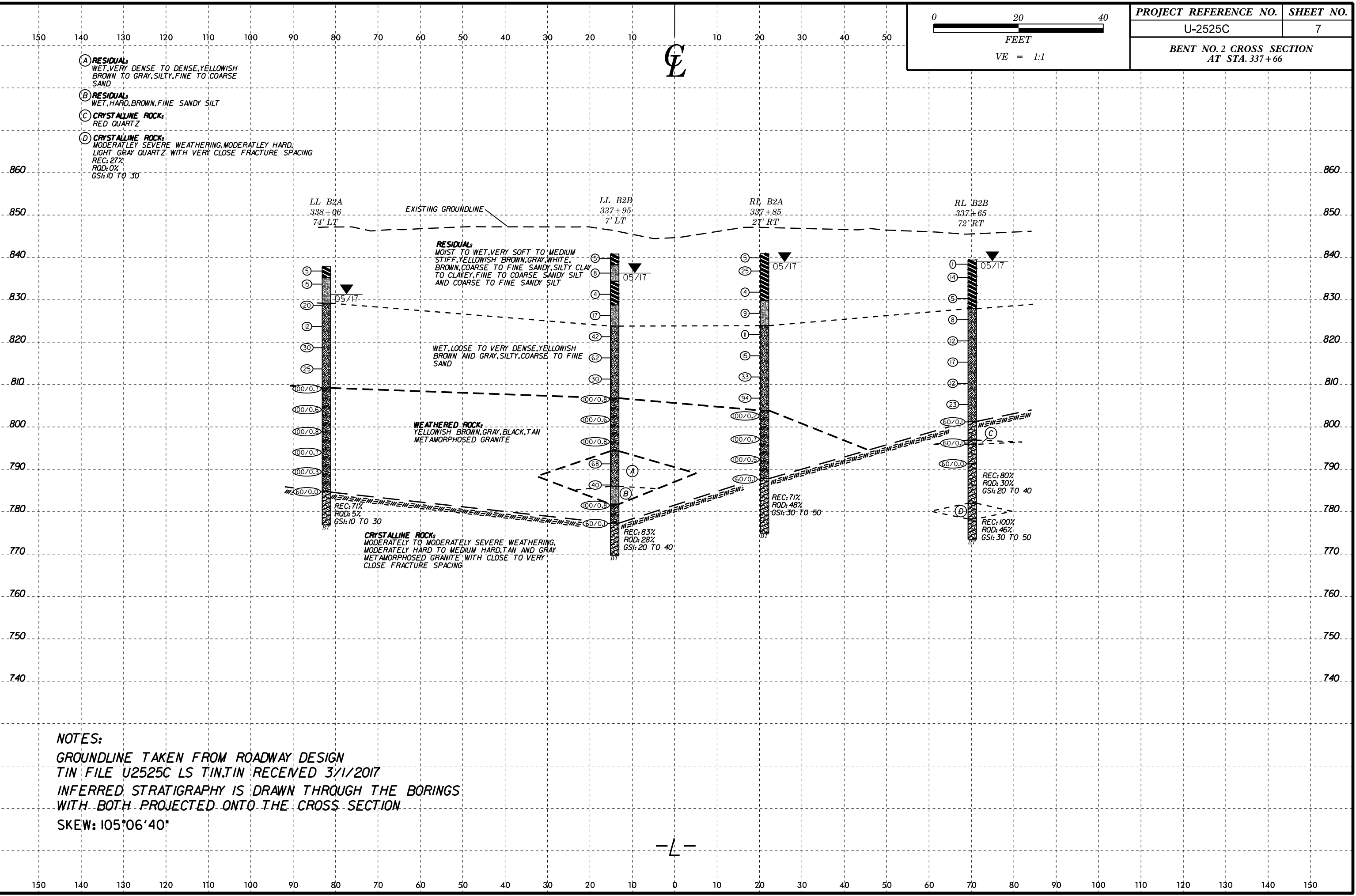
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 SKEW: 105°06'40"

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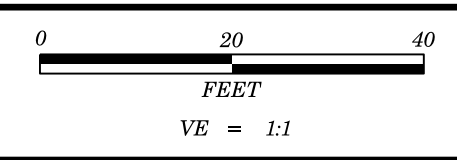


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U-2525C	7
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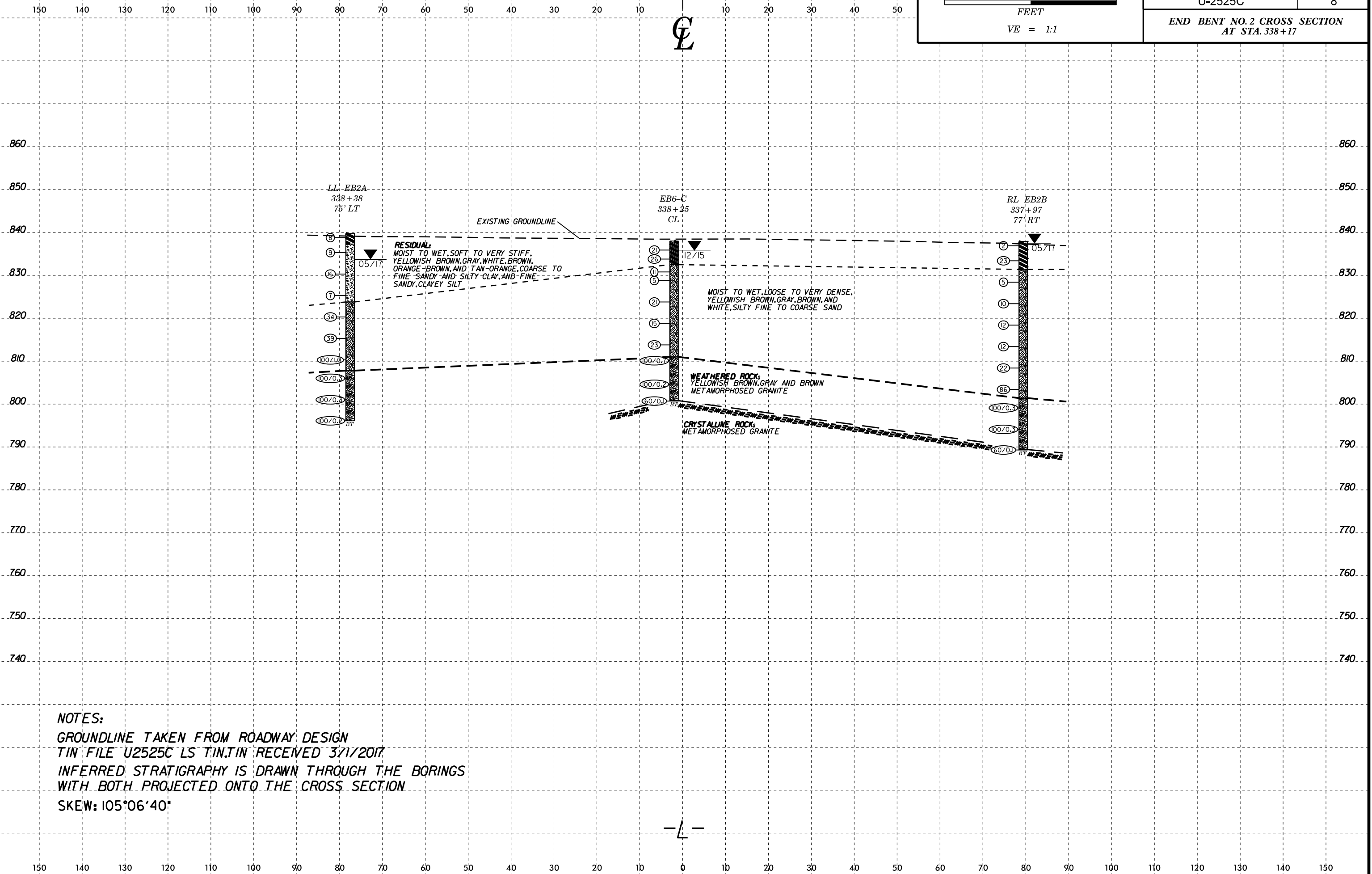


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 SKEW: 105°06'40"

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 BAJohnson AT KAZ06660



PROJECT REFERENCE NO.	SHEET NO.
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 SKEW: 105°06'40"

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GEOTECHNICAL BORING REPORT BORE LOG

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)			GROUND WTR (ft)
BORING NO. LL_EB1A	STATION 336+45	OFFSET 77 ft LT	ALIGNMENT -L-
COLLAR ELEV. 853.6 ft	TOTAL DEPTH 74.1 ft	NORTHING 874,602	EASTING 1,776,861
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/25/17	COMP. DATE 05/26/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
860																
855	853.6	0.0														
850	850.2	3.4	WOH	1	2											
845	845.2	8.4		6	7						3					
840				2	4											
835	835.2	18.4		1	2						3					
830	830.2	23.4		2	3						7					
825	825.2	28.4		2	4						11					
820	820.2	33.4		4	5						14					
815	815.2	38.4		5	11						29					
810	810.2	43.4		10	16						46					
805	805.2	48.4		12	21						55					
800	800.2	53.4		16	24						82					
795	795.2	58.4		28	60						100/0.7					
790	790.2	63.4		12	17						45					
785	785.2	68.4		31	35											
780	780.2	73.4														

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)			GROUND WTR (ft)
BORING NO. LL_EB1A	STATION 336+45	OFFSET 77 ft LT	ALIGNMENT -L-
COLLAR ELEV. 853.6 ft	TOTAL DEPTH 74.1 ft	NORTHING 874,602	EASTING 1,776,861
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/25/17	COMP. DATE 05/26/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
780																

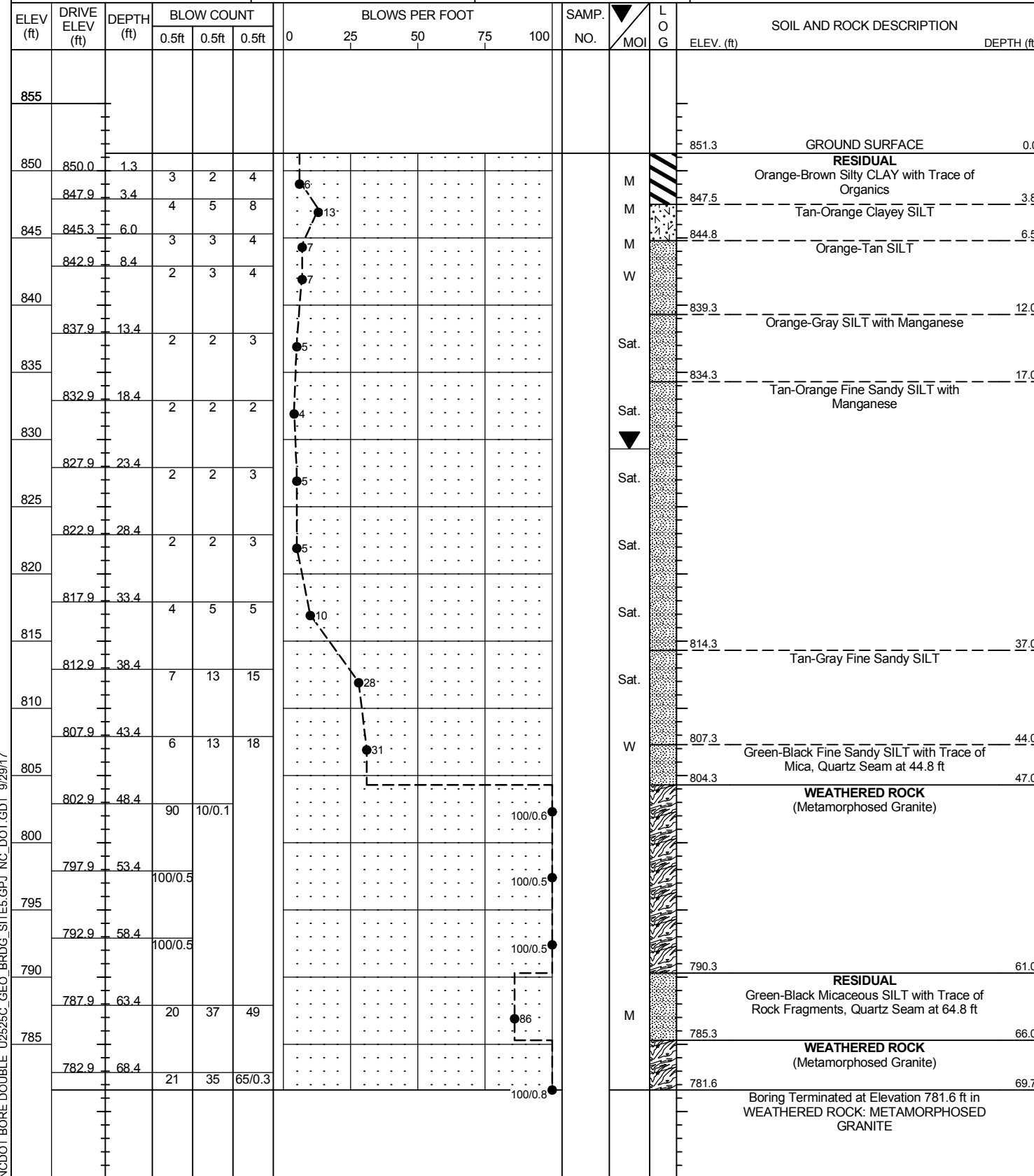
WEATHERED ROCK
Tan and Gray, METAMORPHOSED GRANITE (continued)
Boring Terminated at Elevation 779.5 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)
Topsoil (0.5 foot)

Other Samples:
ST-1 (10.0 - 12.0)
ST-2 (12.1 - 14.1)

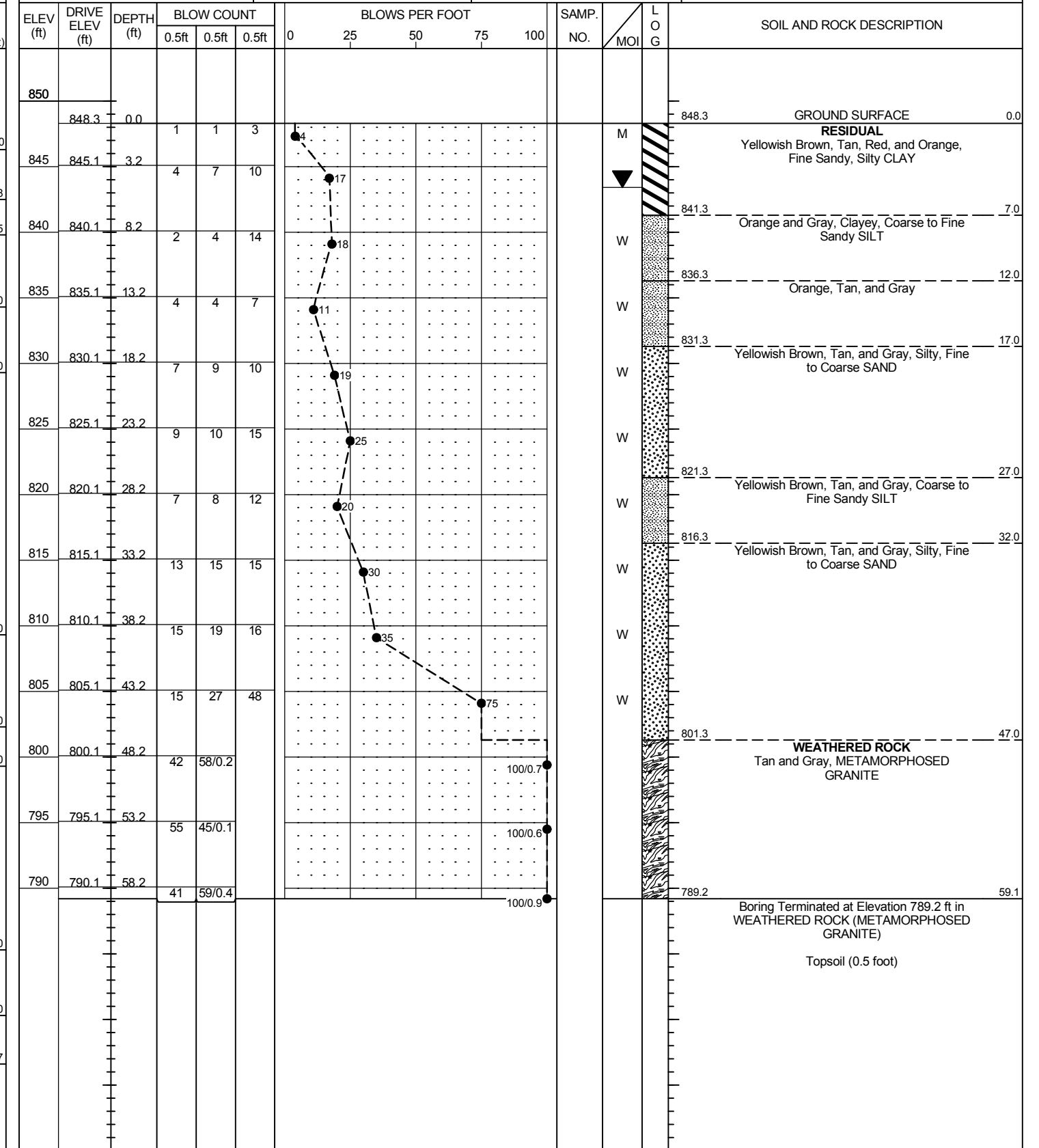
NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ, NC_DOT_GDT, 9/29/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Butler, L.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)		GROUND WTR (ft)	
BORING NO. EB5-C	STATION 336+15	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 851.3 ft	TOTAL DEPTH 69.7 ft	NORTHING 874,679	EASTING 1,776,891
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 83% 01/14/2016		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Norwood, R.	START DATE 11/19/15	COMP. DATE 11/20/15	SURFACE WATER DEPTH N/A



WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)		GROUND WTR (ft)	
BORING NO. RL_EB1B	STATION 335+92	OFFSET 63 ft RT	ALIGNMENT -L-
COLLAR ELEV. 848.3 ft	TOTAL DEPTH 59.1 ft	NORTHING 874,742	EASTING 1,776,914
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/24/17	COMP. DATE 05/25/17	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.										
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)									
BORING NO. LL_B1A		STATION 336+95		OFFSET 69 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 851.3 ft		TOTAL DEPTH 83.3 ft		NORTHING 874,610		EASTING 1,776,811										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 05/30/17		COMP. DATE 05/31/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
855																
	851.3	0.0	1	2	3										851.3	GROUND SURFACE
850	848.3	3.0	4	5	6										848.8	RESIDUAL Orange, Fine Sandy, Silty CLAY
																Red, Orange, and Yellow, Clayey, Fine Sandy, SILT
845	843.1	8.2	2	1	2											
840	838.1	13.2	1	2	1										839.3	Red, Yellowish Brown, Tan, and Gray to Brown, Gray, and Yellow, Fine Sandy SILT with Manganese Seams
835	833.1	18.2	2	2	2											
830	828.1	23.2	2	2	2											
825	823.1	28.2	2	3	5											
820	818.1	33.2	4	10	13											
815	813.1	38.2	6	12	12											
810	808.1	43.2	3	4	8											
805	803.1	48.2	9	10	12											
800	798.1	53.2	4	7	13											
795	793.1	58.2	19	41	59											
790	788.1	63.2	11	17	20											
785	783.1	68.2	16	22	29											
780	778.1	73.2	18	20	24											
775																

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.										
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)									
BORING NO. LL_B1A		STATION 336+95		OFFSET 69 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 851.3 ft		TOTAL DEPTH 83.3 ft		NORTHING 874,610		EASTING 1,776,811										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 05/30/17		COMP. DATE 05/31/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
775																
	773.1	78.2													773.6	CRISTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE
770	768.1	83.2													768.0	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 768.0 ft in CRISTALLINE ROCK (METAMORPHOSED GRANITE)
																Topsoil (0.5 foot)

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)			GROUND WTR (ft)
BORING NO. LL_B1B	STATION 336+81	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 849.5 ft	TOTAL DEPTH 79.6 ft	NORTHING 874,666	EASTING 1,776,825
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/30/17	COMP. DATE 05/31/17	SURFACE WATER DEPTH N/A

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)			GROUND WTR (ft)
BORING NO. LL_B1B	STATION 336+81	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 849.5 ft	TOTAL DEPTH 79.6 ft	NORTHING 874,666	EASTING 1,776,825
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/30/17	COMP. DATE 05/31/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
850	849.5	0.0											GROUND SURFACE	0.0
	846.4	3.1	1	2	2							M	RESIDUAL Yellowish Brown, Orange, and Red, Fine Sandy, Silty CLAY	
845			4	6	10							W		
	841.4	8.1										W	Yellow, Orange, and Red, Clayey, Fine Sandy, SILT	6.5
840			2	1	3							W		
	836.4	13.1										W	Brown, Tan, Orange, and Gray, Coarse to Fine Sandy SILT with Manganese Seams	11.5
835			1	2	2							W		
	831.4	18.1										W		
830			1	2	2							W		
	826.4	23.1										W		
825			1	1	3							W		
	821.4	28.1										W		
820			3	1	2							W		
	816.4	33.1										W		
815			4	5	9							W		
	811.4	38.1										W		
810			3	4	6							W		
	806.4	43.1										W		
805			7	8	11							W		
	801.4	48.1										W		
800			6	7	11							W		
	796.4	53.1										W		
795			38	62/0.4								W		
	791.4	58.1										W		
790			100/0.3									W		
	786.4	63.1										W		
785			100/0.2									W		
	781.4	68.1										W		
780			100/0.2									W		
	776.4	73.1										W		
775			80	20/0.1								W		
	771.4	78.1										W		
770	770.0	79.5	60/0.1									W		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
770													Match Line	
	60/0.1												CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE (continued) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 769.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)	

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.										
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)									
BORING NO. RL_B1A		STATION 336+73		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 849.0 ft		TOTAL DEPTH 91.1 ft		NORTHING 874,693		EASTING 1,776,833										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 06/01/17		COMP. DATE 06/02/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
850	849.0	0.0	WOH	WOH	2									849.0	GROUND SURFACE	0.0
845	845.8	3.2	4	8	10									842.5	RESIDUAL Orange, Yellowish, and Brown, Fine Sandy, Silty CLAY	6.5
840	840.8	8.2	2	3	4									832.5	Red, Gray, and Yellow, Clayey, Fine Sandy SILT	16.5
835	835.8	13.2	2	1	3									807.5	WEATHERED ROCK Tan and Gray, METAMORPHOSED GRANITE	41.5
830	830.8	18.2	2	1	3									802.5	RESIDUAL Brown and Gray, Coarse to Fine Sandy SILT	46.5
825	825.8	23.2	2	4	7									792.5	Gray, Silty, Fine to Coarse SAND	56.5
820	820.8	28.2	3	4	8									785.3	WEATHERED ROCK Brown, Gray, and Tan, METAMORPHOSED GRANITE with Manganese and Quartz	63.7
815	815.8	33.2	5	8	13									777.7	CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE	71.3
810	810.8	38.2	17	28	40									775.1	CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE	73.9
805	805.8	43.2	100/0.4											772.0	WEATHERED ROCK Tan and Gray, METAMORPHOSED GRANITE	77.0
800	800.8	48.2	5	6	13											
795	795.8	53.2	8	17	21											
790	790.8	58.2	8	10	41											
785	785.8	63.2	20	50	50/0.3											
780	780.8	68.2	100/0.4													
775	777.7	71.3	60/0.0													
770																

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.										
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)									
BORING NO. RL_B1A		STATION 336+73		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 849.0 ft		TOTAL DEPTH 91.1 ft		NORTHING 874,693		EASTING 1,776,833										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 06/01/17		COMP. DATE 06/02/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
770														Match Line		
765														765.0	CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE (continued)	84.0
760														761.7	WEATHERED ROCK Brown, METAMORPHOSED GRANITE	87.3
														757.9	CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE	91.1
															Boring Terminated at Elevation 757.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
															Topsoil (0.4 foot)	

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT_GDT 9/29/17

GEOTECHNICAL BORING REPORT

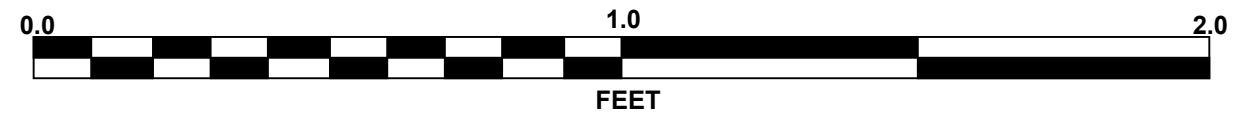
CORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.					
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)				
BORING NO. RL_B1A		STATION 336+73		OFFSET 14 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 849.0 ft		TOTAL DEPTH 91.1 ft		NORTHING 874,693		EASTING 1,776,833					
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER Toothman, R.		START DATE 06/01/17		COMP. DATE 06/02/17		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 19.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
777.7	777.7	71.3	4.8	N=60/0.0 2:29/0.8 2:56 3:42 2:02 2:15	(2.6) 54%	(1.1) 23%	(2.6) 100%	(1.1) 42%		Begin Coring @ 71.3 ft	71.3
775	772.9	76.1	5.0	2:12 2:26 2:46 2:44 2:04	(4.1) 82%	(2.7) 54%	(7.0) 100%	(4.5) 64%		Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing	73.9
770	767.9	81.1	5.0	2:35 2:48 2:36 4:55 4:46	(3.0) 60%	(1.8) 36%	(0.1) 3%	N/A		GSI 25 to 45 7 Fractures at 0 to 20 Degrees	77.0
765	762.9	86.1	5.0	2:31 3:24 2:07 3:14 3:25	(3.8) 76%	(1.2) 24%	(3.8) 100%	(1.2) 32%		SEVERE WEATHERING, SOFT, TAN AND GRAY METAMORPHOSED GRANITE	78.0
760	757.9	91.1								Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection	84.0
										GSI 40 to 60 7 Fractures at 0 to 10 Degrees 4 Fractures at 40 to 60 Degrees	87.3
										SEVERE WEATHERING, SOFT TO VERY SOFT, BROWN, METAMORPHOSED GRANITE	91.1
										Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection	
										GSI 20 to 40 3 Fractures at 0 to 10 Degrees 3 Fractures at 20 to 40 Degrees 3 Fractures at 50 to 70 Degrees	
										Boring Terminated at Elevation 757.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.4 foot)	

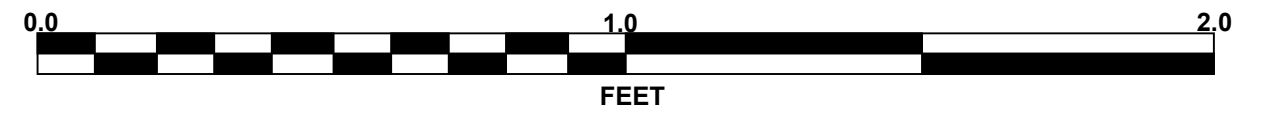
NCDOT CORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT_GDT 9/29/17

CORE PHOTOGRAPHS

RL_B1A
BOX 1: 71.3 to 86.1 FEET



RL_B1A
BOX 2: 86.1 to 91.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

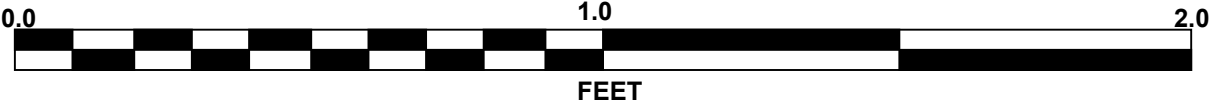
WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.										
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)									
BORING NO. LL_B2A		STATION 338+06		OFFSET 74 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 837.8 ft		TOTAL DEPTH 60.9 ft		NORTHING 874,606		EASTING 1,776,700										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Toothman, R.		START DATE 05/17/17		COMP. DATE 05/18/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
840																
	837.8	0.0	1	2	3									837.8	0.0	GROUND SURFACE
835	834.7	3.1	6	7	8									835.3	2.5	RESIDUAL Yellowish Brown, Fine Sandy, Silty CLAY Yellowish Brown and Gray, Clayey, Fine Sandy SILT
830	829.7	8.1	6	8	12									829.2	8.8	Yellowish Brown and Gray, Silty, Fine to Coarse SAND
825	824.7	13.1	3	5	7											
820	819.7	18.1	9	14	16											
815	814.7	23.1	11	10	15											
810	809.7	28.1	30	60	40/0.2									809.2	28.6	WEATHERED ROCK Yellowish Brown, Tan, Gray, and Brown, METAMORPHOSED GRANITE
805	804.7	33.1	78	22/0.1												
800	799.7	38.1	40	60/0.3												
795	794.7	43.1	65	35/0.2												
790	789.7	48.1	100/0.3													
785	784.7	53.1	60/0.0											784.7	53.1	CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE
780														776.9	60.9	Boring Terminated at Elevation 776.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.7 foot)

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)
BORING NO. LL_B2A		STATION 338+06		OFFSET 74 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 837.8 ft		TOTAL DEPTH 60.9 ft		NORTHING 874,606		EASTING 1,776,700	
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Toothman, R.		START DATE 05/17/17		COMP. DATE 05/18/17		SURFACE WATER DEPTH N/A	
CORE SIZE NQ		TOTAL RUN 7.8 ft		DESCRIPTION AND REMARKS			
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (%)	RQD (%)	SAMP. NO.
784.7	784.7	53.1	2.8	N=60/0.0 1:35/0.8 1:33 1:34	(1.2) 43%	(0.0) 0%	
	781.9	55.9	5.0	3:21 2:46 3:20 2:51 1:30	(3.3) 66%	(0.4) 8%	
780							
	776.9	60.9					
Begin Coring @ 53.1 ft CRYSTALLINE ROCK Moderately Severe Weathering, Medium Hard, Tan and Gray, METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing GSI 10 to 30 6 Fractures at 0 to 10 Degrees Boring Terminated at Elevation 776.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.7 foot)							

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

LL_B2A
BOX 1: 53.1 to 60.9 FEET



GEOTECHNICAL BORING REPORT

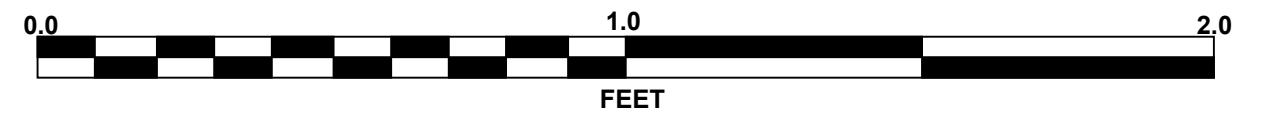
CORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.					
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)				
BORING NO. LL_B2B		STATION 337+95		OFFSET 7 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 840.8 ft		TOTAL DEPTH 71.1 ft		NORTHING 874,673		EASTING 1,776,711					
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER Toothman, R.		START DATE 05/18/17		COMP. DATE 05/19/17		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 7.5 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %			
777.2	777.2	63.6	3.0	2:16	(2.4)	(1.1)	(6.2)	(2.1)		Continued from previous page	
775	774.2	66.6	4.5	2:34 6:58	80%	37%	83%	30%		CRYSTALLINE ROCK Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection	
770	769.7	71.1		3:21 2:46 3:34 2:32 5:22/0.5	(3.8)	(1.0)				GSI 20 to 40 3 Fractures at 10 to 20 Degrees 8 Fractures at 60 to 70 Degrees	71.1
										Weathered Rock Seams Present From 66.0 to 66.6 feet and 70.4 and 71.1 feet (continued)	
										Boring Terminated at Elevation 769.7 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.4 foot)	

NCDOT CORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

LL_B2B
BOX 1: 63.6 to 71.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.									
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)								
BORING NO. RL_B2A		STATION 337+85		OFFSET 27 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 840.9 ft		TOTAL DEPTH 66.0 ft		NORTHING 874,707		EASTING 1,776,721									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Toothman, R.		START DATE 05/18/17		COMP. DATE 05/22/17		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
845															
840	840.9	0.0	2	2	3									840.9	GROUND SURFACE
	837.8	3.1	6	11	14										RESIDUAL Yellowish Brown and Gray, Fine to Coarse Sandy, Silty CLAY
835	832.8	8.1	2	2	2										
830	827.8	13.1	3	5	4										Brown to Gray, Clayey, Fine Sandy SILT with Manganese
825	822.8	18.1	2	5	6										Yellowish Brown and Gray, Silty, Fine to Coarse SAND
820	817.8	23.1	4	6	9										
815	812.8	28.1	9	12	21										
810	807.8	33.1	17	25	69										
805	802.8	38.1	100/0.2												WEATHERED ROCK Gray, Tan, and Brown, METAMORPHOSED GRANITE
800	797.8	43.1	75	25/0.2											
795	792.8	48.1	100/0.5												
790	787.8	53.1	60/0.1												CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE
785															
780															
775															Boring Terminated at Elevation 774.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.7 foot)

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)
BORING NO. RL_B2A		STATION 337+85		OFFSET 27 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 840.9 ft		TOTAL DEPTH 66.0 ft		NORTHING 874,707		EASTING 1,776,721	
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Toothman, R.		START DATE 05/18/17		COMP. DATE 05/22/17		SURFACE WATER DEPTH N/A	
CORE SIZE NQ		TOTAL RUN 12.8 ft		DESCRIPTION AND REMARKS			
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.
787.7	787.7	53.2	2.8	1:08/0.8 1:31 1:52	(2.4) 86%	(1.9) 68%	
785	784.9	56.0	5.0	2:16 2:19 3:09 2:49 2:56	(3.0) 60%	(1.2) 24%	
780	779.9	61.0	5.0	2:27 2:15 2:16 1:27 1:03	(3.7) 74%	(3.1) 62%	
775	774.9	66.0					

Continued from previous page

CRYSTALLINE ROCK
Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Close Fracture Spacing

GSI 30 to 50
7 Fractures at 0 to 20 Degrees
6 Fractures at 60 to 80 Degrees (continued)

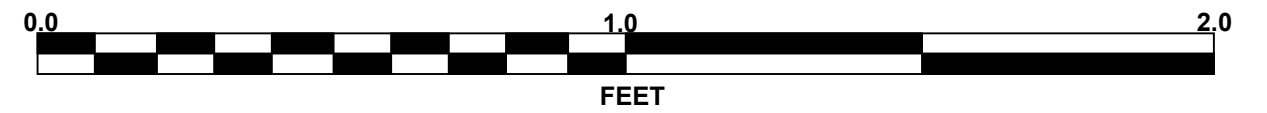
Boring Terminated at Elevation 774.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)

Topsoil (0.7 foot)

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

RL_B2A
BOX 1: 53.2 to 66.0 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.											
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)										
BORING NO. RL_B2B		STATION 337+65		OFFSET 72 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 839.4 ft		TOTAL DEPTH 65.9 ft		NORTHING 874,752		EASTING 1,776,741											
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Toothman, R.		START DATE 05/24/17		COMP. DATE 05/25/17		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
840	839.4	0.0												839.4	0.0	GROUND SURFACE	
	836.3	3.1	WOH	WOH	1											RESIDUAL Gray, White, and Yellowish Brown, Coarse to Fine Sandy, Silty CLAY	
835			3	6	8												
830	831.3	8.1	2	2	3												
825	826.3	13.1	3	3	5									827.9	11.5	Yellowish Brown and Gray, Silty, Fine to Coarse Sand	
820	821.3	18.1	4	6	6												
815	816.3	23.1	7	8	9												
810	811.3	28.1	10	7	5												
805	806.3	33.1	9	9	14												
800	801.3	38.1	60/0.1														CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE
795	796.3	43.1	60/0.1														Red, QUARTZ Tan and Gray, METAMORPHOSED GRANITE
790	791.3	48.1	60/0.0														CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE
785																	
780																	Light Gray, QUARTZ
775																	Tan and Gray, METAMORPHOSED GRANITE
																	Boring Terminated at Elevation 773.5 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
																	Topsoil (0.8 foot)

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.								
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)							GROUND WTR (ft)							
BORING NO. RL_B2B		STATION 337+65		OFFSET 72 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 839.4 ft		TOTAL DEPTH 65.9 ft		NORTHING 874,752		EASTING 1,776,741								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Toothman, R.		START DATE 05/24/17		COMP. DATE 05/25/17		SURFACE WATER DEPTH N/A								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 17.8 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS			
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		ELEV. (ft)	DEPTH (ft)		
791.3												Continued from previous page		
790	791.3	48.1	2.8	N=60/0.0 1:01/0.8 2:48 3:22	(1.6) 57%	(0.8) 29%		(7.4) 80%	(2.8) 30%			791.3	48.1	CRYSTALLINE ROCK Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Close Fracture Spacing
785	788.5	50.9	5.0	2:12 2:14 8:38 6:44 4:28	(4.0) 80%	(0.7) 14%								GSI 20 to 40 11 Fractures at 50 to 70 Degrees 3 Fractures at 30 to 50 Degrees 2 Fractures at 0 to 10 Degrees
780	783.5	55.9	5.0	1:43 2:16 3:04 1:10 1:45	(2.3) 46%	(1.3) 26%		(1.0) 27%	N/A			782.0	57.4	Moderately Severe Weathering, Moderately Hard, Light Gray QUARTZ with Very Close Fracture Spacing
775	778.5	60.9	5.0	2:13 2:27 3:13 7:10 3:07	(5.0) 100%	(2.2) 44%		(4.8) 100%	(2.2) 46%			778.3	61.1	GSI 10 to 30 2 Fractures at 80 to 90 Degrees 2 Fractures at 0 to 5 Degrees
	773.5	65.9					RS-2					773.5	65.9	Slight to Moderate Weathering, Hard to Moderately Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Close Fracture Spacing
														GSI 30 to 50 8 Fractures at 50 to 70 Degrees 6 Fractures at 10 to 30 Degrees Boring Terminated at Elevation 773.5 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
														Topsoil (0.8 foot)

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

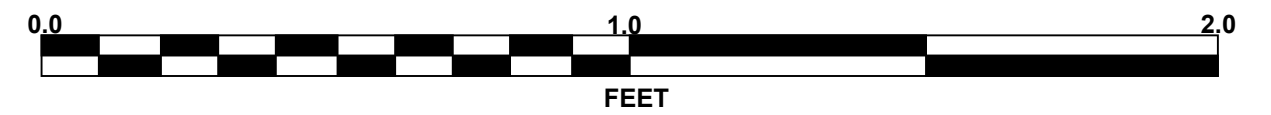
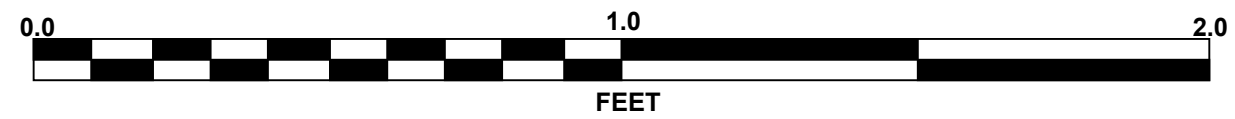
NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITES.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

RL_B2B
BOX 1: 48.1 to 62.5 FEET



RL_B2B
BOX 2: 62.5 to 65.9 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)						GROUND WTR (ft)	
BORING NO. LL_EB2A		STATION 338+38		OFFSET 75 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 839.8 ft		TOTAL DEPTH 43.7 ft		NORTHING 874,605		EASTING 1,776,668	
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Toothman, R.		START DATE 05/16/17		COMP. DATE 05/16/17		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
840	839.8	0.0	2	4	4									GROUND SURFACE	0.0
														RESIDUAL Yellowish Brown and Gray, Coarse to Fine Sandy, Silty CLAY with Trace Gravel Gray, White, and Brown to Yellowish Brown and Gray, Clayey, Fine Sandy SILT	2.5
835	836.3	3.5	3	4	5										
830	831.3	8.5	5	8	8										
825	826.3	13.5	3	3	4										
820	821.3	18.5	3	12	22									Yellowish Brown and Gray, Silty, Fine to Coarse SAND	16.0
815	816.3	23.5	7	18	21										
810	811.3	28.5	16	40	60										
805	806.3	33.5	100/0.3											WEATHERED ROCK Yellowish Brown and Gray, METAMORPHOSED GRANITE	32.0
800	801.3	38.5	100/0.3												
	796.3	43.5	100/0.2											Boring Terminated at Elevation 796.1 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)	43.7
														Topsoil (0.7 foot)	

WBS 34821.1.1		TIP U-2525C		COUNTY GUILFORD		GEOLOGIST Wright, F.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)						GROUND WTR (ft)	
BORING NO. EB6-C		STATION 338+25		OFFSET CL		ALIGNMENT -L-	
COLLAR ELEV. 838.0 ft		TOTAL DEPTH 37.3 ft		NORTHING 874,680		EASTING 1,776,681	
DRILL RIG/HAMMER EFF./DATE SME275 CME-55 89% 01/15/2016				DRILL METHOD Wash Boring		HAMMER TYPE Automatic	
DRILLER Williams, T.		START DATE 12/08/15		COMP. DATE 12/08/15		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
840														GROUND SURFACE	0.0
														RESIDUAL Gray-Tan Fine to Coarse Sandy CLAY	5.5
835	836.9	1.1	4	9	12										
	834.8	3.2	7	8	18										
830	831.8	6.2	4	5	6									Gray-White Silty Fine SAND with Little Clay, Manganese Seams at 18 feet	5.5
	829.8	8.2	3	2	3										
825	824.8	13.2	6	10	11										
820	819.8	18.2	11	8	7										
815	814.8	23.2	11	10	13										
810	810.8	27.2	55	45/0.2										WEATHERED ROCK (Metamorphosed Granite)	27.0
805	804.8	33.2	100/0.2												
	800.8	37.2	60/0.1											CRYSTALLINE ROCK (Metamorphosed Granite)	37.2
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 800.7 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	37.3

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT_GDT 9/29/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34821.1.1	TIP U-2525C	COUNTY GUILFORD	GEOLOGIST Kubinski, D.
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2)			GROUND WTR (ft)
BORING NO. RL_EB2B	STATION 337+97	OFFSET 77 ft RT	ALIGNMENT -L- 0 HR. 2.2
COLLAR ELEV. 837.9 ft	TOTAL DEPTH 48.6 ft	NORTHING 874,757	EASTING 1,776,709 24 HR. 0.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Toothman, R.	START DATE 05/15/17	COMP. DATE 05/15/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
840																
	837.9	0.0	1	1	1									837.9	0.0	GROUND SURFACE
835	834.4	3.5	9	12	11											RESIDUAL Yellowish Brown and Gray, Coarse to Fine Sandy, Silty CLAY
830	829.4	8.5	3	2	3									831.4	6.5	Gray, Brown, and White, Silty, Fine to Coarse SAND
825	824.4	13.5	4	5	5											
820	819.4	18.5	5	5	7											
815	814.4	23.5	7	7	5											
810	809.4	28.5	10	10	12											
805	804.4	33.5	23	30	56											
800	799.4	38.5	100/0.3											801.4	36.5	WEATHERED ROCK Brown and Gray, METAMORPHOSED GRANITE
795	794.4	43.5	100/0.3													
790	789.4	48.5	60/0.1											789.4	48.5	CRYSTALLINE ROCK METAMORPHOSED GRANITE
														789.3	48.6	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 789.3 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
																Topsail (0.6 foot)

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

SHEET 28

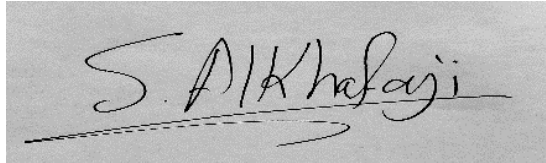
PROJECT NO.: 34821.1.1 (U-2525C)

COUNTY: GUILFORD

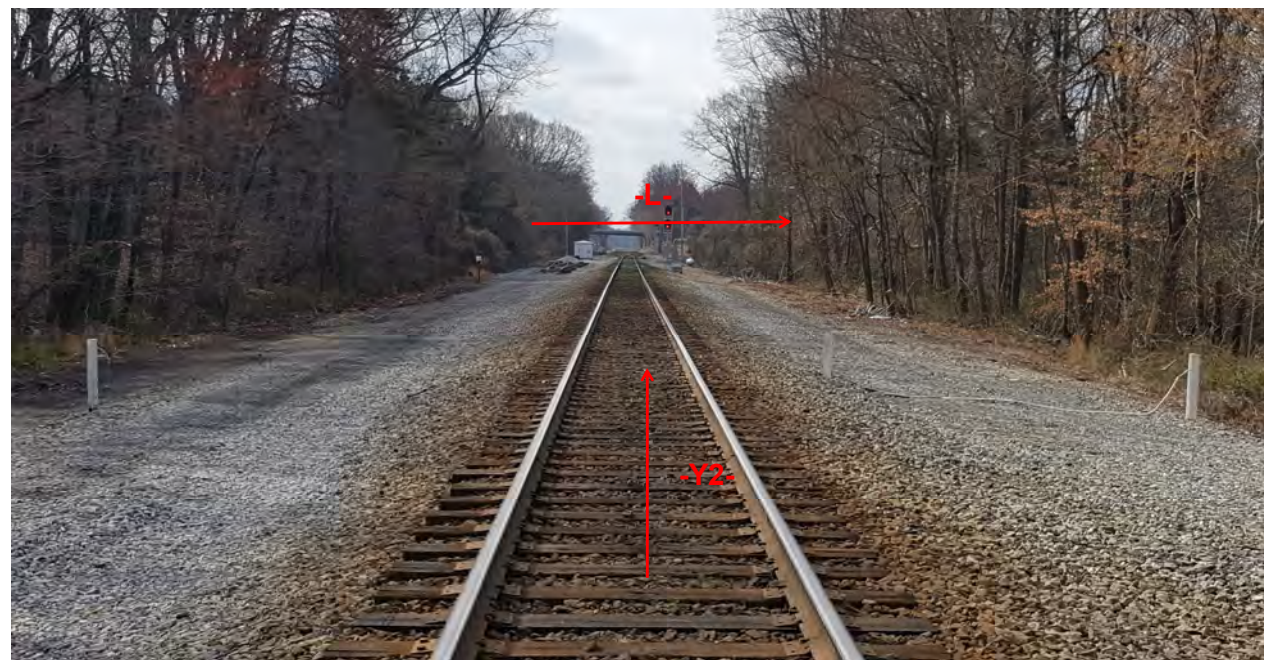
SITE #3 (STRUCTURE #4 & #5) - BRIDGE NO. 1243 AND 1244 ON I-85 BYPASS (-L-) OVER NORFOLK SOUTHERN RAILROAD (-Y2-)

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Splitting Tensile Strength (PSI)	Remarks
RS-1	RL_B1A	76.5-76.8	GRANITE	PzZG	54	3.96	1.98	165.3	5,739	N/A	N/A	GSI from 40 to 60
RS-2	RL_B2B	65.0-65.3	GRANITE	PzZG	44	4.04	2.00	159.7	2,335	N/A	N/A	GSI from 30 to 50

Lab Technician: Saja Alkhafaji



SITE PHOTOGRAPHS



View Looking South along -Y2- from Hillcroft Road



View Looking West on East Side of Bridge along -L-