

REFERENCE: P-5705B

PROJECT: 44475

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2-2A	SOIL & ROCK, AND GSI LEGEND
3	SITE PLAN
4-8	CROSS SECTIONS
9-17	BORE LOGS, CORE LOGS AND CORE PHOTOGRAPHS
18	SOIL TEST RESULTS
19	SITE PHOTOGRAPHS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
 PROJECT DESCRIPTION CHARLOTTE GATEWAY
STATION AND TRACK AND SAFETY
IMPROVEMENTS
 SITE DESCRIPTION BRIDGE ON STATION TRACK 1
(-S1-) OVER WEST TRADE STREET BETWEEN
WEST 4TH STREET AND WEST 5TH STREET

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5705B	1	19

CAUTION NOTICE

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

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

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

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

PERSONNEL

<u>RIGGS, A. F.</u>	<u>DUGGINS, W. T.</u>
<u>WERITZ, M. A.</u>	<u>J. R. TURNAGE</u>
<u>WEAVER, L. A.</u>	<u>EKLUND, M. A.</u>
<u>SCHLEMM, T. S.</u>	<u>MASHBURN, S. R.</u>
<u>McMILLIAN, M. F.</u>	<u>STUDNICKY, R. T.</u>
	<u>COGAR, T. E.</u>

INVESTIGATED BY TERRACON CONSULTANTS
 DRAWN BY FIELDS, W. D.
 CHECKED BY RIGGS, A. F.
 SUBMITTED BY TERRACON CONSULTANTS
 DATE DECEMBER 2017

Prepared in the Office of:

Terracon
 Consulting Engineers and Scientists
 2401 BRENTWOOD ROAD, SUITE 107
 RALEIGH, NORTH CAROLINA 27604
 NC REGISTERED ENGINEERING FIRM: P-0869
 NC REGISTERED GEOLOGIC FIRM: C-367



DocuSigned by:
Abner F. Riggs, Jr. 12/18/2017
 5228073BBA4F482... 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

Table containing: SOIL DESCRIPTION, SOIL LEGEND AND AASHTO CLASSIFICATION, GRADATION, MINERALOGICAL COMPOSITION, COMPRESSION, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, ROCK DESCRIPTION, WEATHERING, ROCK HARDNESS, FRACTURE SPACING, BEDDING, INDURATION, and TERMS AND DEFINITIONS.

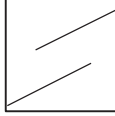
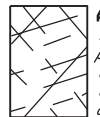
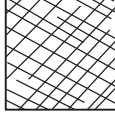
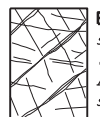




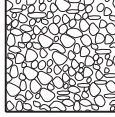
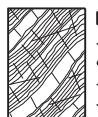
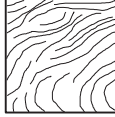

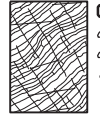


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SUBSURFACE INVESTIGATION

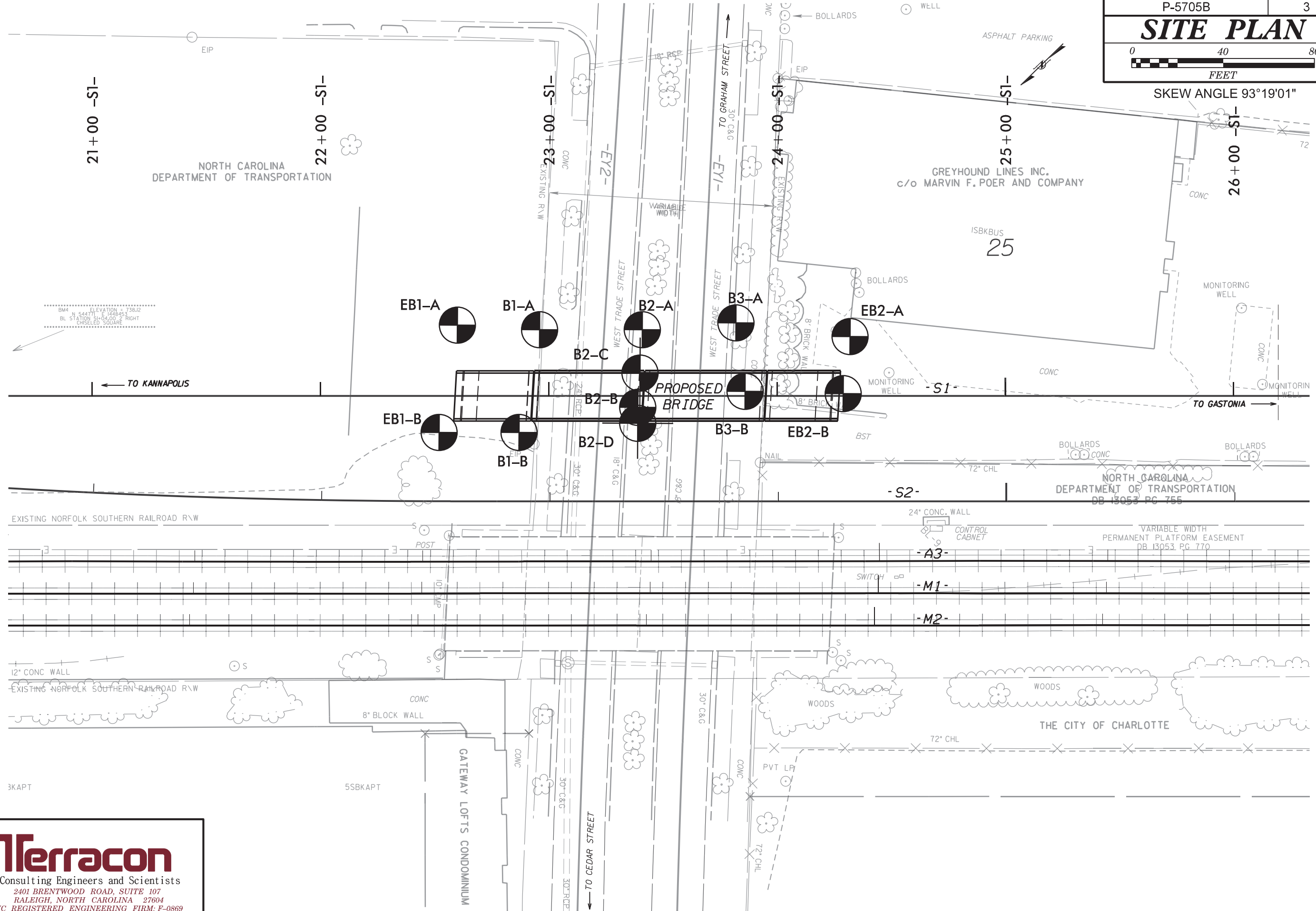
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

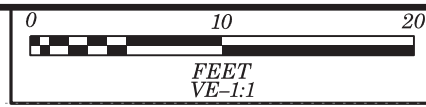
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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	50	40			
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		60	50			 C. Sandstone and siltstone in similar amounts		40	30			
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			40	30		 D. Siltstone or silty shale with sandstone layers			20			
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				20		 E. Weak siltstone or clayey shale with sandstone layers				10		
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A				 F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure						
							 G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						
							 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.						
							 Means deformation after tectonic disturbance						

PROJECT REFERENCE NO.	SHEET NO.
P-5705B	3
SITE PLAN	



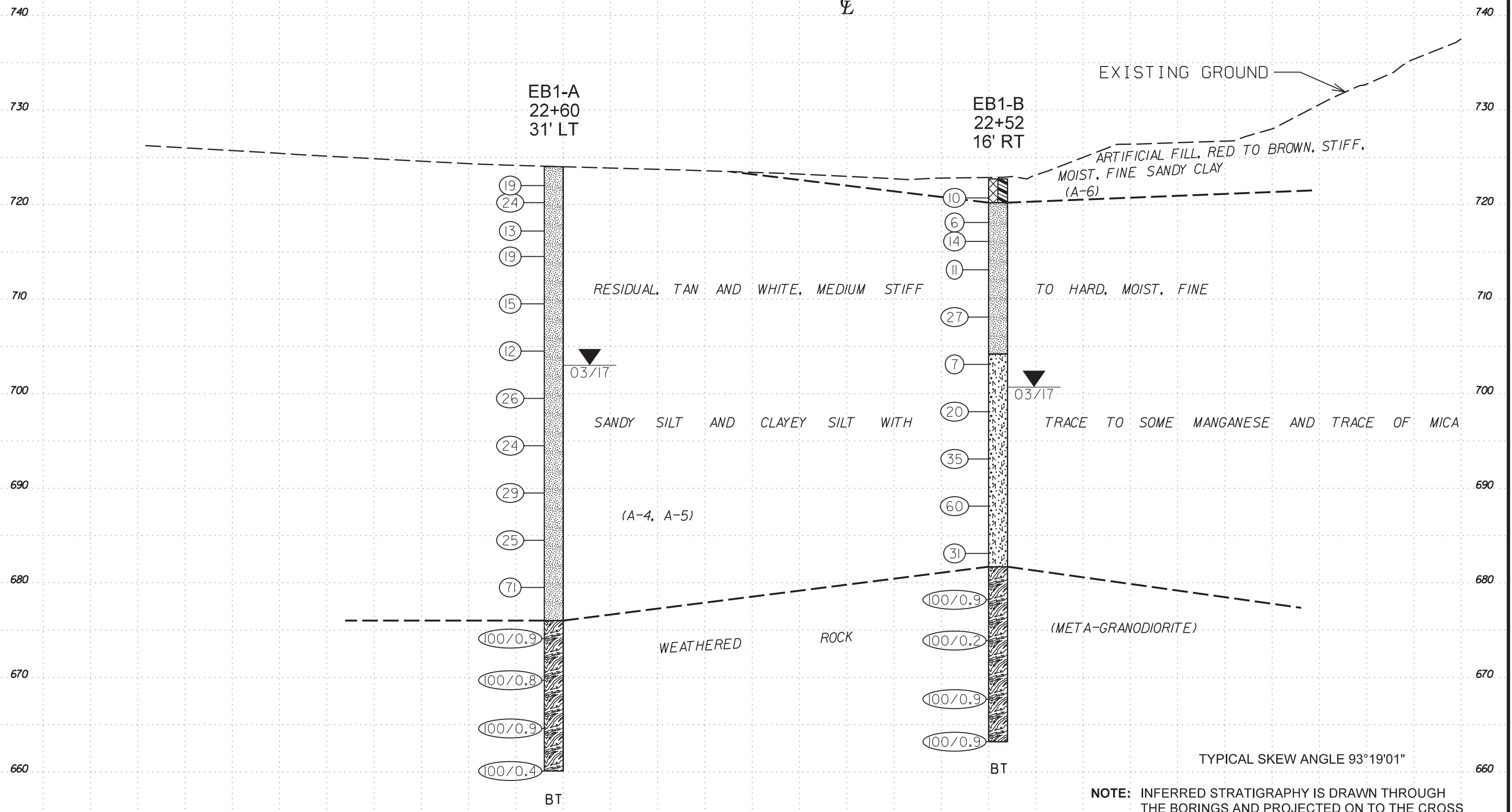
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PROJECT REFERENCE NO. P-5705B	SHEET NO. 4
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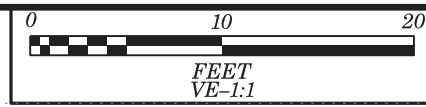
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CROSS SECTION THROUGH END BENT 1 AT STA. 22+59 -S1-



TYPICAL SKEW ANGLE 93°19'01"

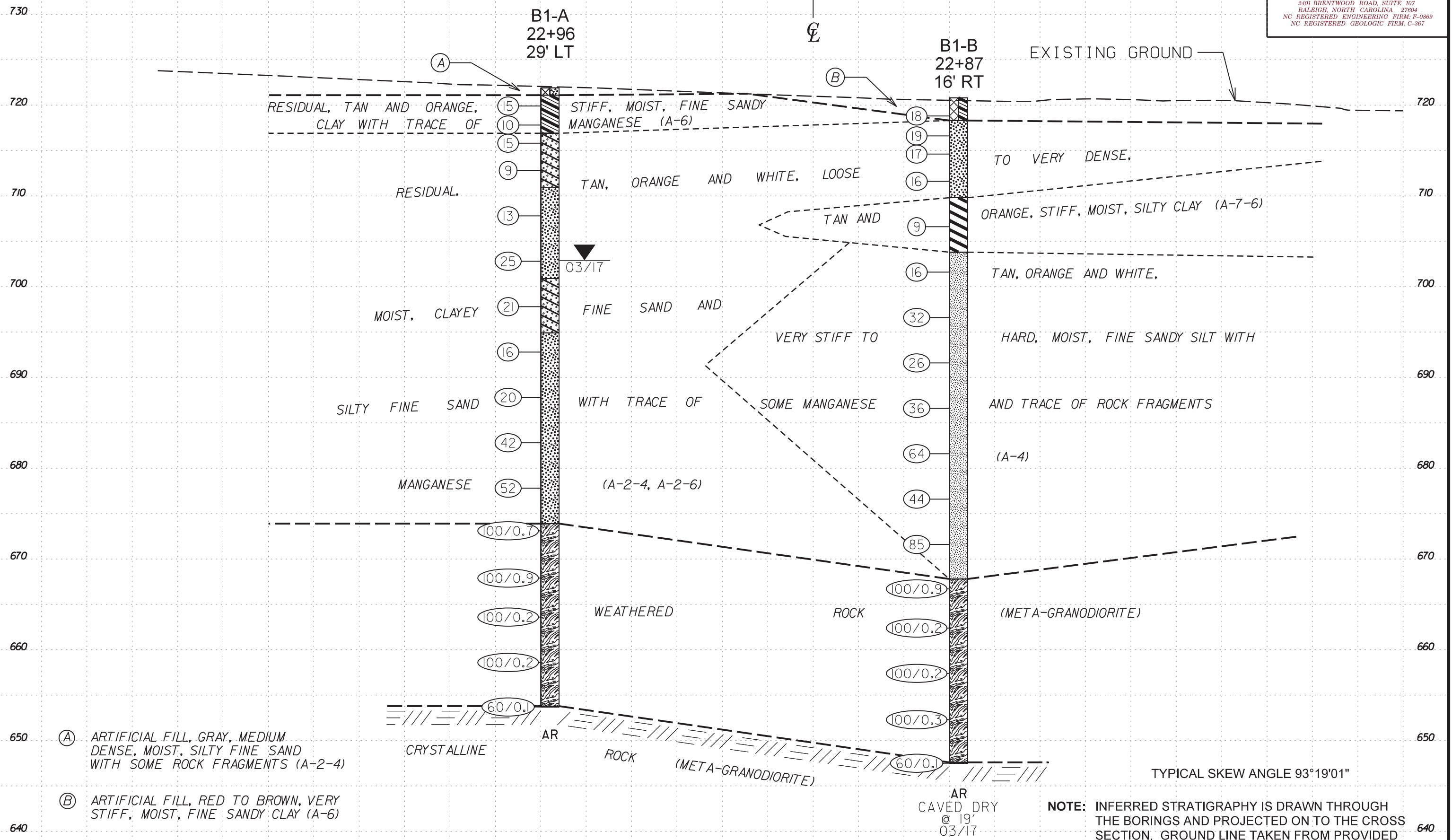
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE p5705b Is tin.tin (DATED 01/12/2017)



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P-5705B	5

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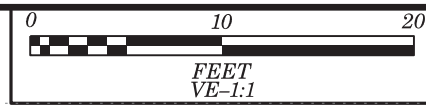
CROSS SECTION THROUGH BENT 1 AT STA. 22+93 -S1-



- (A) ARTIFICIAL FILL, GRAY, MEDIUM DENSE, MOIST, SILTY FINE SAND WITH SOME ROCK FRAGMENTS (A-2-4)
- (B) ARTIFICIAL FILL, RED TO BROWN, VERY STIFF, MOIST, FINE SANDY CLAY (A-6)

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE p5705b Is tin.tin (DATED 01/12/2017)

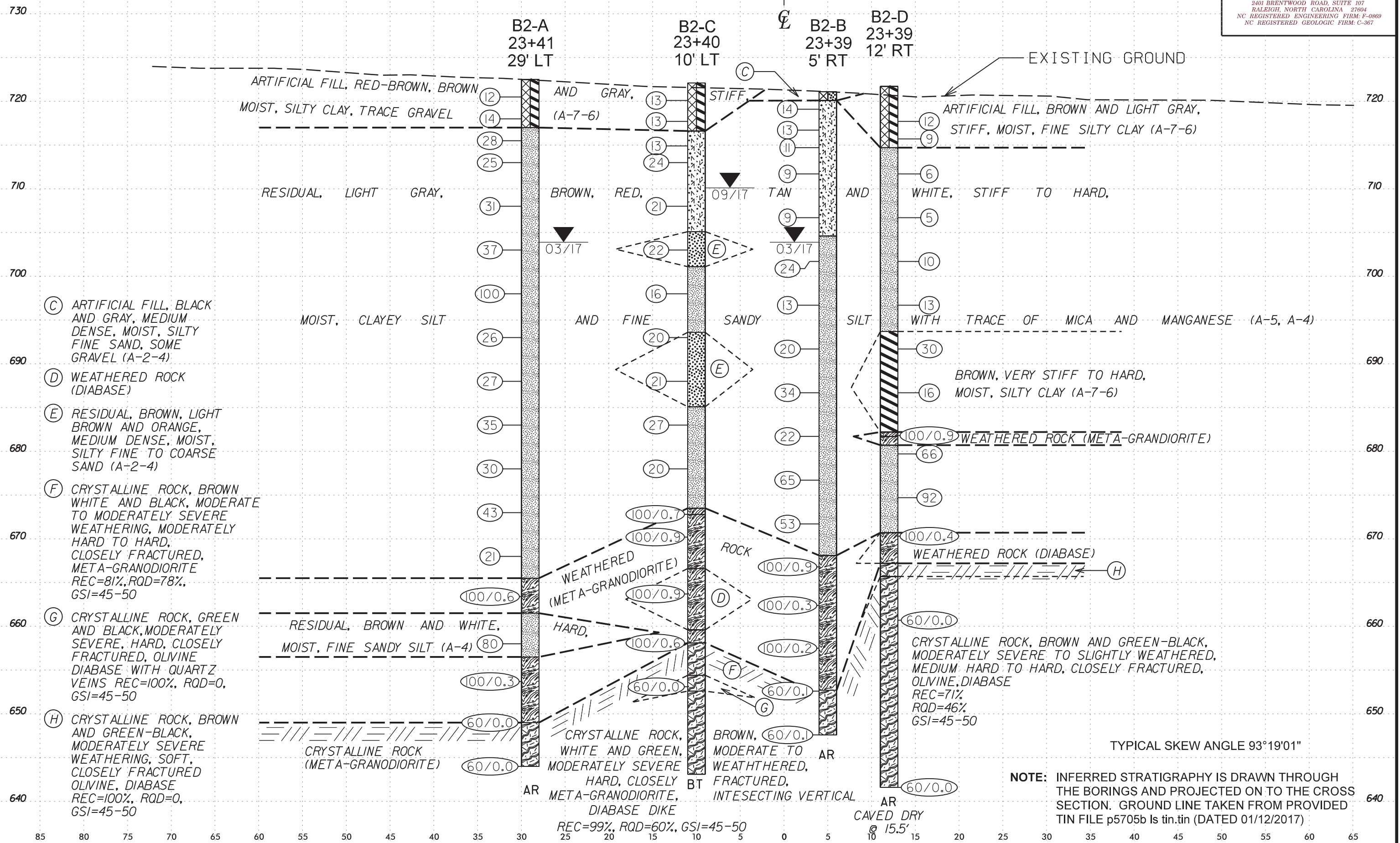
TYPICAL SKEW ANGLE 93°19'01"

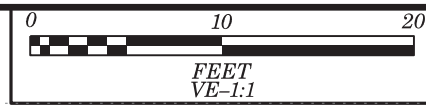


PROJECT REFERENCE NO.	SHEET NO.
P-5705B	6

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CROSS SECTION THROUGH BENT 2 AT STA. 23+41 -S1-

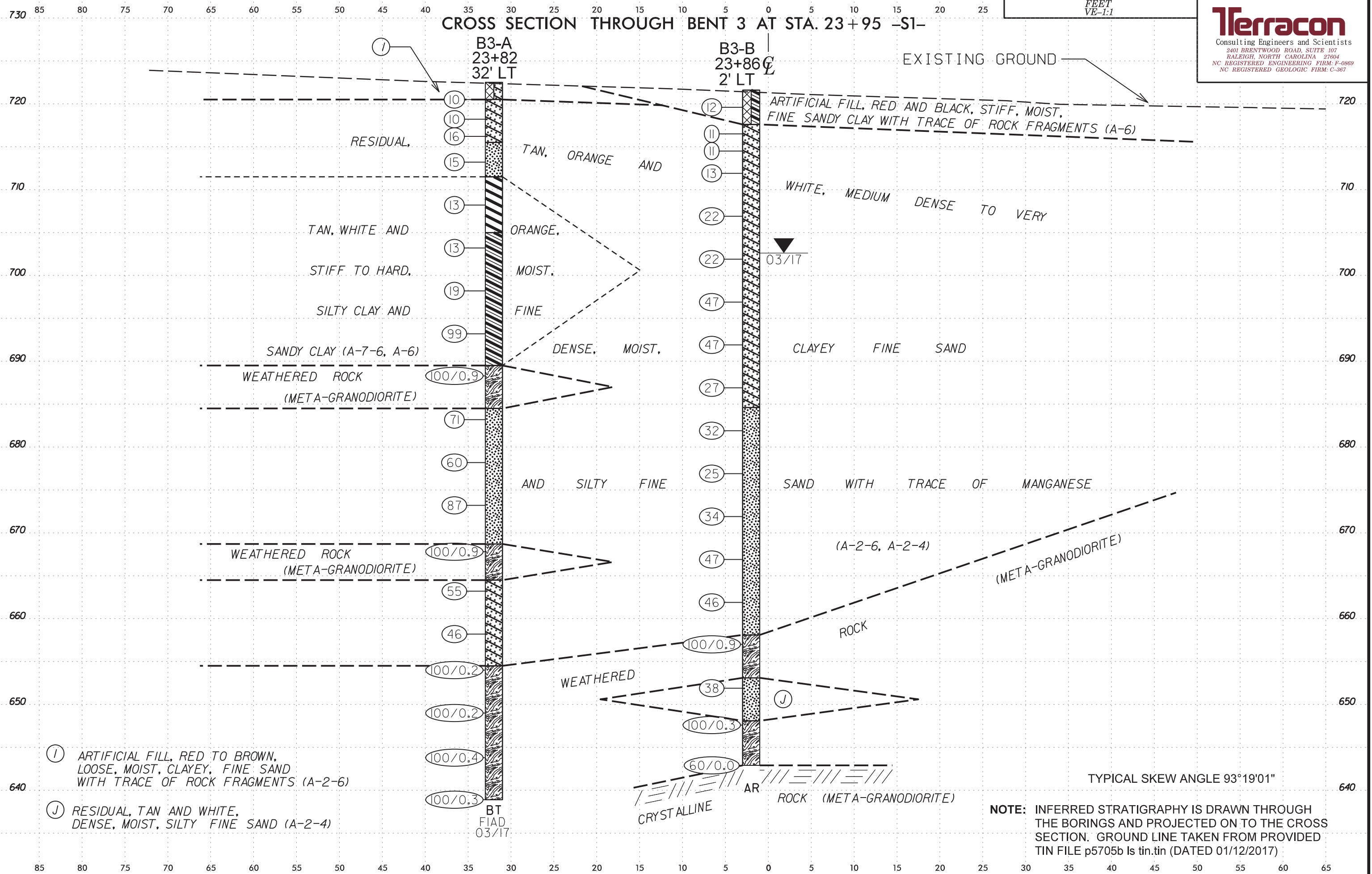




PROJECT REFERENCE NO. P-5705B	SHEET NO. 7
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CROSS SECTION THROUGH BENT 3 AT STA. 23+95 -S1-

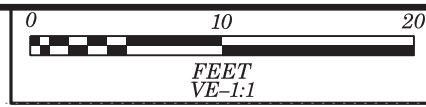


- ① ARTIFICIAL FILL, RED TO BROWN, LOOSE, MOIST, CLAYEY, FINE SAND WITH TRACE OF ROCK FRAGMENTS (A-2-6)
- ② RESIDUAL, TAN AND WHITE, DENSE, MOIST, SILTY FINE SAND (A-2-4)

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE p5705b Is tin.tin (DATED 01/12/2017)

TYPICAL SKEW ANGLE 93°19'01"

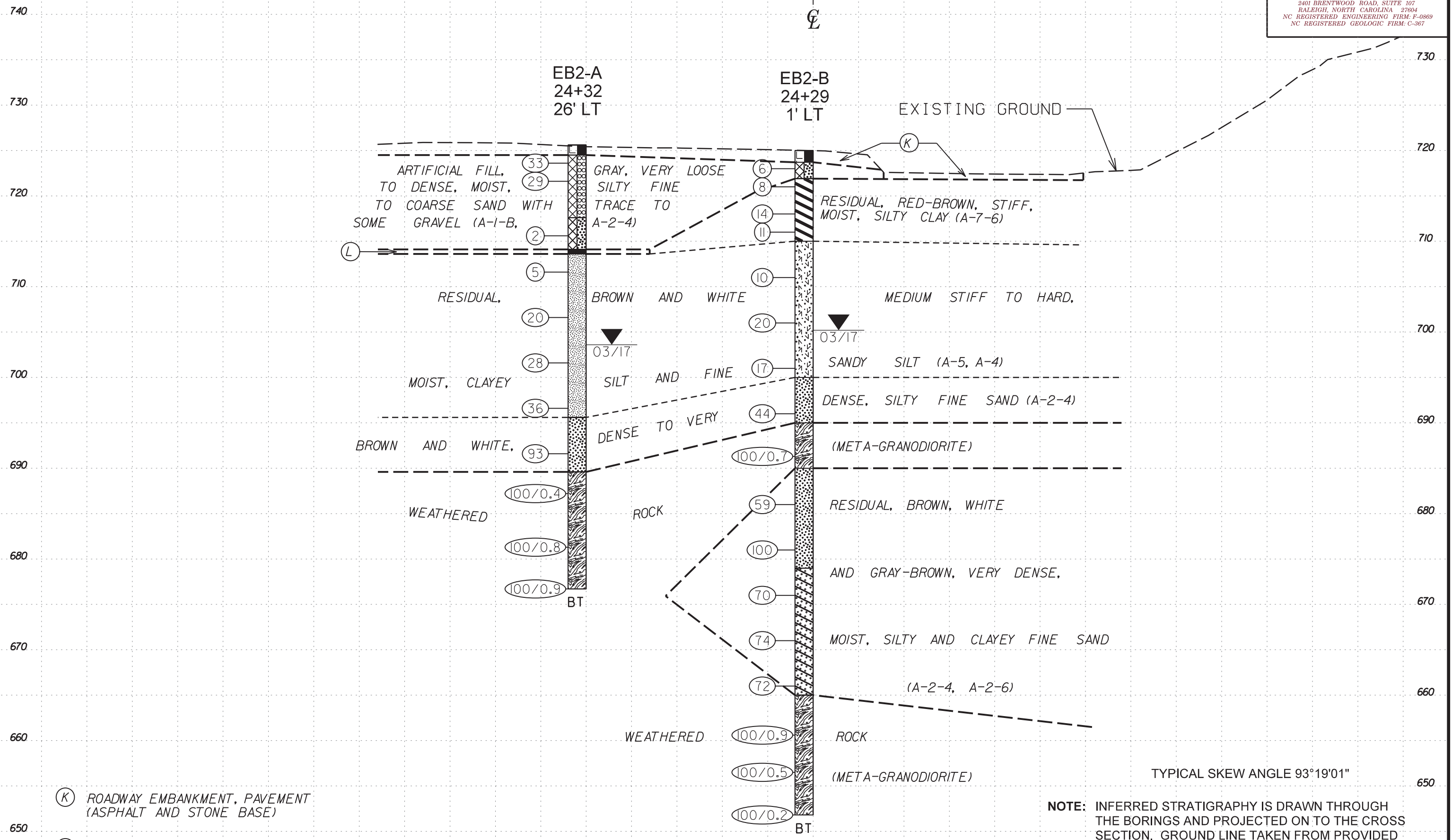
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PROJECT REFERENCE NO. P-5705B	SHEET NO. 8
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CROSS SECTION THROUGH END BENT 2 AT STA. 24+29 -S1-



- (K) ROADWAY EMBANKMENT, PAVEMENT (ASPHALT AND STONE BASE)
- (L) CONCRETE SLAB (POSSIBLE ANCHOR FOR UST)

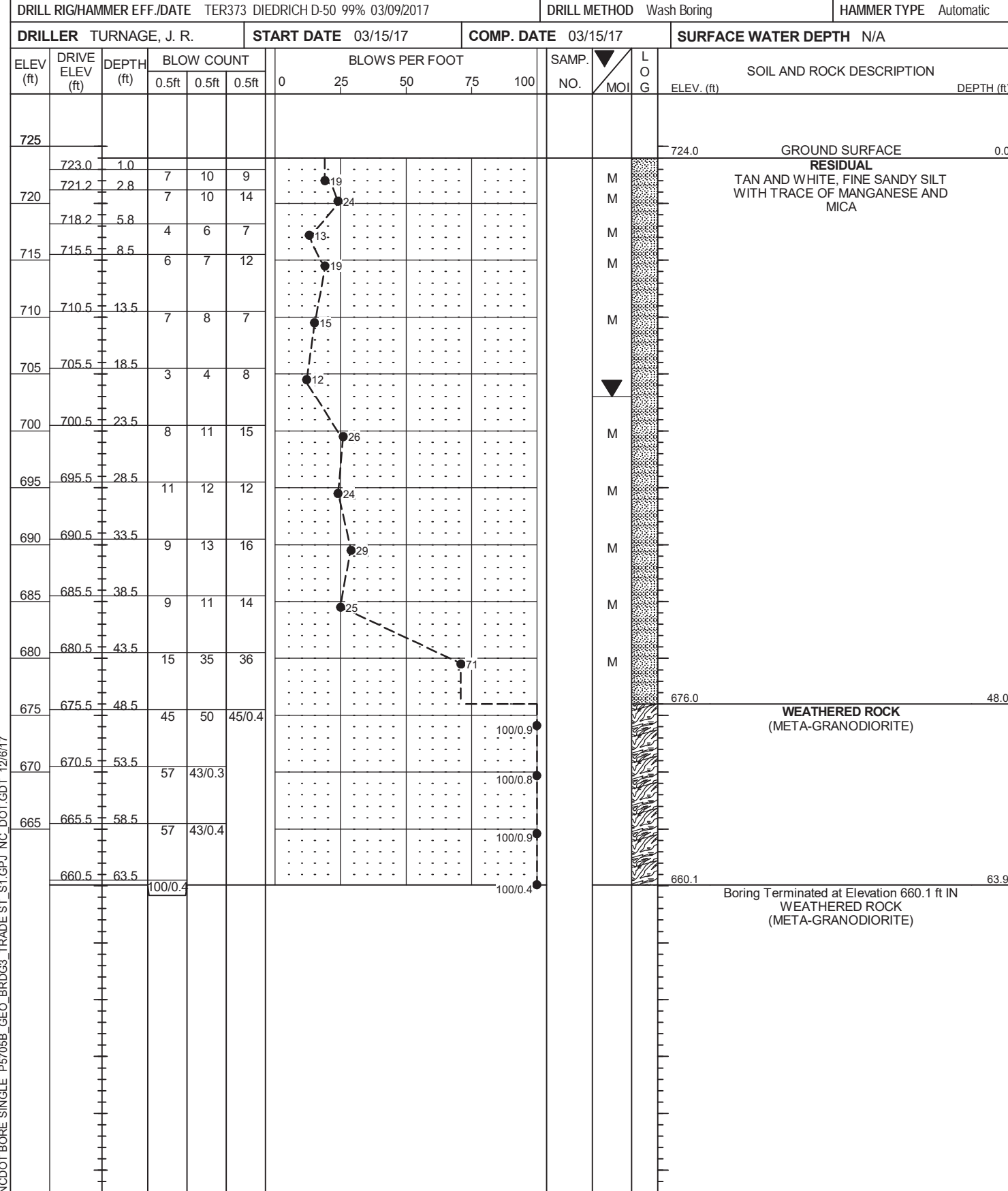
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE p5705b Is tin.tin (DATED 01/12/2017)

TYPICAL SKEW ANGLE 93°19'01"

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 65

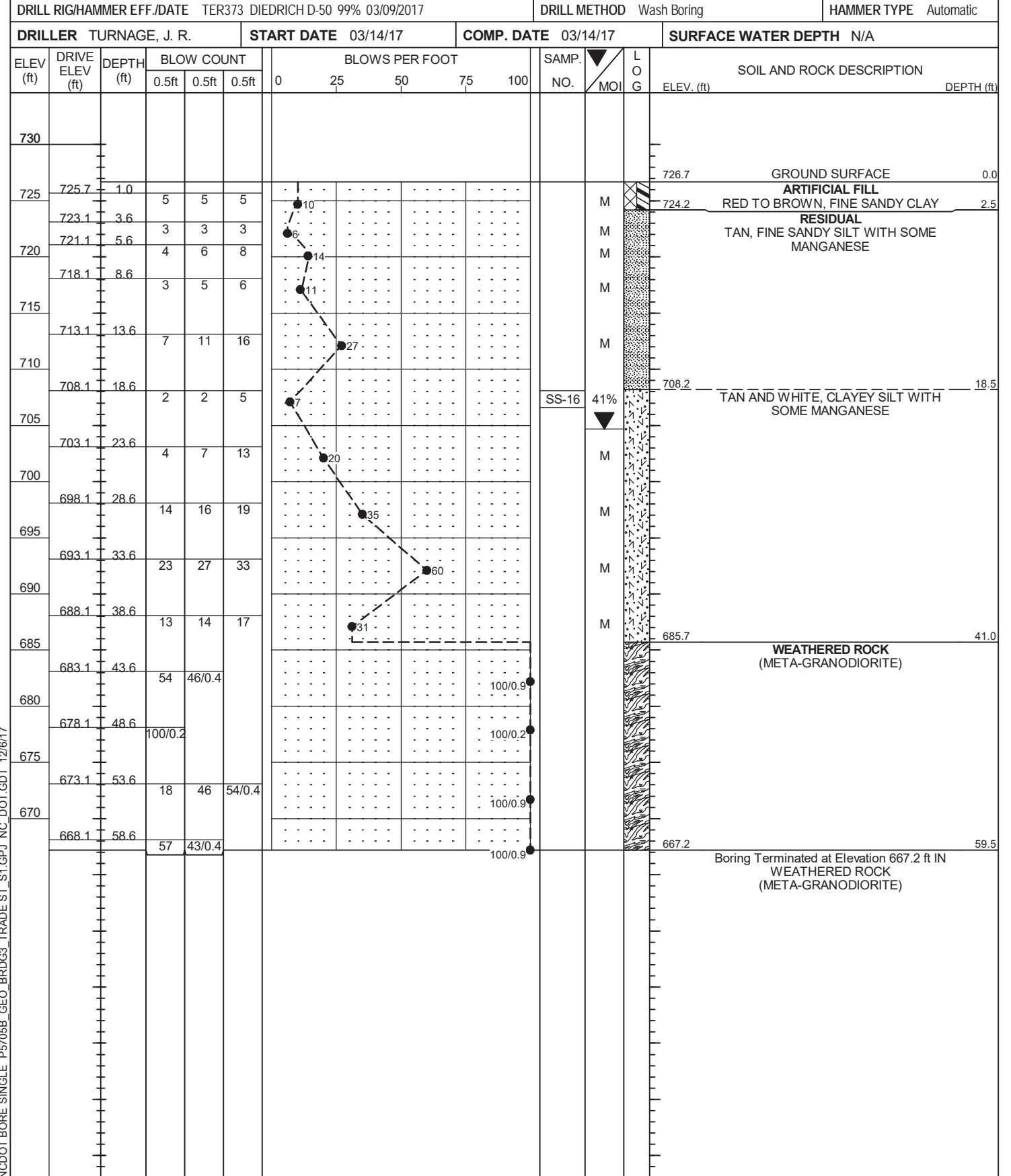
GEOTECHNICAL BORING REPORT BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WEAVER, L. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. EB1-A	STATION 22+60	OFFSET 31 ft LT	ALIGNMENT -S1-
COLLAR ELEV. 724.0 ft	TOTAL DEPTH 63.9 ft	NORTHING 544,392	EASTING 1,448,215
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 03/15/17	COMP. DATE 03/15/17	SURFACE WATER DEPTH N/A



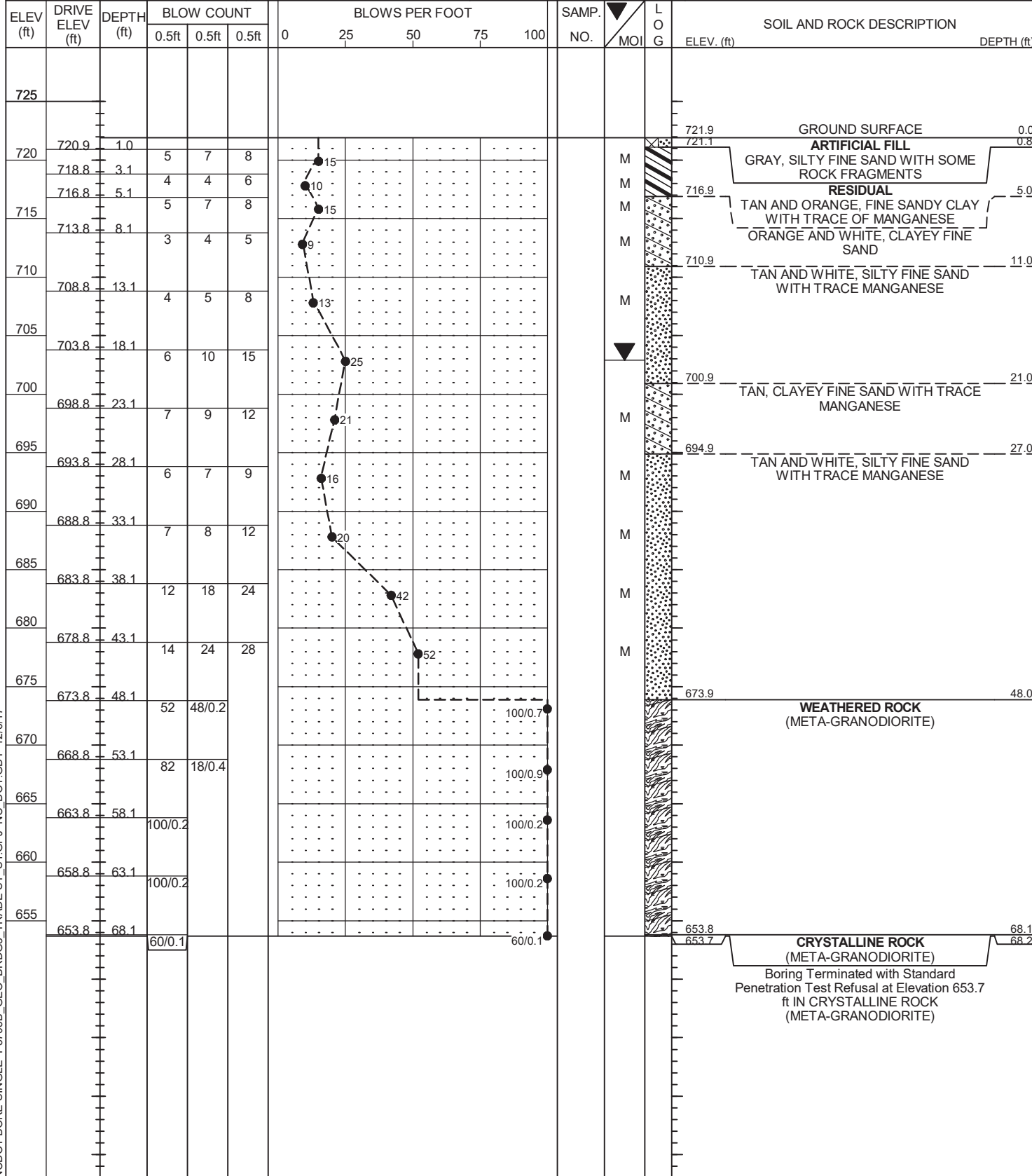
GEOTECHNICAL BORING REPORT BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WEAVER, L. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. EB1-B	STATION 22+52	OFFSET 16 ft RT	ALIGNMENT -S1-
COLLAR ELEV. 726.7 ft	TOTAL DEPTH 59.5 ft	NORTHING 544,431	EASTING 1,448,187
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 03/14/17	COMP. DATE 03/14/17	SURFACE WATER DEPTH N/A



GEOTECHNICAL BORING REPORT
BORE LOG

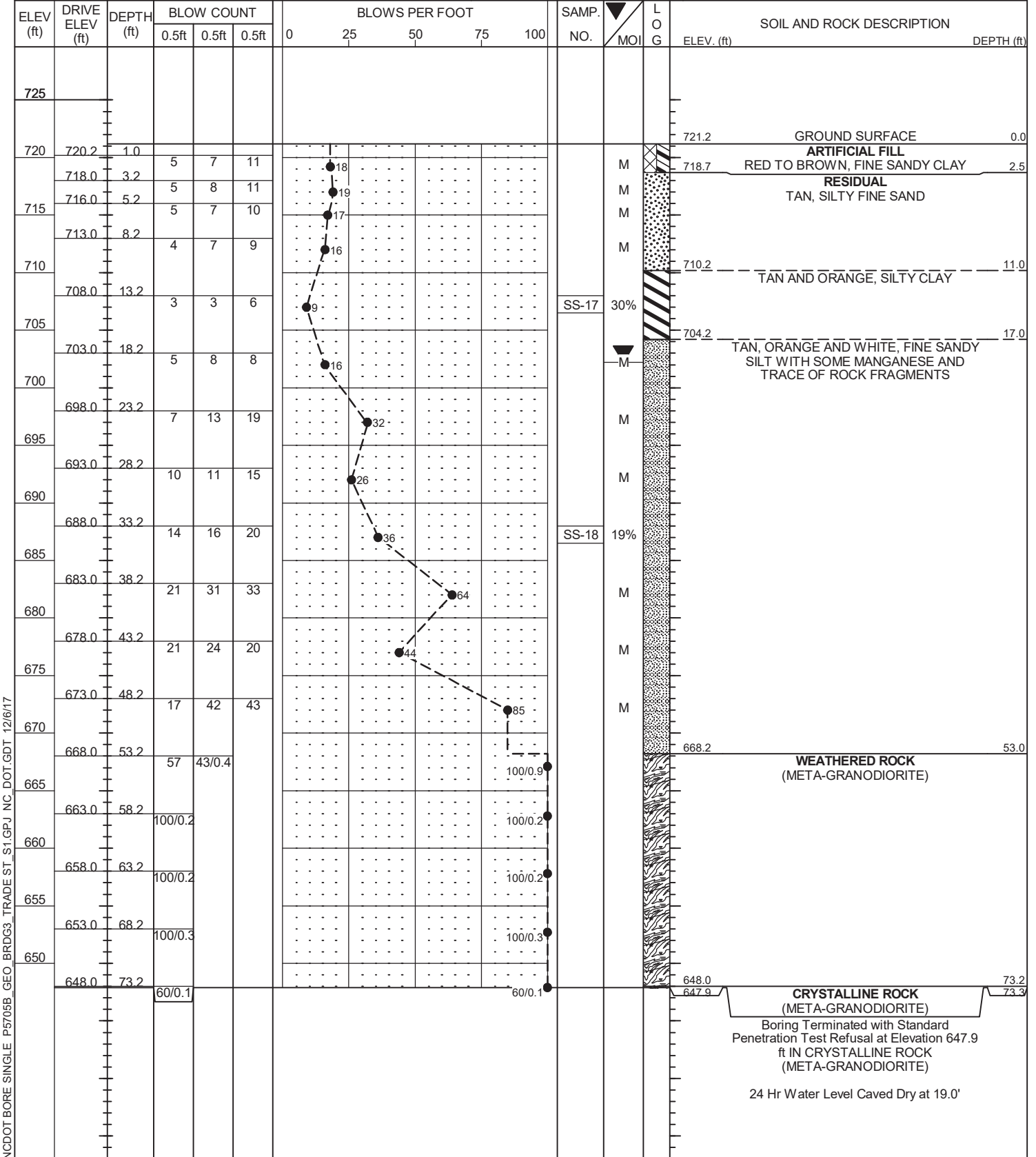
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SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B1-A	STATION 22+96	OFFSET 29 ft LT	ALIGNMENT -S1-
COLLAR ELEV. 721.9 ft	TOTAL DEPTH 68.2 ft	NORTHING 544,368	EASTING 1,448,188
DRILL RIG/HAMMER EFF./DATE TER373 DIETRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 03/27/17	COMP. DATE 03/27/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WEAVER, L. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B1-B	STATION 22+87	OFFSET 16 ft RT	ALIGNMENT -S1-
COLLAR ELEV. 721.2 ft	TOTAL DEPTH 73.3 ft	NORTHING 544,406	EASTING 1,448,162
DRILL RIG/HAMMER EFF./DATE TER373 DIETRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 03/21/17	COMP. DATE 03/21/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

Boring Terminated with Standard Penetration Test Refusal at Elevation 647.9 ft IN CRYSTALLINE ROCK (META-GRANODIORITE)
24 Hr Water Level Caved Dry at 19.0'

0011DEL_P28



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WERITZ, M. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B2-A	STATION 23+41	OFFSET 29 ft LT	ALIGNMENT -S1-
COLLAR ELEV. 722.5 ft	TOTAL DEPTH 78.5 ft	NORTHING 544,336	EASTING 1,448,157
DRILL RIG/HAMMER EFF./DATE TER346 DIETRICH D-50 90% 03/10/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER EKLUND, M. A.	START DATE 03/16/17	COMP. DATE 03/17/17	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						
725																
720	721.5	1.0	2	6	6											722.5
	719.0	3.5	4	5	9											
	716.5	6.0	9	10	18											
715	714.0	8.5	7	10	15											
	709.0	13.5	12	14	17											
710	704.0	18.5	17	17	20											
	699.0	23.5	33	23	77											
695	694.0	28.5	6	12	14											
	689.0	33.5	12	12	15											
685	684.0	38.5	11	13	22											
	679.0	43.5	10	12	18											
680	674.0	48.5	14	18	25											
	669.0	53.5	13	9	12											
675	664.0	58.5	78	22/0.1												
	659.0	63.5	17	29	51											
670	654.0	68.5	100/0.3													
	649.0	73.5	60/0.0													
665	644.0	78.5	60/0.0													

NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WEAVER, L. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B2-B	STATION 23+39	OFFSET 5 ft RT	ALIGNMENT -S1-
COLLAR ELEV. 719.7 ft	TOTAL DEPTH 73.5 ft	NORTHING 544,361	EASTING 1,448,134
DRILL RIG/HAMMER EFF./DATE TER373 DIETRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 03/16/17	COMP. DATE 03/16/17	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						
720																
	718.7	1.0	4	6	8											
	716.3	3.4	4	6	7											
715	714.3	5.4	3	5	6											
	711.3	8.4	5	5	4											
710	706.3	13.4	3	4	5											
	701.3	18.4	6	10	14											
705	696.3	23.4	3	6	7											
	691.3	28.4	6	7	13											
690	686.3	33.4	10	14	20											
	681.3	38.4	8	10	12											
685	676.3	43.4	19	31	34											
680	671.3	48.4	15	21	32											
	666.3	53.4	58	42/0.4												
675	661.3	58.4	100/0.3													
	656.3	63.4	100/0.2													
670	651.3	68.4	60/0.1													
	646.3	73.4	60/0.1													
665																

NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT BORE LOG

Table with header information: WBS 44475.1.2, TIP P-5705B, COUNTY MECKLENBURG, GEOLOGIST SCHLEMM, T.S., SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-, BORING NO. B2-C, STATION 23+40, OFFSET 10 ft LT, ALIGNMENT -S1-, GROUND WTR (ft) 0 HR. 13.0, COLLAR ELEV. 722.1 ft, TOTAL DEPTH 79.0 ft, NORTHING 544,350, EASTING 1,448,144, 24 HR. 12.0, DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017, DRILL METHOD SPT Core Boring, HAMMER TYPE Automatic, DRILLER EKLUND, M.A., START DATE 08/30/17, COMP. DATE 09/05/17, SURFACE WATER DEPTH N/A

Main bore log table with columns: ELEV (ft), DRIVE ELEV (ft), DEPTH (ft), BLOW COUNT (0.5ft, 0.5ft, 0.5ft), BLOWS PER FOOT (0, 25, 50, 75, 100), SAMP. NO., LOG, SOIL AND ROCK DESCRIPTION, DEPTH (ft). Includes blow count data and soil descriptions like ARTIFICIAL FILL, RESIDUAL SILT, SANDY SILT, WEATHERED ROCK, and CRYSTALLINE ROCK.

NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT CORE LOG

Table with header information: WBS 44475.1.2, TIP P-5705B, COUNTY MECKLENBURG, GEOLOGIST SCHLEMM, T.S., SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-, BORING NO. B2-C, STATION 23+40, OFFSET 10 ft LT, ALIGNMENT -S1-, GROUND WTR (ft) 0 HR. 13.0, COLLAR ELEV. 722.1 ft, TOTAL DEPTH 79.0 ft, NORTHING 544,350, EASTING 1,448,144, 24 HR. 12.0, DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017, DRILL METHOD SPT Core Boring, HAMMER TYPE Automatic, DRILLER EKLUND, M.A., START DATE 08/30/17, COMP. DATE 09/05/17, SURFACE WATER DEPTH N/A

Main core log table with columns: ELEV (ft), RUN ELEV (ft), DEPTH (ft), RUN (ft), DRILL RATE (Min/ft), RUN REC. (%), RUN RQD (%), SAMP. NO., STRATA REC. (%), STRATA RQD (%), LOG, DESCRIPTION AND REMARKS, DEPTH (ft). Includes core size HQ3, total run 26.7 ft, and detailed rock descriptions like WEATHERED ROCK and CRYSTALLINE ROCK.

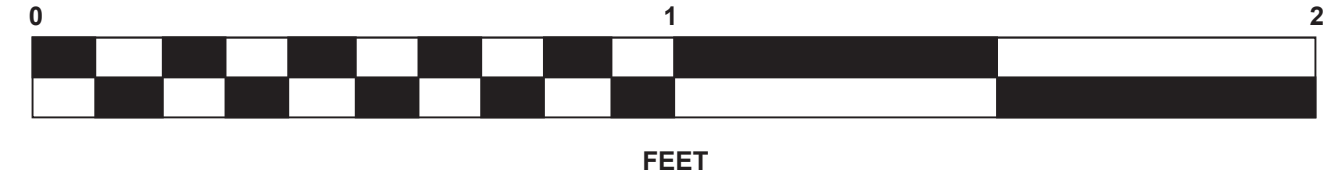
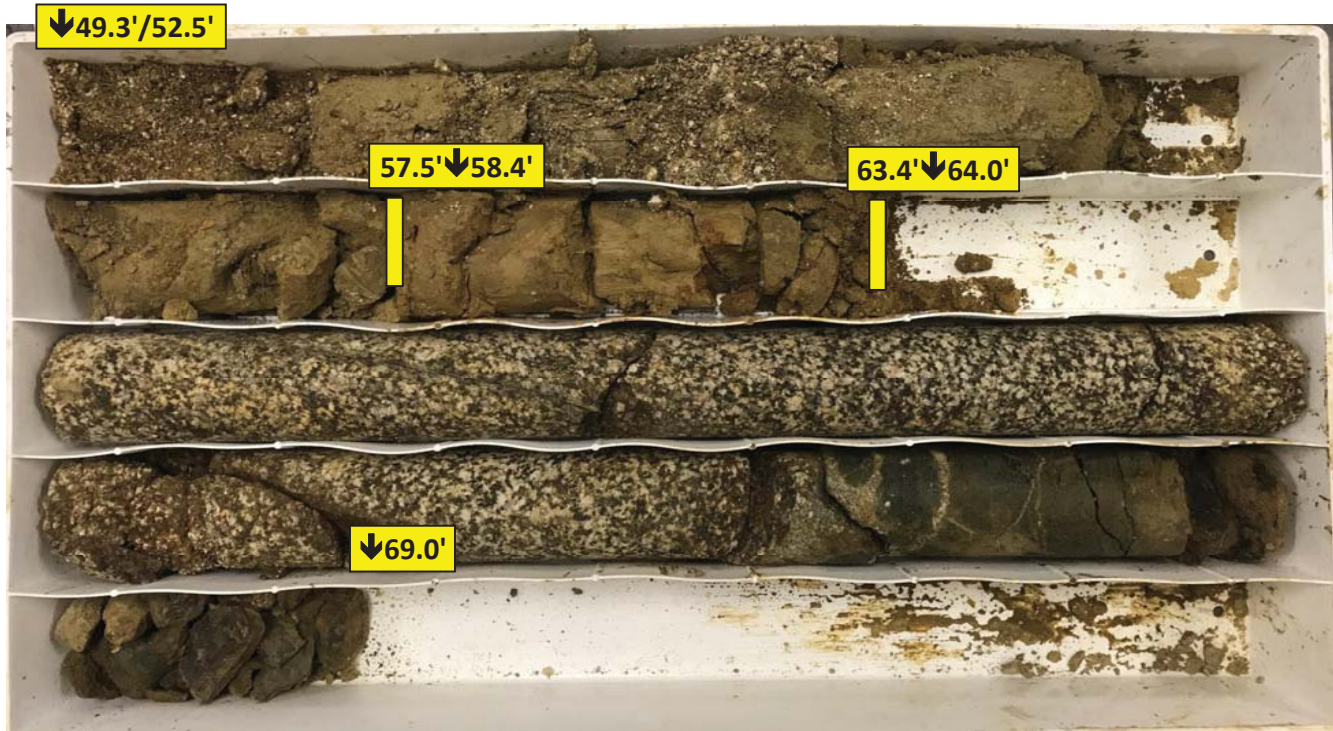
NCDOT CORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

CORE PHOTOGRAPHS

Project No. 44475.1.2 (P-5705B)
Charlotte Gateway Station- W. Trade Street Bridge -S1-

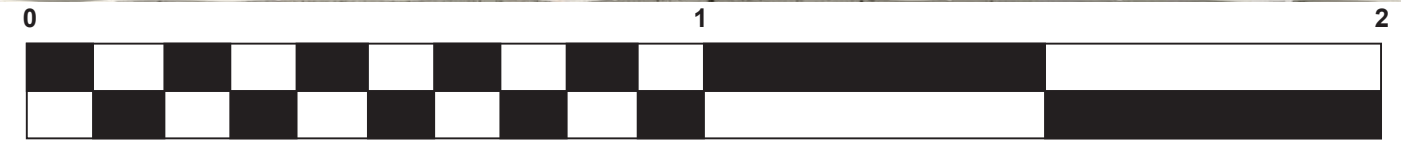
B2-C

BOX 1: 49.3 - 69.0 FEET



B2-C

BOX 2: 69.0 - 74.0 FEET



FEET

B2-C

BOX 3: 74.0 - 79.0 FEET



FEET

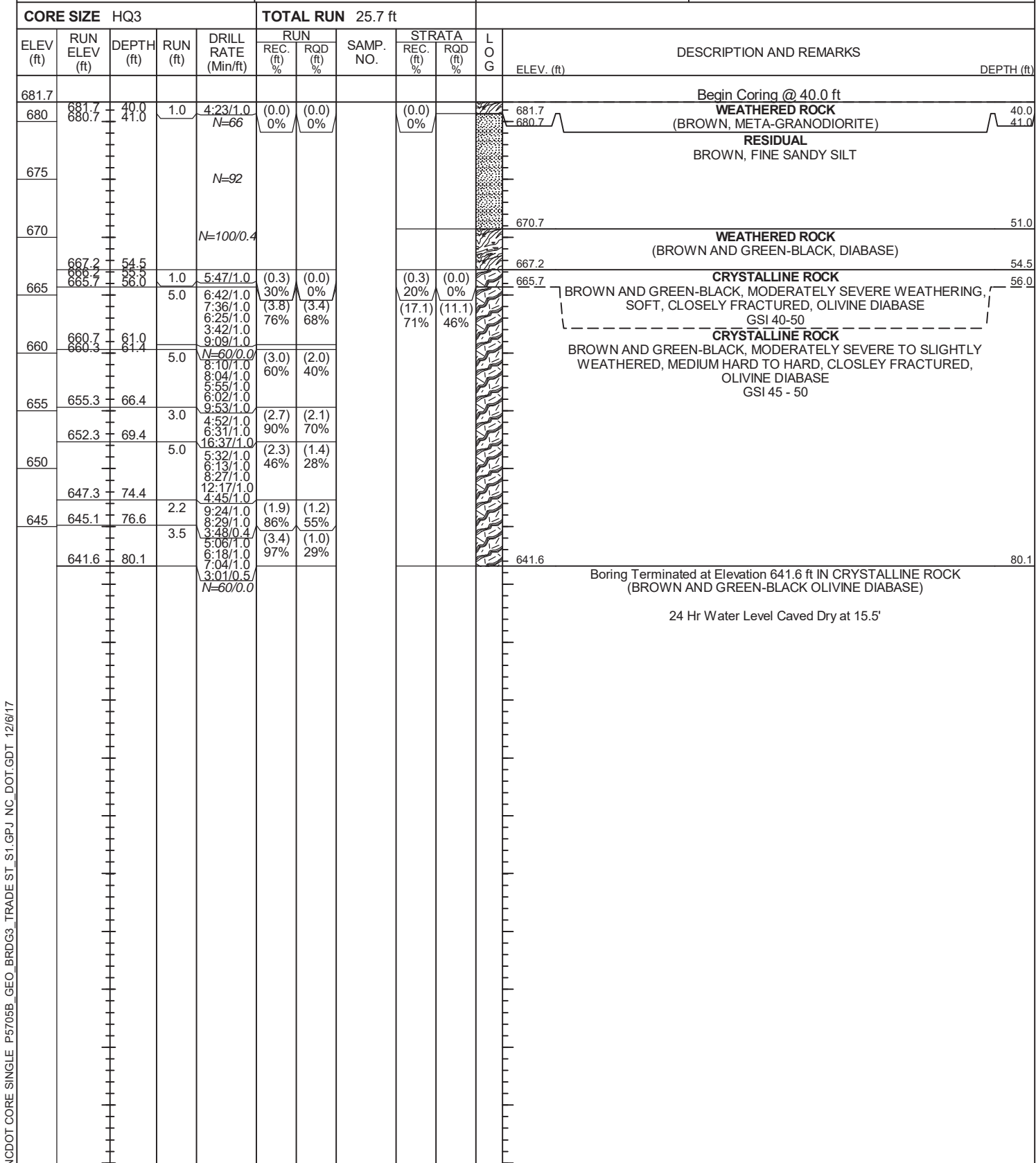
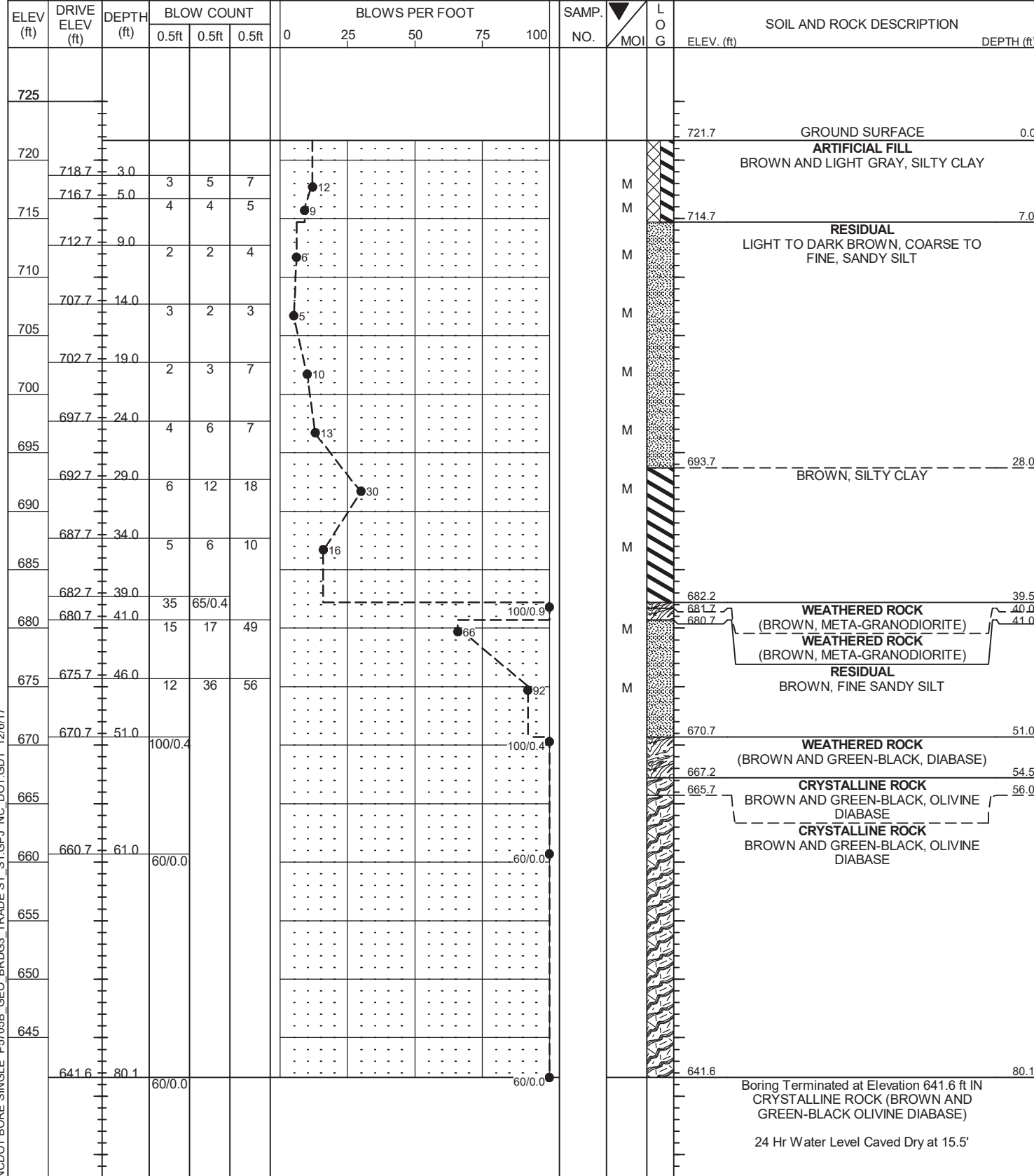
GEOTECHNICAL BORING REPORT
BORE LOG

GEOTECHNICAL BORING REPORT
CORE LOG

0011DEL_P28

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST SCHLEMM, T.S.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B2-D	STATION 23+39	OFFSET 12 ft RT	ALIGNMENT -S1-
COLLAR ELEV. 721.7 ft	TOTAL DEPTH 80.1 ft	NORTHING 544,366	EASTING 1,448,129
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER EKLUND, M.A.	START DATE 09/05/17	COMP. DATE 09/08/17	SURFACE WATER DEPTH N/A

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST SCHLEMM, T.S.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. B2-D	STATION 23+39	OFFSET 12 ft RT	ALIGNMENT -S1-
COLLAR ELEV. 721.7 ft	TOTAL DEPTH 80.1 ft	NORTHING 544,366	EASTING 1,448,129
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER EKLUND, M.A.	START DATE 09/05/17	COMP. DATE 09/08/17	SURFACE WATER DEPTH N/A

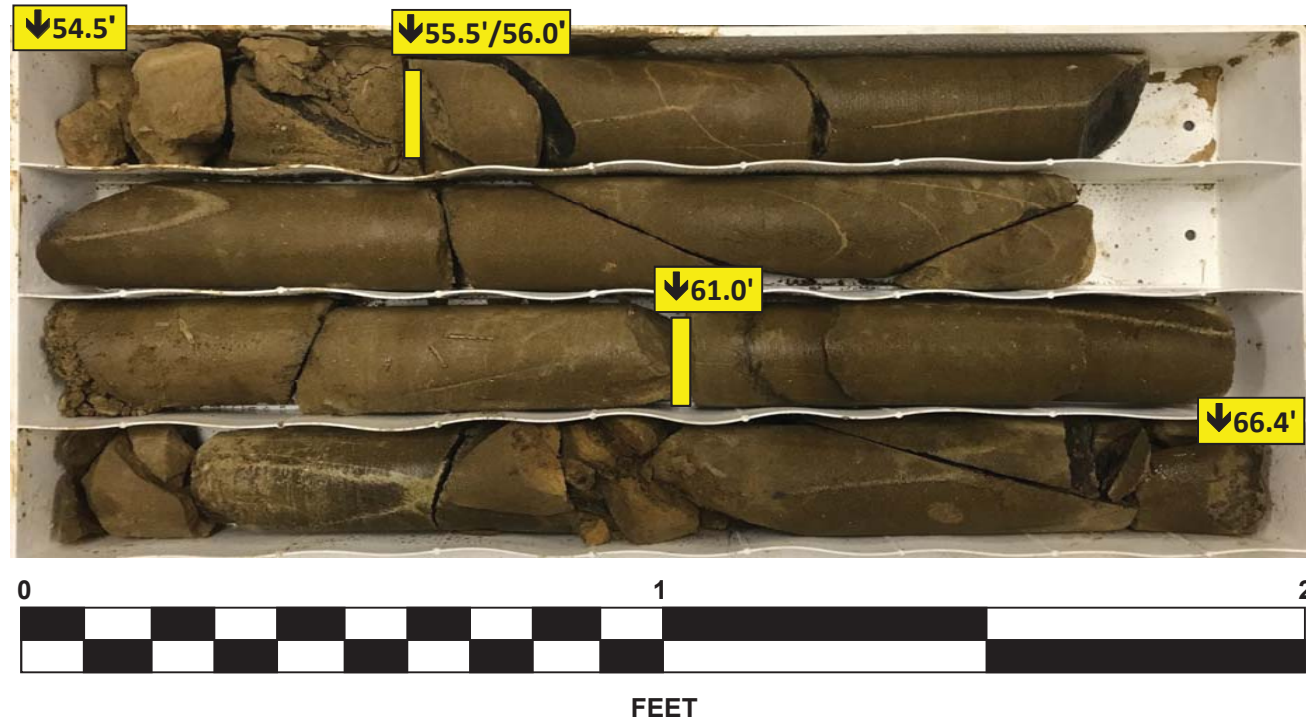


NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

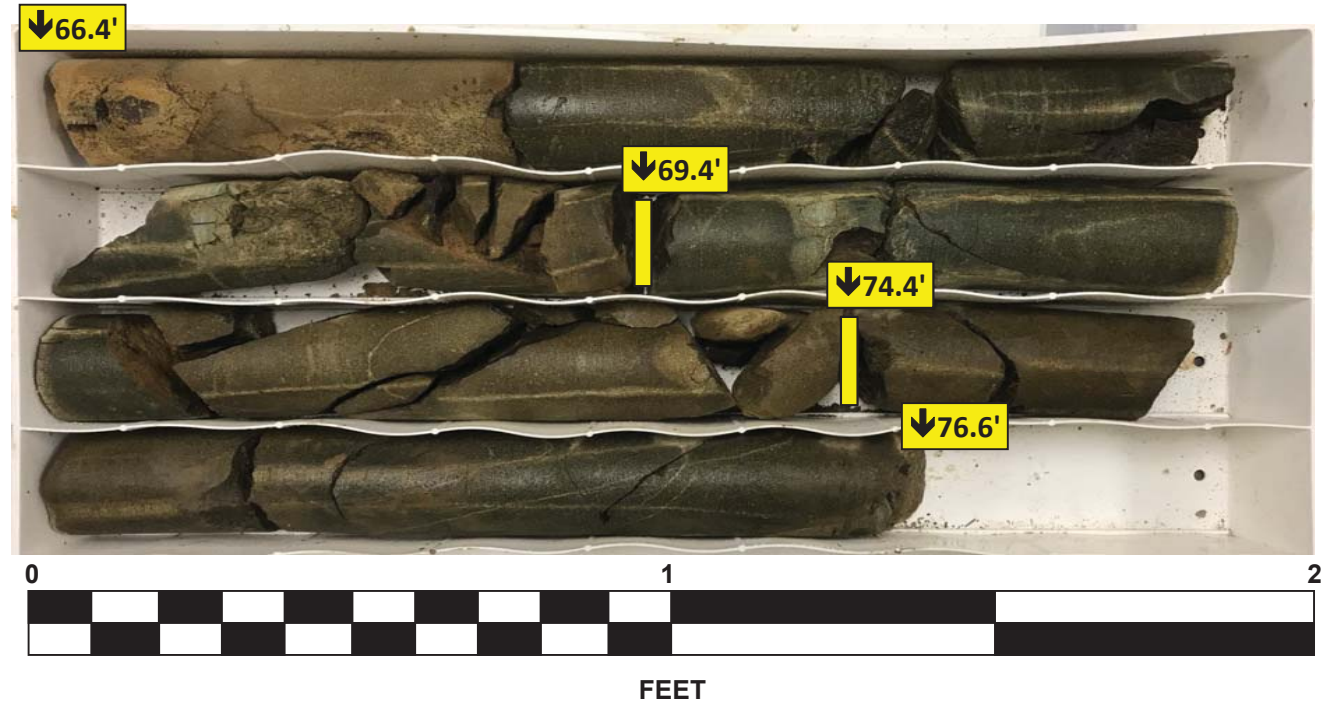
NCDOT CORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

CORE PHOTOGRAPHS
 Project No. 44475.1.2 (P-5705B)
 Charlotte Gateway Station- W. Trade Street Bridge -S1-

B2-D
 BOX 1: 54.5 - 66.4 FEET



B2-D
 BOX 2: 66.4 - 76.6 FEET



B2-D
 BOX 3: 76.6 - 80.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2		TIP P-5705B		COUNTY MECKLENBURG		GEOLOGIST WEAVER, L. A.										
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-						GROUND WTR (ft)										
BORING NO. B3-A		STATION 23+82		OFFSET 32 ft LT		ALIGNMENT -S1-										
COLLAR ELEV. 722.5 ft		TOTAL DEPTH 83.6 ft		NORTHING 544,304		EASTING 1,448,131										
DRILL RIG/HAMMER EFF./DATE TER373 DIETRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring		HAMMER TYPE Automatic												
DRILLER TURNAGE, J. R.		START DATE 03/23/17		COMP. DATE 03/24/17		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						
725																
720	721.5	1.0	4	6	4								M	722.5 GROUND SURFACE 0.0		
	719.2	3.3	4	5	5								M	720.5 ARTIFICIAL FILL 2.0		
	717.2	5.3	6	7	9								M	715.5 RESIDUAL 7.0		
715	714.2	8.3	6	7	8								M	711.5 ORANGE AND TAN, SILTY CLAY 11.0		
710	709.2	13.3	5	6	7								SS-23 24%	705.0 TAN AND WHITE, FINE SANDY CLAY 17.5		
705	704.2	18.3	4	5	8								SS-24 21%			
700	699.2	23.3	7	7	12								M			
695	694.2	28.3	17	20	79								M			
690	689.2	33.3	50	50/04									M	689.5 WEATHERED ROCK (META-GRANODIORITE) 33.0		
685	684.2	38.3	30	31	40								M	684.5 RESIDUAL 38.0		
680	679.2	43.3	23	24	36								M	TAN AND WHITE, SILTY FINE SAND		
675	674.2	48.3	30	37	50								M			
670	669.2	53.3	30	58	42/0.4								M	668.7 WEATHERED ROCK (META-GRANODIORITE) 53.8		
665	664.2	58.3	20	23	32								M	664.5 RESIDUAL 58.0		
660	659.2	63.3	20	20	26								M	TAN AND ORANGE, CLAYEY SAND WITH TRACE OF MANGANESE		
655	654.2	68.3	100/0.2										M	654.5 WEATHERED ROCK (META-GRANODIORITE) 68.0		
650	649.2	73.3	100/0.2										M			
645	644.2	78.3	100/0.4										M			
640	639.2	83.3	100/0.3										M	638.9 Boring Terminated at Elevation 638.9 ft IN WEATHERED ROCK (META-GRANODIORITE) 83.6		

NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2		TIP P-5705B		COUNTY MECKLENBURG		GEOLOGIST WEAVER, L. A.										
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-						GROUND WTR (ft)										
BORING NO. B3-B		STATION 23+86		OFFSET 2 ft LT		ALIGNMENT -S1-										
COLLAR ELEV. 719.4 ft		TOTAL DEPTH 78.7 ft		NORTHING 544,322		EASTING 1,448,106										
DRILL RIG/HAMMER EFF./DATE TER373 DIETRICH D-50 99% 03/09/2017		DRILL METHOD Wash Boring		HAMMER TYPE Automatic												
DRILLER TURNAGE, J. R.		START DATE 03/28/17		COMP. DATE 03/28/17		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						
720																
	718.4	1.0	5	7	5								M	719.4 GROUND SURFACE 0.0		
715	715.3	4.1	4	4	7								M	715.4 ARTIFICIAL FILL 4.0		
	713.3	6.1	5	5	6								M	RESIDUAL		
710	710.7	8.7	4	5	8								M	TAN, ORANGE AND WHITE, CLAYEY FINE SAND WITH TRACE OF MANGANESE		
705	705.7	13.7	6	10	12								M			
700	700.7	18.7	5	10	12								M			
695	695.7	23.7	11	18	29								M			
690	690.7	28.7	12	20	27								M			
685	685.7	33.7	10	12	15								M			
680	680.7	38.7	10	12	14								M	682.4 TAN AND WHITE, SILTY FINE SAND 37.0		
675	675.7	43.7	9	10	15								M			
670	670.7	48.7	13	15	19								M			
665	665.7	53.7	22	23	24								M			
660	660.7	58.7	17	23	23								M			
655	655.7	63.7	69	31/0.4									M	655.9 WEATHERED ROCK (META-GRANODIORITE) 63.5		
650	650.7	68.7	15	10	28								M	650.9 RESIDUAL 68.5		
645	645.7	73.7	100/0.3										M	645.9 TAN AND WHITE, SILTY FINE SAND 73.5		
	640.7	78.7	60/0.0										M	640.7 WEATHERED ROCK (META-GRANODIORITE) 78.7		
																Boring Terminated with Standard Penetration Test Refusal at Elevation 640.7 ft IN CRYSTALLINE ROCK (META-GRANODIORITE)

NCDOT BORE SINGLE P5705B_GEO_BRD03_TRADE ST. S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WERITZ, M. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. EB2-A	STATION 24+32	OFFSET 26 ft LT	ALIGNMENT -S1-
COLLAR ELEV. 725.6 ft	TOTAL DEPTH 48.9 ft	NORTHING 544,273	EASTING 1,448,091
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 94% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER DUGGINS, W. T.	START DATE 03/28/17	COMP. DATE 03/28/17	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				
730														
725	724.6	1.0	15	15	18								PAVEMENT SURFACE 0.0	
	722.6	3.0	12	14	13								ROADWAY EMBANKMENT PAVEMENT 1.1	
													ARTIFICIAL FILL 0.6' ASPHALT AND 0.5' STONE	
720													GRAY, SILTY FINE TO COARSE SAND WITH SOME GRAVEL 8.0	
	716.6	9.0	WOH	1	1								GRAY, SILTY FINE TO COARSE SAND WITH TRACE OF GRAVEL 11.5	
	712.6	13.0		2	3								CONCRETE SLAB 12.0	
710													RESIDUAL BROWN AND WHITE, FINE SANDY SILT	
	707.6	18.0		3	14									
705														
	702.6	23.0		5	19									
700														
	697.6	28.0		8	24									
	692.6	33.0		22	48									
695														
	687.6	38.0	100/0.4											
	682.6	43.0		38	64/0.3									
685														
	677.6	48.0		43	57/0.4									

NCDOT BORE SINGLE P5705B_GEO_BRD3_TRADE ST, S1.GPJ_NC_DOT.GDT 12/6/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 44475.1.2	TIP P-5705B	COUNTY MECKLENBURG	GEOLOGIST WERITZ, M. A.
SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND SAFETY IMPROVEMENTS - WEST TRADE STREET BRIDGE -S1-			GROUND WTR (ft)
BORING NO. EB2-B	STATION 24+29	OFFSET 1 ft LT	ALIGNMENT -S1-
COLLAR ELEV. 722.6 ft	TOTAL DEPTH 73.2 ft	NORTHING 544,292	EASTING 1,448,076
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 94% 03/09/2017		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER DUGGINS, W. T.	START DATE 03/27/17	COMP. DATE 03/28/17	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				
725														
	721.6	1.0		4	3	3							PAVEMENT SURFACE 0.0	
720													PAVEMENT 1.3	
	719.6	3.0		3	3	5							0.5' ASPHALT AND 0.8' STONE BASE 3.1	
	716.6	6.0											ROADWAY EMBANKMENT GRAY, SILTY FINE SAND WITH SOME GRAVEL	
	714.6	8.0		2	5	6							RESIDUAL RED-BROWN, SILTY CLAY 10.0	
715													BROWN, CLAYEY SILT	
	709.6	13.0		2	4	6								
710														
	704.6	18.0		3	6	14								
705														
	699.6	23.0		4	6	11								
700														
	694.6	28.0		8	19	25								
695														
	689.6	33.0		60	40/0.2									
690														
	684.6	38.0		43	30	29								
685														
	679.6	43.0		30	46	54								
680														
	674.6	48.0		11	25	45								
675														
	669.6	53.0		16	39	35								
670														
	664.6	58.0		19	32	40								
665														
	659.6	63.0		38	52	48/0.4								
660														
	654.6	68.0	100/0.5											
655														
	649.6	73.0		100/0.2										

NCDOT BORE SINGLE P5705B_GEO_BRD3_TRADE ST, S1.GPJ_NC_DOT.GDT 12/6/17

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 44475.1.2

TIP: P-5705B

COUNTY: MECKLENBURG

DESCRIPTION: Charlotte Gateway Station and Track and Safety Improvements - West Trade Street Bridge on -S1-

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (φ)	Effective Cohesion (psf)	Effective Friction (φ')
SS-16	-S1-	EB1-B	16' RT	18.6-20.1	A-5 (1)	42	9	38.7	23.1	25.8	12.4	0	95	67	42	40.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-17	-S1-	B1-B	16' RT	13.2-14.7	A-7-6 (3)	42	12	37.5	20.7	26.4	15.4	0	96	69	46	29.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-18	-S1-	B1-B	16' RT	33.2-34.7	A-4 (0)	34	5	43.8	24.4	21.3	10.5	0	95	64	36	18.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-20	-S1-	B2-A	29' LT	13.5-15.0	A-4 (0)	22	NP	45.7	22.3	22.0	10.0	0	100	68	37	15.3	N/D	N/D	N/D	N/D	N/D	N/D
SS-21	-S1-	B2-B	5' RT	13.4-14.9	A-5 (2)	42	9	34.9	21.5	29.5	14.1	0	96	70	48	27.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-23	-S1-	B3-A	32' LT	13.3-14.8	A-7-6 (5)	42	16	36.5	19.4	27.0	17.1	0	96	68	48	23.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-24	-S1-	B3-A	32' LT	18.3-19.8	A-6 (1)	40	11	43.7	22.1	22.4	11.8	0	93	60	37	21.3	N/D	N/D	N/D	N/D	N/D	N/D

N/D - NOT DETERMINED

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

SITE PHOTOGRAPHS

CHARLOTTE GATEWAY STATION AND TRACK IMPROVEMENTS - WEST TRADE STREET BRIDGE ON -S1-



PHOTOGRAPH NO. 1: EAST APPROACH TO END BENT NO. 1 ON -S1- ALIGNMENT, LOOKING WEST



PHOTOGRAPH NO. 3: ON WEST TRADE MEDIAN, NORTHWEST OF -S1- ALIGNMENT, LOOKING SOUTHEAST



PHOTOGRAPH NO. 2: ON WEST TRADE STREET MEDIAN, SOUTHEAST OF -S1- ALIGNMENT, LOOKING NORTHWEST



PHOTOGRAPH NO. 4: WEST APPROACH TO END BENT NO.2 ON -S1- ALIGNMENT, LOOKING EAST